ANNUAL INTERNATIONAL CONFERENCE
On Religious Moderation
e-ISSN: 3046-9775
by Universitas Islam Zainul Hasan Genggong

LEARNING EFFECTIVENESS: THE USE OF TEACHING AT THE RIGHT LEVEL (TARL) APPROACH IN GEOMETRIC TRANSFORMATION MATERIAL

(The Effectiveness of Teaching at the Right Level (TaRL) Approach in Geometric Transformation Material)

Nila Dwi Romah Donni[1], Novitasari[2], Rahma Febriyanti[3]

[1,2,3] Universitas Islam, Lamongan, Indonesia
Email : niladwi@unisla.ac.id, novitasari@unisla.ac.id, rahmafebriyanti@unisla.ac.id

Abstract:

The existence of differences in students' learning abilities or readiness to understand certain material, especially in mathematics subjects, causes gaps in understanding between students in one class. One alternative solution that can optimize teaching flexibility with different student abilities is to use the Teaching at the Right Level (TaRL) approach. TaRL is a learning approach that refers to the level of student achievement or ability. Therefore, this research aims to determine the effectiveness of the TaRL approach on the learning outcomes of class XI MAN 1 Lamongan students on geometric transformation material. This type of research is quantitative research with a quasi experimental design. The sample in this study was class XI MIPA 4 with 35 students as the experimental class and class XI MIPA 5 with 35 students as the control class. The research instruments used were pretest and posttest sheets in essay form. Meanwhile, the data collection technique in this research uses tests. The data analysis technique in this research is descriptive and inferential analysis. The research results show that the Teaching at the Right Level (TaRL) approach is effective in improving the learning outcomes of class XI students at MAN 1 Lamongan. This can be seen from the results of the hypothesis test which has Asymp. Sig. (2 − tailed) of 0.000 < 0.05.

Keywords: *teaching at the right level, effectiveness, geometry*

INTRODUCTION

This section comprises the background, the literature review or the summary of Education is the most important thing and must exist in every country. The aim of education is to improve human quality and make the life of the nation intelligent. Education is an effort to influence, protect and provide assistance aimed at the maturity of students or helping students to be capable enough to carry out their own life tasks without the help of others (Suriansyah, 2011). One way that educational goals can be achieved is through good learning. Good learning can help students more easily accept what is taught and delivered (Magdalena, 2021).

Based on initial observations when researchers carried out activities to introduce the school field at MAN 1 Lamongan in classes XI MIPA 4 and XI MIPA 5, it showed that some students' mathematical abilities were still low. The mathematical abilities in this class are diverse so that learning outcomes also vary. This results in negative student responses to mathematics learning and being less active in the mathematics learning process. This is supported by data on students' daily test scores obtained during the introduction to the school field is shown in Tabel 1.

*Corresponding author.
E-mail addresses: novitasari@unisla.ac.id

Tabel 1. Class XI Mathematics Daily Test Results

Subjects	Average Daily Test Score		
	XI MIPA 4	XI MIPA 5	KKM
Mathematics	56.00	69.00	76.00

Source: Document data on MAN 1 Lamongan daily test scores

In the learning process, researchers carried out observation activities in the classroom. The responses shown by students when delivering material varied, including several students who actively asked questions and were able to answer the questions given. Students who actively ask questions and are able to answer questions are students who have high level mathematical abilities. Apart from that, there are some students who are passive and listen when the material is presented, these students are students with low mathematical abilities. This shows that the abilities possessed by students at one grade level certainly vary (Abidin, et al., 2021). There are students who learn quickly and there are those who are slow in understanding learning (Meilawati, 2020). Students who have low levels of mathematical ability become active in asking and answering questions when the teacher delivers material to them individually. When delivering the material, some students did not understand the basic concepts being taught. This makes it difficult for students to solve problems given by the teacher. With these problems, it creates difficulties for teachers and students when delivering material. The difficulty that teachers have is how to deliver the material so that it is on time and all the students being taught understand and master the material. Meanwhile, the difficulty faced by students, especially those in the category of having low achievement in learning mathematics, is how they can understand and not miss out on the material being taught, because their understanding of the initial concepts of the material is different from other students.

From this problem, of course, a solution is needed that can help teachers and students in the learning process so that they do not have difficulty in conveying the material and it is easy to understand the material based on the allotted time. One solution is to choose the right learning approach. The learning approach is an aspect of the learning system that inspires, strengthens and includes theory to achieve certain curriculum goals (Hasriadi, 2022). The appropriate approach to overcome this problem is to use the Teaching at The Right Level (TaRL) approach. This is because the TaRL approach provides evaluations to students whose learning outcomes have not been achieved by providing special guidance tailored to the students' characteristics, needs and potential. The TaRL approach is an approach that exists in the Kurikulum Merdeka. The TaRL approach is a learning approach that refers to the level of student achievement or ability. The TaRL approach is a learning approach that does not refer to class level, but rather refers to the student's ability level (Muammar, 2022; Ningrum, et. al., 2023). This is supported by research results which state that learning using the TaRL approach can improve student learning outcomes and motivation (Cahyono et al, 2022).

One of the mathematical materials that students consider difficult is geometric transformations. Geometric transformation is an operation given to the geometric image of an object to change its position, orientation, or size (Nahak, 2022). Students still find it difficult to solve problems related to geometric transformations. This is supported by research results which state that there are errors made by students in solving geometric transformation problems, namely conceptual errors. The causes of conceptual errors in solving geometric transformation problems include discontinuous learning methods, lack of effort in working on the questions given, students not mastering the concept of geometric transformation material, and students not being careful and rushing in solving the problems given (Maulani et al., 2020; Wahyuni, 2023).

