

## **The Effectiveness Analysis of Using Angle Puzzle Tools on the Achievement of Students' Learning Outcomes**

<sup>1</sup>I Nyoman Sudyana, <sup>2</sup>Hartin Kurniawati, <sup>3</sup>Rachmat Susanto, <sup>4</sup>Irma Maria Dulame, <sup>5</sup>Antonius Rino Vanchapo

<sup>1</sup>Universitas Palangka Raya, Jl. Yos Sudarso, Palangka, Kec. Jekan Raya, Kota Palangka Raya, Kalimantan Tengah

<sup>2</sup>STAI Al-Hamidiyah, Jl. Raya Sawangan No.12, Rangkapan Jaya, Kec. Pancoran Mas, Kota Depok, Jawa Barat

<sup>3</sup>STIKes Serulingmas Cilacap, Jl. Raya Maos No. 505, Maos, Kampungbaru, Karangreja, Cilacap, Kabupaten Cilacap, Jawa Tengah

<sup>4</sup>STIE Bhakti Pembangunan Jakarta, Jl. Sabar Raya No.66, RT.6/RW.6, Petukangan Sel., Kec. Pesanggrahan, Kota Jakarta Selatan, Daerah Khusus Ibukota Jakarta

<sup>5</sup>STIKes Faathir Husada, Jl. Raya Saga - Bunar No.20, RT.001/RW.003, Saga, Kec. Balaraja, Kabupaten Tangerang, Banten  
[nyomansudyana@mipa.upr.ac.id](mailto:nyomansudyana@mipa.upr.ac.id)

### **Abstract**

The purpose of this study is to determine whether corner puzzle props are useful in enhancing student learning results. The study was conducted through experimental research using a posttest-only control design. The participants of the study were students, with class A being the experimental group and class B as the control group. The data collection method employed in this study was documentation and testing. The results of the analysis of academic performance using corner puzzle props indicated a significant improvement in the average academic performance of the experimental group, which was 69.83, compared to the control group, which was 62.07. The data was analyzed using a difference test (t test) on the right side. The research on academic performance revealed that the t-count was higher than the t-table. This implies that the average academic performance of students in class A (the experimental group) who were taught using corner puzzle props was greater than or equal to that of students who were not taught using corner puzzle props.

**Keywords:** Learning Outcomes, Students, Puzzle, Experimental

### **Abstrak**

Tujuan dari penelitian ini adalah untuk mengetahui apakah alat peraga corner puzzle bermanfaat dalam meningkatkan hasil belajar siswa. Penelitian dilakukan melalui penelitian eksperimen dengan menggunakan desain posttest-only control. Peserta penelitian adalah siswa, dengan kelas A sebagai kelompok eksperimen dan kelas B sebagai kelompok kontrol. Metode pengumpulan data yang digunakan dalam penelitian ini adalah dokumentasi dan tes. Hasil analisis prestasi akademik dengan menggunakan alat peraga corner puzzle menunjukkan adanya peningkatan yang signifikan pada rata-rata prestasi akademik kelompok eksperimen sebesar 69,83 dibandingkan dengan kelompok kontrol sebesar 62,07. Data dianalisis dengan menggunakan uji beda (uji t) pada ruas kanan. Penelitian tentang prestasi akademik mengungkapkan bahwa t-hitung lebih tinggi dari t-tabel. Artinya, rata-rata prestasi akademik siswa kelas A (kelompok eksperimen) yang diajar menggunakan alat peraga corner puzzle lebih besar atau sama dengan siswa yang tidak diajar menggunakan alat peraga corner puzzle.

**Kata Kunci:** Hasil Belajar, Siswa, Puzzle, Eksperimen

Copyright (c) 2023 I Nyoman Sudyana, Hartin Kurniawati, Rachmat Susanto, Irma Maria Dulame, Antonius Rino Vanchapo

---

Corresponding author: I Nyoman Sudyana

Email Address: [nyomansudyana@mipa.upr.ac.id](mailto:nyomansudyana@mipa.upr.ac.id) (Jl. Yos Sudarso, Palangka, Kec. Jekan Raya, Kota Palangka Raya)

