International Journal of Research in Mathematics Education
Vol. 2 No. 1, July 2024, 71-78
Universitas Islam Negeri Prof. K.H. Saifuddin Zuhri Purwokerto
e-ISSN: 3025-7638, p-ISSN: 3025-1842

Enhancing Students' Independent Learning: Integrating Problem-Based Learning with TaRL and CRT Strategies

Evi Zulfiani Santoso[1]✉

[1]*Universitas Muhammadiyah Purwokerto, Indonesia*

✉ *Corresponding email: evizulfiani@gmail.com*

Received June 9, 2024
Accepted July 15 , 2024
Published July 31, 2024

https://doi.org/10.24090/ijrme.v2i1.11283

Abstract: Observations in Class X E9 at SMA Negeri 5 Purwokerto revealed a significant issue in the mathematics learning process: students' lack of independent learning skills. Many students struggled with self-evaluation and showed insufficient readiness before class sessions. This was evident as only a few students prepared themselves before lessons began. When assignments were given, many relied on their peers instead of attempting the tasks independently. For instance, students often copied answers from classmates during practice sessions. To address this issue, a teaching method that actively engaged students and encouraged them to independently utilize their problem-solving skills was very important. The researchers implemented classroom action research as the proposed solution. This classroom action research followed a four-stage cycle: planning, action, observation, and reflection. The study aimed to enhance independent learning among students by implementing a Problem-Based Learning (PBL) model integrated with Teaching at the Right Level (TaRL) and Culturally Responsive Teaching (CRT) strategies. Finally, focusing on the Probability material in Class X E9, the research demonstrated a 39.6% increase in students' independent learning from cycle I to cycle III.

Keywords: culturally responsive teaching (crt); independent learning; mathematics; problem-based learning (PBL); teaching at the right level (TaRL)

A. Introduction

Pane & Darwis Dasopang (2017) interpret learning as a process of changing behavior as a result of individual interactions with their environment. According to Mayangsari (2015), learning is a process where a person's behavior changes due to experience to gain knowledge, skills and attitudes from someone who carries out learning activities. Mathematics is a science that studies order, and also concepts that are arranged hierarchically, structured and systematically starting from the simplest concepts to the most complex concepts (Hasratuddin, 2014). By teaching mathematics, it is hoped that it can foster students' logical, critical and creative thinking skills, so that students have the ability to solve problems (F Assyifa et al., 2020). To develop these abilities, the ability to develop is needed, one of which is independence. In interpreting independent learning, it is not just students who learn alone, but rather students who learn with self-awareness to make the most important decisions to meet their learning needs (Wulandari, 2022). The mathematical problems solving ability can be increased by mind map learning methods, it is important to use several learning methods to

make students more interest and problems solving ability increase(Ika Purwati & Maria Ulpah, 2023). Beside that, the variety of learning methods can make students' mathematical communication skills increase (Khaq & Febriana, 2023).

The term "independence" indicates confidence in one's own ability to solve problems without special help from others and a reluctance to be controlled by others. Independence is an individual's ability to solve problems on their own without always depending on others, being able to make decisions, having initiative, and also creative wherever the individual is (Woi & Prihatni, 2019). According to Rantina (2015), independence is the ability to direct and control one's own feelings in thinking and acting, being responsible, having self-confidence, being disciplined. Independence in learning mathematics is observed from the indicators: 1) having a sense of responsibility, 2) not depending on others, 3) having one's own initiative, and 4) self-confidence. (Reski et al., 2019).

The Teaching at the Right Level (TaRL) approach is an approach that is guided by the level of students' abilities (Edizon & Maharani Zan, 2023). Implementing TaRL requires teachers to identify students' interests and learning outcomes through diagnostic assessments. The results of this assessment will be used by teachers as a reference in planning learning according to the characteristics of students (Jauhari et al., 2023). The Culturally Responsive Teaching (CRT) approach is an approach in the world of education that focuses on recognizing, respecting and responding to the diversity of cultures, backgrounds and experiences of students in the learning process (Sari et al., 2023). Meanwhile, according to Gay in research by Inayah et al., (2023) CRT is a learning approach that uses cultural knowledge, student experience and student learning styles to create more meaningful learning.

