**The 2nd International Conference on Mathematics Education and Technology (ICOMET) 2023**
ISSN 2986-8513 | pp. 296-301 (2023)
Publisher: University of Islam Malang

# THE INFLUENCE OF THE *CONTEXTUAL TEACHING AND LEARNING* (CTL) LEARNING MODEL ON STUDENTS' PROBLEM-SOLVING ABILITY AND LEARNING INDEPENDENCE

**Suhilda Aini[1], Jaka Wijaya Kusuma[2], Sarah Caesarani[3]**
[1,2,3]Mathematics Study Program, Faculty of Teacher Training and Education, Universitas Bina Bangsa, Serang, Indonesia
Email: hilda65aini@gmail.com

## Abstract

This study aims to determine the effect of the use of *contextual teaching and learning learning models* on students' mathematical problem solving abilities and student learning independence compared to conventional learning models. This type of research is a quasi-experiment with a research design, namely *the nonequivalent pretest-posttest control group design*. The population in this study was all grade VII students of SMP Negeri 1 Tirtayasa. Samples were taken using *purposive sampling techniques* so that the samples obtained were class VII-E students as a control class and class VII-F as an experimental class with 38 students in each class. The data collection technique uses 5 items of essay tests, students' mathematical problem-solving abilities, and learning independence questionnaires. The data were analyzed by data normality test, data homogeneity, t-test, as well as quantitative descriptive analysis. Results were obtained (1*) independent test sample t-test (*posttest) *in the experimental class and control class respectively obtained a calculated t-value* > ttable so that H0 was accepted and H1 was rejected. (2*) Independent sample t-test (*posttest) test in experimental class and control class obtained tcalculate value < ttable so that H0 was rejected and H1 was accepted. Moreover, (3) the results of the analysis of student learning independence were obtained on average by 75% with solid criteria.

**Keywords**: *Contextual Teching and Learning*, Problem solving ability, Student Learning Independence.

## INTRODUCTION

Mathematics is one of the fields of study that occupies a vital role in education and is taught to creative. In addition, mathematics is the basic science of the development of science and is very useful in life (Septian &; Rahayu, 2021) all levels of education. Mathematics as a science that must be mastered, because it supports other subjects (Davita &; Pujiastuti, 2020). The process of learning mathematics is not just a transfer of knowledge from teachers to students, but a process that is conditioned or pursued by teachers so that students are active in various ways to construct or build their knowledge. However, in fact, complaints from students about many mathematics lessons are challenging, uninteresting, and dull, giving rise to the opinion that students are not talented in doing math problems (Muslihah &; Suryaningrat, 2021).

Problem solving is one of the abilities that students must master, therefore problem solving is called the heart of mathematics. Through problem solving, it is expected that students can find the mathematical concepts they learn. Problem solving is not a general ability but rather a human activity that combines previously acquired concepts and rules (Purnamasari &; Setiawan, 2019)

The reality that occurs in the field based on the results of interviews conducted with teachers of grade VII mathematics subjects of SMP Negeri 1 Tirtayasa, it is generally

known that students' mathematical problem solving skills regarding mathematics learning are still relatively low. It is known that students have difficulties when solving problems related to daily life. This can be seen from the results of previous student tests, it can be seen that the scores on the problem solving questions are still low. Some students only memorize formulas and without knowing the initial steps in how to solve them. Students are not used to solving problems freely or seeking their approach to solving problems. Students can only do the same questions as the sample questions given by the teacher so that when doing questions that are different from the example questions, students can have difficulties.

Problem solving requires thoroughness, confidence, determination, curiosity and confidence in addition to problem solving. This attitude must be rooted in oneself and learning. Such an attitude is expected to develop and improve mathematical problem solving skills. The attitude in question is an attitude of independent learning. This self-learning attitude plays an active role in the process of completing other studies or daily problems (Asih &; Ramdhani, 2019)

Learning independence is influenced by internal and external factors. Internal factors refer to affective aspects in the form of will, motivation and emotions, and cognitive aspects related to the ability to focus attention on the problem-solving process. While external factors are related to the teacher's ability to build relationships with students and create a supportive environment. The characteristics of people who learn independently are as follows: (1) have self-determination; 2) creative and proactive; 3) responsible; 4) able to catch; 5) make your own decisions; and 6) able to overcome problems with his skills (Nasution &; Mujib, 2022).