Received 19 May 2023, Accepted 29 May 2023, Published 3 June 2023

## **INTRODUCTION**

In order to accomplish educational objectives that take place in a certain setting, education is primarily an interaction between instructors and pupils. The mutual influence between teachers and students is what is referred to as educational interaction. Due to their position as adults, greater experience, and increased control over beliefs, knowledge, and abilities, educators in this encounter

have the most significant influence. Judging from its narrow meaning, education is synonymous with school. In this regard, education is teaching held in schools as educational institutions (teaching). Education is all the influences that schools strive for in school-age children so that they have perfect cognitive abilities and mental readiness, which are useful for them later when they enter society and live as social beings. Education cannot be separated from learning or the learning process. Education can be defined as the enduring impact on conduct, knowledge, and cognitive abilities derived from experience. In fact, the learning process is the most crucial aspect of education. It is during this process that modifications in behavior are instilled (Kurniawati et al., 2022). Learning is deemed successful when alterations in behavior are aligned with the intended learning objectives. The learning process is essentially a form of communication. A communication process invariably involves three principal elements: the sender (the instructor), the receiver (the learners), and the message component, which is the subject matter. Occasionally, communication breakdowns occur during the learning process. This implies that not all information imparted by the instructor can be optimally grasped by the students, resulting in a lack of proper comprehension of the presented material. This can hinder the achievement of learning objectives (Kurniawati et al., 2023).

To prevent communication breakdowns, teachers should create engaging learning strategies by leveraging learning tools and media. Teachers have access to a wide variety of learning media today. Both traditional and modern (Tannady & Budi, 2023). Traditional-based learning media include pictures, posters, board games, puzzles, etc., while modern media are technology-based learning media, such as games on computers, PowerPoint, macromedia flash, and others. The teacher, as an educator, can take advantage of technological advances in creating learning media (Santrock, 2007). The learning method, message delivery, and learning material will all be significantly enhanced by the usage of learning media during the learning orientation stage (Sukmadinata, 2009). Props can provide direct experience for students. Because learning is actually a change in behavior through experience, both direct and indirect. Direct experience is experience that is done or experienced alone. Direct experience will leave an impression on someone. So that the use of props can have its own meaning for students, and of course it will be easier to remember than not using props. So, teaching aids or learning media can help students understand lessons that are considered difficult and make it easier for them to remember what the teacher says. Learning will be more effective if you use visual aids (Hamu et al., 2022). However, until now, the use of visual aids in schools has been rare, especially in learning mathematics. Often, the teacher only explains and then gives examples and practice questions without using props. Even though there are lots of math teaching aids that can be used for learning, one of them is the angle puzzle. This teaching aid can be used to learn mathematics on angles in triangles for schools. With the angle puzzle props, students can find angles in triangles. So that students can build their own concepts, which of course greatly impact their understanding. According to constructivism learning theory, students must build their own concepts to create knowledge according to their experiences (Ichsan et al., 2023).

The Angle Puzzle teaching aid is a teaching aid made by teachers at one school in Indonesia. This teaching aid is made to make math lessons more fun and provide hands-on experience in discovering the concept of angles in triangles. With this direct experience, it is hoped that students will gain in-depth knowledge that will not be easily forgotten (Somoyukti, 2010). Based on interviews with teachers, he said that in the learning process they still use conventional learning methods, namely that students are given formulas and examples of questions and how to solve them and never use math aids. This is due to the limited facilities at the school. As a result, many of their successes will still be below the established KKM, or 65, and the information presented by the teacher will be readily forgotten. Students encounter this issue when working with triangle angles. Many students are still unable to relate the idea of angles to triangles (Merlin et al., 2022). This is because these students do not master the concepts that have been taught by the teacher. They cannot remember the concept that was given by the teacher (Nugroho et al., 2023). To overcome this problem, educators can work around it by providing direct experiences that are hard to forget and are always remembered by students, for example, using corner puzzle props. By using corner puzzle props, students will understand more about the basic concept of angles in triangles. Because the concepts are already developed in the pupils, they will be able to comprehend the content as expected and be able to respond to a variety of questions.