According to Isnawati et al., (2015), The cause of low quality education can occur due to a lack of independent learning that is driven by the passion and enthusiasm that should exist within a person. The results of observations that have been made in class X E9 SMA Negeri 5 Purwokerto show that the problem that exists in Mathematics learning is the lack of student independence, many students do not carry out independent evaluations individually and according to their abilities. The learning process implemented by the teacher has basically stimulated students to actively learn to use the internet, such as instructing students to search for material on the internet, but in reality students use the internet for other things and depend on their friends to get material. In fact, students' learning independence during the learning process is still relatively low. There are still students who lack awareness in preparing themselves before the learning process begins. This can be seen when the teacher starts learning activities, only a small number of students prepare themselves before the learning process begins. When students are given an assignment, they don't do it straight away but still depend on their friends, for example, if they are given practice questions, they still look at their friends' answers. The lack of students' sense of responsibility in collecting assignments can be seen when students do not immediately collect the assignments before the teacher orders them.

This means that low learning independence is likely to have an impact on learning success or learning achievement. Seeing this, learning is needed that actively involves students and can make students dare to try to use their own abilities in solving problems. Therefore, the author is interested in conducting classroom action research with the research title "Enhancing

Students' Independence of Learning: Problem-Based Learning Model Integrated with TaRL and CRT Strategies"

B. Methods

This research was carried out collaboratively, the process involving lecturers, teachers and colleagues who were tasked with helping make observation activities easier, more thorough and objective. This research was also carried out in a participatory manner, the research carried out its own observations when carrying out actions which included determining topics, problem formulation, planning, carrying out analysis and research reports. This classroom action research is divided into four stages, namely planning, action, observation and reflection.

The subjects of this research were class X E9 students at SMA Negeri 5 Purwokerto. There were 36 students in the class, 21 girls and 15 boys. Meanwhile, the mathematics teacher who was used as the research subject was the researcher himself. This research was carried out in class X E9 of SMA Negeri 5 Purwokerto in the even semester. This research was carried out during teaching hours so that it did not interfere with other lessons. The placement for class This class was chosen as a research location because of the low level of student independence and student learning achievement which was not yet optimal.

In this research, researchers collaborated with observers of teacher and student activities. The action taken was the application of the Problem Based Learning learning model accompanied by the TaRL and CRT approaches as an effort to increase student independence and mathematics learning outcomes for class X E9 SMA Negeri 5 Purwokerto. Observations are carried out by observers by making observations regarding the implementation of learning and student independence by giving a mark 0 if they do not do it and 1 if they do this aspect of independence. Observation assessment by providing a checklist on the prepared observation sheet. The observation sheet that will be used in this research is the observation sheet for student learning independence. The researcher prepared a grid of observation sheets before carrying out the research. The target indicators for the success of student learning independence in this research are as follows:

Table 1. Target of Success Indicators

Number	Indicator	Target
1	Have a sense of responsibility	75%
2	Does not depend on others	75%
3	Has own initiative	75%
4	Confidence	75%

Data processing and analysis in the research process is carried out using descriptive, critical and comparative analysis. The steps are as follows: based on observation data, the independence value of each student for each indicator is processed by adding up the scores obtained to determine the total value of learning independence for each student indicator; After obtaining the total independence score for each indicator for each student, the next step is to compare it with the expected maximum score; calculate the percentage of student independence using the formula:

$$\frac{\Sigma\ Score\ for\ each\ indicator}{\Sigma\ indicator \times\ \Sigma\ number\ of\ students} \times 100\%$$

C. Results and Discussion

1. Cycle I

a. Result

At the first cycle meeting, 30 students attended. The results of observations of students' learning independence during learning are as follows:

Table 2. Data from Cycle I Observations

Number	Indicator	Cycle I	Target
1	Have a sense of responsibility	66,6%	75%
2	Does not depend on others	33,3%	75%
3	Has own initiative	13,3%	75%
4	Confidence	43,3%	75%
Average		39,1%	75%

b. Discussion

The implementation of cycle I was carried out by grouping students based on the initial test (TaRL), the form of LKPD questions that were appropriate to the grouping (TaRL) and inserting cultural values in the form of simple habits in everyday life (CRT). The results of observations in cycle I showed a relatively low independence score with an average score of 39.1%. The highest indicator score was a sense of responsibility, namely 66.6%, and the lowest was having one's own initiative, 13.3%. This is because during the observations carried out in the first cycle of learning, students were already responsible for the tasks given but were still very lacking in terms of initiative to solve problems. Students still need a lot of help from teachers or asking friends even in assignments given individually. Because the results obtained by students' independent learning have not reached the target, the cycle continues to cycle II with reflection and improvement.