Learning independence involves how students learn on a daily basis, how to adapt to rapidly changing circumstances, and how to take initiative when there are few or no opportunities to do so. With independence, students learn better, are able to effectively monitor, evaluate and manage their learning, save time effectively, are able to direct and control themselves in their thoughts and actions, and are empowered to trust others. A student with the ability to learn independently knows how to analyze complex problems, knows how to work alone or in a group, and dares to speak his mind. The importance of independence in learning mathematics due to the demands of the curriculum, allows students to face increasingly complex problems inside and outside the classroom, as well as reduce students' dependence on others in everyday life—changes in the Student Independence Model (Simamora et al., 2022).

However, the fact is that currently learning independence has not been socialized and developed among students, according to them teachers are the only source of knowledge that makes students dependent on others, according to (Jumaisyaroh &; Hasratuddin, 2016) especially teachers. Similarly, based on the results of an interview with one of the mathematics teachers at SMP Negeri 1 Tirtayasa on Monday, June 19, 2023, said that there are still many students who have not become independent learners. For example, (1) students do not prepare before school and study the material only during exams, (2) students do not understand the questions when doing the questions. applied to real problems when students have not been given similar examples of questions before, (3) and when asked to come to the front of the class to do a problem, students only expect new questions. friend to do it. Based on this, it can be concluded that the level of independence of students in learning mathematics is still low.

In addition to the lack of problem solving and independence in student learning, the learning model used by teachers is still

conventional. According to the results of an interview with a mathematics teacher at SMP Negeri 1 Tirtayasa on Monday, June 19, 2023, said that learning activities were running normally, the teacher explained the material and students listened to the explanation from the teacher, followed by asking practical questions. Learning cannot be done in accordance with the applicable RPP, the most important thing is that the explanation of the material reaches the students and students can absorb the information provided by the teacher.

The *Contextual Teaching and Learning* (CTL) model is a learning approach that emphasizes the process of involving students to find the material they learn, relate it, and apply it in everyday life. The role of students in contextual teaching and learning is to study topics discovering and building on concepts they learn on their own. Learning does not mean memorizing and remembering facts, but learning is an effort to optimize students' potential both in terms of cognitive, affective and psychomotor.

Model advantages *Contextual Teaching and Learning* (CTL) is all The material students learn can be Associated with experience live everyday, in student teaching and learning activities can get involved active deep Application from what he learned. *Contextual Teaching and Learning* (CTL) get Creating students who think creative By The science that he has studied. Learning saturation can be minimized by: Engaging students in experience Related with eye lesson. According to some existing studies, (Mamartohiroh et al., 2020) Type *Contextual Teaching And Learning* (CTL) has a good effect on students compared to conventional classrooms and students taught with teaching models and models *Contextual Teaching And Learning* (CTL) has higher problem-solving skills than students using conventional learning models.

Based on the background above, this study aims to determine the influence of the *contextual teaching and learning* (CTL) learning model on students' problem-solving ability and learning independence.

## RESEARCH METHODS

The subjects of this study were 38 students of class VII F SMP Negeri 1 Tirtayasa for the 2022/2023 academic year. The type of research used is quasi-experiment or known as pseudo-experiment. The research design used in this study is *the nonequivalent pretest-posttest control group design* (control group design *pretest-posttest* not equivalent). This design involved two groups, namely the experimental group and the control group that received the conventional learning model. According to Sugiyono (2022) The form of this research design is described as follows:

Experimental Class: $O_1 \ X \ O_2$

Control Class : $O_1 \ - \ O_2$

Information:

$O_1$ : *Pretest* students' mathematical problem-solving ability

$O_2$ : *Posttest* students' mathematical problem-solving ability

$X$ : Application of *the Contextual Teaching and Learning learning model* (CTL)

$-$ : Application of the Conventional model

---: Sampling is not random

*Data Collection Techniques*

Data collection techniques in this study are in the form of tests, questionnaires, observations, interviews, and documentation. The test given is a description question or essay that is adjusted to indicators of students' mathematical problem-solving ability. The tests in this study are divided into two kinds of tests, namely Pretest and posttest. Questionnaires are used to determine the level of learning independence of students.

This study used non-participant observation, researchers only observed the ongoing learning process. Interviews were conducted with mathematics teachers of grade VII. The researcher will document all classroom activities and observations in the appendix to the research report.