## **METHOD**

The study employs a quantitative experimental research approach that involves a true experimental design and posttest-only control design. The design comprises two groups that are randomly selected, with one group receiving treatment and the other serving as the control. The group that receives treatment is referred to as the experimental group, while the control group does not receive treatment. The study focuses on all students in the class, and the experimental class (A) consists of 30 students, while the control class (B) has 27 students. The selection of the experimental and control classes is carried out using a random sampling technique that is simple. The data collection techniques utilized in the study include documentation and testing. The hypothesis test employed is the right-tailed test, which aims to determine whether there is a significant difference in student learning outcomes between the experimental and control groups. Before conducting the right-tailed test, the normality and homogeneity tests are carried out to establish whether the experimental and control groups are normally distributed and homogeneous. The same normality and homogeneity test formulas used in the initial stage are employed in this test. The subsequent stage involves the one-tailed t-test, which is utilized to test the hypothesis proposed before the study. The final step involves presenting and analyzing the data collected, followed by drawing conclusions.

## RESULT AND DISCUSSION

According to the data collected, it is evident that the average of the experimental group (A) is  $x = 58.13$ , while the average of the control group (B) is  $x_2 = 57.58$ . The sample sizes for group A and group B are  $n_1 = 30$  and  $n_2 = 27$ , respectively. The t-value obtained is 0.114, with a significance level of  $\alpha = 5\%$  and degrees of freedom (dk) of 57. The t-value obtained from the table is 2.002. Since  $t\text{-table} = -2.002 < t\text{-value} = 1.086$ , there is no significant difference in the means of the experimental and control groups. The analysis confirms that the data on student learning outcomes in both groups are normally distributed and have equal variances. To test the difference in the means of the two groups, a one-tailed t-test was conducted. The right-tailed test was used to determine if there is a difference in the mean learning outcomes of the experimental and control groups. It is concluded that there is a significant difference in the means of the two groups if  $t\text{-value} > t\text{-table}$ , with a significance level of  $\alpha = 5\%$  and  $dk = 30 + 27 - 2 = 55$ . On the other hand, it is stated that there is no mean value when t-value is less than t-table at a significance level of  $\alpha = 5\%$ , with  $dk = 30 + 27 - 2 = 55$ . According to the study, it was found that the average learning outcomes of the experimental group ( $x_1$ ) = 69.83 and the average of the control group ( $x_2$ ) = 62.07. The calculation results, with  $n_1 = 30$  and  $n_2 = 27$ , yielded  $t\text{-value} = 3.749$  and  $t\text{-table} = 1.673$ . Since t-value is greater than t-table,  $H_0$  is rejected, and  $H_1$  is accepted. This implies that the mean cognitive learning outcomes using corner puzzle props in the experimental group are higher than the mean value of learning without using props.

This research commenced by examining the initial competencies of students in the experimental and control groups. In order to determine if the initial abilities of the two groups were equivalent, the study employed the use of midterm test scores. Based on the preliminary analysis, the mean score for class A was 58.133 and class B was 57.852. Therefore, it can be observed that  $f\text{-count} < f\text{-table}$  for a significance level of 5%, indicating that both classes had comparable initial abilities. The even midterm test scores for both groups showed that they were in a normal and homogeneous state, and thus both groups were deemed appropriate for use as experimental and control groups. The preliminary analysis demonstrated that the data was normally distributed, both groups were homogeneous, and there was no difference in the means of the two groups. Consequently, it can be concluded that both groups had similar initial conditions. Subsequently, during the learning process, the experimental group received corner puzzle props while the control group did not. After the treatment, both groups were given the same post-test, which consisted of five descriptive questions.

The post-test, which contains five description questions, is the result of a trial analysis that has previously been tried out in a trial class. The trial class is a class that has received material on angles in a triangle, which consists of 32 students. While the questions tested were ten description questions. The examination questions that were previously attempted are then assessed for feasibility, including accuracy, consistency, level of complexity, and item differentiation power. Consequently, seven questions are viable for utilization, and five are opted for utilization as a subsequent

examination for both the experimental and controlled factions. The post-examination is executed after both the experimental and controlled factions accomplish their education. Based on the results of the assessments administered, the mean education outcome for the experimental faction (A) is 69.83 with a deviation standard of 7.808. The controlled faction's mean outcome value (B) is 62.07 with a deviation standard of 7.795. The ultimate data analysis indicates that  $t\text{-count} = 3.749$  and  $t\text{-table} = 1.673$  for a significance level of  $\alpha = 5\%$ . As  $t\text{-count} > t\text{-table}$ ,  $H_0$  is invalidated.