2. Cycle II

a. Result

At the second cycle meeting, 30 students attended. The results of observations of students' learning independence during learning are as follows:

Table 3. Data from Cycle II Observations

Number	Indicator	Cycle II	Target
1	Have a sense of responsibility	73,3%	75%
2	Does not depend on others	60%	75%
3	Has own initiative	33,3%	75%
4	Confidence	53,3%	75%
Average		54,9%	75%

b. Discussion

The implementation of cycle II was carried out by grouping students based on the initial test (TaRL), the form of LKPD questions that were appropriate to the grouping (TaRL), choosing evaluation questions according to ability (TaRL) and inserting cultural values in the form of traditional Banyumas and Wayang games (CRT). The results of observations in cycle II showed that the independence score increased for each indicator with an average score of 54.9%. The highest indicator score was a sense of responsibility, namely 73.3%, and the lowest was having one's own initiative, 33.3%. The score for the initiative indicator itself is still relatively low because there are still many students who have not done their individual assignments independently and still ask other people for help. Even though the scores for each indicator and the average score have increased, these results have not met the initial target so the cycle continues to cycle III with reflection and improvement.

3. Cycle III

a. Result

At the cycle III meeting the number of students attending was 33 people. The results of observations of students' learning independence during learning are as follows:

Table 4. Data from Cycle III Observations

Number	Indicator	Cycle III	Target
1	Have a sense of responsibility	78,7%	75%
2	Does not depend on others	81,8%	75%
3	Has own initiative	78,7%	75%
4	Confidence	75,7%	75%
Average		78,7%	75%

b. Discussion

The implementation of cycle III was carried out by grouping students based on the initial test (TaRL), the form of LKPD questions that were appropriate to the grouping (TaRL), and inserting cultural values in the form of Wayang and regional languages (CRT). The results of observations in cycle III showed that the independence score increased for each indicator with an average score of 78.7%. The highest indicator score was a sense of responsibility, namely 78.7%, and the lowest was self-confidence, 75.7%. As the cycle is carried out, researchers as teachers who teach always insert character strengthening in the form of independence which convinces students that mistakes when working on questions are normal so that participants must have the courage to write their own answers. In cycle III, the level of independence of students in class X E9 had reached the target, so the research cycle was stopped.

D. Conclusion

From the results of cycle I, cycle II, and cycle III, a recapitulation of the presentation of student learning independence was obtained as follows:

Table 5. Recapitulation of the Percentage of Student Learning Independence

Number	Indicator	Cycle I	Cycle II	Cycle III	Target
1	Have a sense of responsibility	66,6%	73,3%	78,7%	75%
2	Does not depend on others	33,3%	60%	81,8%	75%
3	Has own initiative	13,3%	33,3%	78,7%	75%
4	Confidence	43,3%	53,3%	75,7%	75%
Average		39,1%	54,9%	78,7%	75%

Based on the results of the analysis and discussion carried out, the conclusion that can be put forward in this research is that the application of the Problem Based Learning model accompanied by the TaRL and CRT approaches in Probability material in class X E9 SMA Negeri 5 Purwokerto can increase students' learning independence. Learning with the Problem Based Learning model accompanied by TaRL and CRT approaches in Probability material in class X E9 SMA Negeri 5 Purwokerto can increase the percentage of students' learning independence from cycle I to cycle III by 39.6%.

References

Edizon, & Maharani Zan, A. (2023). Penerapan Model Discovery Learning Terintegrasi TaRL untuk Meningkatkan Motivasi dan Hasil Belajar Matematika Peserta Didik. *Jurnal Pendidikan Tambusai*, *7*(2), 18939–18949.