*Data Analysis Techniques*

1. *Test Data Analysis Techniques*

   Data analysis in this study used descriptive techniques and statistical analysis tests. Descriptive techniques are obtained through pretest and posttest results in the experimental class and control class groups in the form of mean values, minimum values, maximum values, and standard deviations. Furthermore, statistical analysis tests are obtained through normality tests, homogeneity tests, and T tests.

2. *Questionnaire Data Analysis Techniques*

   The research questionnaire uses a likert scale in the form of a *checklist* (√) consisting of two types of questions, namely positive questions and negative questions with 4 categories of responses chosen, namely Strongly Agree (SS), Agree (S), Disagree (TS), and Strongly Disagree (STS). The weight of each question on the scale of student attitudes towards student learning independence through *Contextual Teaching and Learning* (CTL) learning is presented in the table after which the percentage of student attitudes towards the implementation of learning is seen.

## RESULTS AND DISCUSSION

***Table 1. Test Results of Hypothesis 1***

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference Lower |
| Nilai | Equal variances assumed | .000 | .992 | .034 | 74 | .973 | .079 | 2.314 | -4.531 |
| | Equal variances not assumed | | | .034 | 74.000 | .973 | .079 | 2.314 | -4.531 |

Based on table 6 above, *Sig.* (2-tailed) *of 0.973 > 0.05 was obtained so that it was* $H_0$ accepted and rejected. Because it was accepted and rejected. So it can be concluded that there is no difference in the initial ability of solving mathematical problems of students in the experimental class and the control class.$H_1 H_0\ H_1$

***Table 2. Results of Hypothesis Test 2***

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference Lower | Upper |
| Nilai | Equal variances assumed | .668 | .416 | 24.942 | 74 | .000 | 54.895 | 2.201 | 50.509 | 59.280 |
| | Equal variances not assumed | | | 24.942 | 71.461 | .000 | 54.895 | 2.201 | 50.507 | 59.283 |

Based on table 7 above, *Sig.* (2-tailed*) of 0.000* < 0.05 was obtained so that it was $H_0$ rejected and accepted. Because it was rejected and accepted. then it can be concluded that there are differences in mathematical problem solving abilities using the $H_1 H_0 H_1$*Contextual Teaching and Learning* (CTL) learning model with conventional learning models

***Table 3. Descriptive Test Results of Questionnaire***

**Statistics**

| | | konvensional | Ctl |
|---|---|---|---|
| N | Valid | 38 | 38 |
| | Missing | 0 | 0 |
| Mean | | 64.2105 | 70.6316 |
| Std. Deviation | | 6.10342 | 6.08685 |
| Minimum | | 54.00 | 60.00 |
| Maximum | | 78.00 | 88.00 |

Based on table 8 above, it can be seen from 38 respondents who filled out the learning independence questionnaire in the experimental class had an average score of 70,632 with a maximum value of 88 and a minimum value of 60. While the control class learning independence questionnaire had an average score of 64,211 with a maximum score of 78 and a minimum score of 54.

It can be seen that the percentage results on each indicator of learning independence

conducted in the experimental class as many as 38 respondents.

***Table 4. Questionnaire Percentage Results***

| No | Learning Independence Indicators | Max Score | Experimental Class Percentage | Criterion |
|---|---|---|---|---|
| 1 | Learning initiatives | 608 | 80% | Strong |
| 2 | Diagnosing needs | 456 | 77% | Strong |
| 3 | Setting learning goals/objectives | 608 | 71% | Strong |
| 4 | Viewing adversity as a challenge | 304 | 75% | Strong |
| 5 | Utilize and search for relevant sources | 304 | 73% | Strong |
| 6 | Choosing and implementing learning strategies | 304 | 75% | Strong |
| 7 | Evaluate learning processes and outcomes | 304 | 74% | Strong |
| 8 | *Self efficacy (Self-concept)* | 456 | 73% | Strong |
| Average | | | 75% | Strong |

Based on the percentage results in table 9 shows that indicators 1, 2, 3, 4, 5, 6, 7, and 8 have substantial criteria. The most significant percentage of learning initiative indicators is 80%. While the smallest percentage of indicators set learning targets / goals of 71%.

## CONCLUSION

The results of research at SMP Negeri 1 Tirtayas in grade VII regarding the influence of *the contextual teaching and learning (CTL) learning model* on students' problem-solving ability and learning independence were obtained conclusions (1) There is no significant difference in initial mathematical ability between the *Contextual Teaching and Learning model and* the Conventional learning model. (2) There is a significant difference between the *Contextual Teaching and Learning model and* the Conventional learning model on students' mathematical problem solving abilities. (3) Student learning independence shows vital criteria in the use of *contextual teaching and* learning learning models, because the learning model used requires students to be more active in obtaining more in-depth material.