The learning outcomes of the pupils in the experimental and control groups varied, according to the research that was done. The increase in the experimental group's average learning outcome score when compared to the control group is proof of this. Compared to the control group, which had an average score of 62.07, the experimental group received an average score of 69.83. Thus, it can be concluded that using corner puzzle props to enhance student learning outcomes was successful. Between the experimental and control groups, the use of corner puzzle props significantly changed the average score. The transformation in the learning outcomes can be attributed to the incorporation of corner puzzle props in the experimental group which aided students in constructing their own knowledge in determining the number of angles in a triangle and focused their attention on comprehending the subject matter. This aligns with the constructivism theory which emphasizes that students must independently discover and transform the acquired information. Furthermore, it is also consistent with Bruner's theory which stresses that learning is more meaningful if students concentrate on understanding the structure of the subject matter.

## **CONCLUSION**

The proposed hypothesis can be accepted because the mean difference is significant and  $t\text{-count}$  is bigger than  $t\text{-table}$ . When compared to students who received instruction without the use of teaching aids, the average learning outcomes of students who received instruction utilizing corner puzzle props were better. Thus, it can be said that using angle puzzle props during studying helps to improve learning results. Props are a tool that teachers can utilize to aid in the teaching and learning process. It is hoped that teachers can teach pupils about thoroughly mastering concepts through mathematical learning activities. Learning to use visual aids can help students contextualize material in their environment. Students have a good mastery of concepts, so they understand what will be done when working in groups. Students can cooperate well and be more active in learning activities. Students can apply their mastery of mathematical concepts in everyday life.

## **REFERENCES**

- Kurniawati, H., Satyaninrum, I. R., Sayekti, S. P., & Rahmizar, P. (2022). Meningkatkan Kecerdasan Kinestetik pada Anak Usia Dini Melalui Outbound pada Siswa RA Al-Ghifary. *LITERASI: Jurnal Pendidikan Guru Indonesia*, 1(2), 128-137.

- Kurniawati, H., Rosidah, R., & Ernawati, E. (2023). Strategi Pengembangan Sosial Emosional Anak Berkebutuhan Khusus. *Mimbar Kampus: Jurnal Pendidikan dan Agama Islam*, 22(1), 42-60.
- Santrock, J. W. (2007). *Educational Psychology*. Jakarta: PT Fajar Interpratama Offset.
- Hamu, A., Kedang, S., & Vanchapo, A. (2022). Relationship of coping strategies with resilience, self-efficiency, and anxiety in the new normal period of the covid-19 pandemic on Teenagers In Kupang City. *JNKI (Jurnal Ners Dan Kebidanan Indonesia) (Indonesian Journal Of Nursing And Midwifery)*, 10(3), 198-204.
- Ichsan, I., Tannady, H., Nuryana, A., Fuadi, T. M., & Putra, P. (2023). Efforts to Build Nationalism Values to Vocational High School Students with The implementation of Character Education. *Jurnal Pendidikan dan Kewirausahaan*, 11(2), 361-372.
- Somoyukti, N. (2010). *Educational Theories*. Jogjakarta: Ar-Ruzz Media.
- Merlin, N. M., Vanchapo, A. R., Riantiaro, F. (2022). Influence of depression, stress, and anxiety on work performance among nurses in tuberculosis/HIV and COVID-19 units on Timor Island. *J Psy Nurs.*,13(2), 157-162.
- Nugroho, B. S., Tannady, H., Fuadi, T. M., Aina, M., & Anggreni, M. A. (2023). Role of Work Experience, Work Motivation and Educational Background on Teacher Performance at Vocational School. *Jurnal Pendidikan dan Kewirausahaan*, 11(2), 476-487.
- Sukmadinata, N. S. (2009). *The Foundation of Educational Process Psychology*. Bandung: PT Rosdakarya Offset.
- Tannady, H., & Budi, I. S. K. (2023). The Influence of Organization Culture, Work Environment and Leadership On Performance of Fulltime Lecturer (Case Study of Private Higher Education Institution which Supported by Corporate). *Journal on Education*, 5(4), 13020-13025.