F Assyifa, E., Pujiastuti, H., & S, C. A. H. F. (2020). Matematis Ditinjau Dari Kemandirian Belajar Siswa. *Jurnal Inovasi Dan Riset Pendidikan Matematika*, *1*(4), 367–382.

Hasratuddin. (2014). Pembelajaran Matematika Sekarang dan yang akan Datang Berbasis Karakter. *Jurnal Didaktik Matematika*, *1*(2), 30–42.

Ika Purwati, & Maria Ulpah. (2023). The Effect of Mind Mapping Methods Types of Mind Map Syllabus on Mathematics Problem Solving Ability in Flat Side Space Construction Materials of Class VIII Students of Smp Negeri 1 Karangreja District Purbalingga. *International Journal of Research in Mathematics Education*, *1*(2), 126–135. https://doi.org/10.24090/ijrme.v1i2.9285

Inayah, N., Triana, L., & Retnoningrum, D. (2023). Pendekatan Culturally Responsive Teaching Menggunakan Media Game Kahoot pada Pembelajaran Bahasa Indonesia. *Seminar Nasional Literasi Pedagogi (SRADA) III*, 24–31.

Isnawati, N., Samian, dan, Prodi Pendidikan Akuntansi FKIP-UMS, A., & Prodi Pendidikan Akuntansi FKIP -UMS, D. (2015). Kemandirian Belajar Ditinjau Dari Kreativitas Belajar Dan Motivasi Belajar Mahasiswa. *Jurnal Pendidikan Ilmu Sosial*, *25*(1), 128–144.

Jauhari, T., Rosyidi, A. H., & Sunarlijah, A. (2023). Pembelajaran dengan Pendekatan TaRL untuk Meningkatkan Minat dan Hasil Belajar Matematika Peserta Didik. *Jurnal PTK Dan Pendidikan*, *9*(1), 59–73. https://doi.org/10.18592/ptk.v9i1.9290

Khaq, A., & Febriana, M. (2023). The Effect of Think Pair Share Learning Model with the Help of Geogebra Software on Students' Mathematical Communication Skills. *International Journal of Research in Mathematics Education*, *1*(2), 151–162. https://doi.org/10.24090/ijrme.v1i2.9265

Mayangsari, S. N. (2015). Strategi Belajar Matematika. *LIKHITHAPRADNYA*, *17*(2), 107–117.

Pane, A., & Darwis Dasopang, M. (2017). Belajar Dan Pembelajaran. *FITRAH:Jurnal Kajian Ilmu-Ilmu Keislaman*, *3*(2), 333. https://doi.org/10.24952/fitrah.v3i2.945

Rantina, M. (2015). Peningkatan Kemandirian Melalui Kegiatan Pembelajaran Practical Life. *Jurnal Pendidikan Usia Dini*, *9*(2), 181–200.

Reski, R., Hutapea, N., & Saragih, S. (2019). Peranan Model Problem Based Learning (PBL) terhadap Kemampuan Pemecahan Masalah Matematis dan Kemandirian Belajar Siswa. *JURING (Journal for Research in Mathematics Learning)*, *2*(1), 049. https://doi.org/10.24014/juring.v2i1.5360

Sari, A., Sari, Y. A., & Namira, D. (2023). PENERAPAN MODEL PEMBELAJARAN PROBLEM BASED LEARNING TERINTEGRASI CULTURALLY RESPONSIVE TEACHING (CRT) UNTUK MENINGKATKAN MOTIVASI DAN HASIL BELAJAR SISWA KELAS X IPA 2 SMA NEGERI 7 MATARAM PADA MATA PELAJARAN KIMIA TAHUN AJARAN 2022/2023. *Jurnal Asimilasi Pendidikan*, *1*(2), 110–118.

Woi, M. F., & Prihatni, Y. (2019). Hubungan antara kemandirian belajar dengan hasil belajar matematika. *Teacher in Educational Research*, *1*(1), 1. https://doi.org/10.33292/ter.v1i1.3

Wulandari, A. (2022). Analisis Kemandirian Belajar Siswa pada Pembelajaran Matematika. *Journal of Mathematics Learning Innovation (Jmli)*, *1*(2), 151–162.

This page has been intentionally left blank.