## REFERENCES

Asih, N., & Ramdhani, S. (2019). Peningkatan Kemampuan Pemecahan Masalah Matematis dan Kemandirian Belajar Siswa Menggunakan Model Pembelajaran Means End Analysis. Mosharafa: Jurnal Pendidikan Matematika, 8(3), 435–446. https://doi.org/10.31980/mosharafa.v8i3.534

Davita, P. W. C., & Pujiastuti, H. (2020). Anallisis Kemampuan Pemecahan Masalah Matematika Ditinjau Dari Gender. Kreano, Jurnal Matematika Kreatif-Inovatif, 11(1), 110–117. https://doi.org/10.15294/kreano.v11i1.23601

Gunawan, G., Putri, S. A., Untarti, R., & Kusuma, J. W. (2022). CONTEXTUAL BASED MODULE: IMPLEMENTATION ON CRITICAL THINKING SKILLS. International Journal of Multidisciplinary Research and Literature, 1(3), 327-334.

Gunawan, G., Ulia, N., Iqbal, A. M., & Kusuma, J. W. (2022). DEVELOPMENT OF AUGMENTED REALITY LEARNING MEDIA TO IMPROVE MATHEMATIC SPATIAL ABILITY. International Journal of Economy, Education and Entrepreneurship, 2(3), 816-824.

Jumaisyaroh, T., & Hasratuddin, E. E. N. (2016). Peningkatan Kemampuan Berpikir Kritis Matematis Dan Kemandirian Belajar Siswa Smp Melalui Pembelajaran Berbasis Masalah. AdMathEdu : Jurnal Ilmiah Pendidikan Matematika, Ilmu Matematika dan Matematika Terapan, 5(1). https://doi.org/10.12928/admathedu.v5i1.4786

Mamartohiroh, S., Muhandaz, R., & Revita, R. (2020). Pengaruh Model Contextual Teaching and Learning Terhadap Kemampuan Pemecahan Masalah Matematis Berdasarkan Kemandirian Belajar Siswa SMP/MTs. Tarbawi : Jurnal Ilmu Pendidikan, 16(1), 46–58. https://doi.org/10.32939/tarbawi.v16i01.524

Muslihah, N. N., & Suryaningrat, E. F. (2021). Model Pembelajaran Contextual

Teaching and Learning terhadap Kemampuan Pemecahan Masalah Matematis. Plusminus: Jurnal Pendidikan Matematika, 1(3), 553–564. https://doi.org/10.31980/plusminus.v1i3.1445

Nasution, S. R., & Mujib, A. (2022). Peningkatan Kemampuan Pemecahan Masalah Matematis dan Kemandirian Belajar Siswa Melalui Pembelajaran Berbasis Masalah. Edumaspul: Jurnal Pendidikan, 6(1), 40–48. https://doi.org/10.33487/edumaspul.v6i1.1850

Purnamasari, I., & Setiawan, W. (2019). Analisis Kemampuan Pemecahan Masalah Matematis Siswa SMP pada Materi SPLDV Ditinjau dari Kemampuan Awal Matematika. Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang, 3(2), 207. https://doi.org/10.31331/medivesveteran.v3i2.771

Septian, A., & Rahayu, S. (2021). Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa melalui Pendekatan Problem Posing dengan Edmodo. Prisma, 10(2), 170. https://doi.org/10.35194/jp.v10i2.1813

Simamora, N. I., Simamora, E., & Dewi, I. (2022). Pengembangan Perangkat Pembelajaran Berbasis Pendekatan Matematika Realistik Menggunakan Hypercontent untuk Meningkatkan Kemampuan Pemecahan Masalah Dan Kemandirian Belajar Siswa. Jurnal Cendekia : Jurnal Pendidikan Matematika, 6(3), 2635–2651. https://doi.org/10.31004/cendekia.v6i3.1740

Sugiyono. (2022). Metode Penelitian Kuantitatif. bandung: alfabeta.

Wigati, M., Gunawan, G., Akhsani, L., & Kusuma, J. W. (2023). DESCRIPTION OF UNDERSTANDING MATHEMATICAL CONCEPTS ABILITY BASED ON BRAIN DOMINATION. International Journal of Multidisciplinary Research and Literature, 2(2), 242-249.