The novelty in this research is the use of the TaRL approach in mathematics learning for high school students. Therefore based on the background above, the aim of this research is to determine the effectiveness of the TaRL approach on student learning outcomes in geometric transformation material. It is hoped that the results of this research will be used by teachers as an alternative learning in an effort to improve student learning outcomes through learning that is adapted to the level of student learning achievement.

RESEARCH METHODS

This research is a quantitative research using a quasi-experimental design, namely nonequivalent pretest-posttest control group design. This research was conducted at MAN 1 Lamongan. The sample for this research was class XI MIPA 4 consisting of 35 students as the experimental class and class XI MIPA 5 consisting of 35 students as the control class. The sampling technique used in this research was purposive sampling. The two classes used have almost the same level of achievement in mathematics abilities. Then, data collection was carried out using data collection techniques, namely tests and observations. The research instrument consists of a pretest and posttest instrument in the form of essay questions totaling 5 questions. The test instrument used in this research meets all the requirements for validity, reliability, level of difficulty and differentiating power. The data analysis techniques used are N-Gain, normality test, homogeneity test and hypothesis testing using mann whitney test.

RESULTS AND DISCUSSION

The data obtained in this research is pretest and posttest data taken from classes that use the teaching at the right level (TaRL) learning approach with classes that use conventional learning on geometric transformation material which is then analyzed. Pretest data is used to measure students' initial abilities before being given treatment. Meanwhile, post-test data is used to measure student learning outcomes after being given treatment.

Based on the results of data analysis, descriptive analysis results and inferential analysis results were obtained which are shown in Tabel 2.

Table 2. Descriptive Statistics of Pretest and Posttest Results for Experimental and Control Classes

Descriptive Statistics						
	N	**Minimum**	**Maximum**	**Sum**	**Mean**	**Std. Deviation**
Pretest-Experimental Class (XI-MIPA 4)	35	55	85	2460	70.29	8.903
Posttest-Experimental Class (XI-MIPA 4)	35	70	97	3042	86.91	7.172
Pretest-Control Class (XI-MIPA 5)	35	45	83	2063	58.94	7.292
Posttest- Control Class (XI-MIPA 5)	35	60	85	2561	73.17	6.960
Valid N (listwise)	35					

Based on Table 2, the pretest results in the experimental class show an average of 70.28 with a standard deviation of 8.903. Meanwhile, the pretest results in the control class showed an average of 58.94 with a standard deviation of 7.292. This shows that the two samples have almost the same initial mathematical ability in geometric transformation material. The posttest results in the experimental class showed an average of 86.91 with a standard deviation of 7.172. Meanwhile, the posttest results in the control class showed an average of 73.17 with a standard deviation of 6.96. This shows that the learning outcomes of classes with the TaRL approach (experimental class) are higher than classes with conventional learning (control class).

After that, the pre-test and post-test data were subjected to an N-Gain test to determine the effectiveness of the TaRL approach on student learning outcomes in the experimental class when compared with conventional learning for control class students. The following are the results of the N-Gain test calculation as shown in Table 3.

Table 3. Experimental and Control Class N-Gain Test Results

Class	**N-Gain**	**Criteria**
Experimental	0,53	Medium
Control	0,29	Low

Based on Table 3, the N-Gain test results show that the N-Gain score for the experimental class is higher than the control class. This is shown by the N-Gain score in the experimental class of 0.53, which indicates medium criteria. Meanwhile, the N-Gain score in the control class was 0.29, which indicates low criteria.

Next, a normality test was carried out to determine the significance of the data distribution based on pre-test and post-test data from the experimental class and control class. The normality test was carried out using the kolmogorov-smirnov test. Following are the results of the normality test as shown in Table 4.

Table 4. Normality test results for experimental and control classes

Tests of Normality				
	Class	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
Learning Outcomes	Pretest-Experimental Class (XI-MIPA 4)	.181	35	.005
	Posttest-Experimental Class (XI-MIPA 4)	.181	35	.005
	Pretest-Control Class (XI-MIPA 5)	.185	35	.004
	Posttest- Control Class (XI-MIPA 5)	.232	35	.000
a. Lilliefors Significance Correction				

Based on Table 4, the normality test results show that the data is not normally distributed. This is because the significance value (sig.) of the pretest and posttest data in the experimental and control classes shows less than 0.05. Because the data obtained in this study was not normally distributed, further analysis could not be carried out by testing the hypothesis using parametric tests. Therefore, researchers tested the hypothesis using non-parametric tests. The non-parametric test used in this research is the mann whitney test.

Before testing the hypothesis with the mann whitney test, a homogeneity test is carried out. The homogeneity test in this study was used to determine whether the sample conditions between the experimental and control classes had the same variance value or not. The homogeneity test results can be seen in Table 5.

Table 5. Results of the homogeneity test for the experimental and control classes

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	sig.
Learning Outcomes	Based on Mean	1.976	3	136	.121
	Based on Median	1.852	3	136	.141
	Based on Median and with adjusted df	1.852	3	134.161	.141
	Based on trimmed mean	1.965	3	136	.122

Based on Table 5, the homogeneity test results show a significance value based on a mean of 0.121. The significance value is greater than 0.05 (0.121>0.05). Therefore, it can be concluded that the data in this study is homogeneous.

After carrying out the prerequisite tests, namely the normality test and homogeneity test, a hyopthesis test is carried out. Based on the prerequisite tests, the results showed that the data in this study was not normally distributed but was homogeneous. Therefore, the Mann Whitney test was carried out as shown in Table 6.

Table 6. Mann Whitney test results

Test Statistics[a]	
	Learning Outcomes
Mann-Whitney U	114.000
Wilcoxon W	744.000
Z	-5.909
Asymp. sig. (2-tailed)	.000
a. *Grouping Variable*: Class	

Based on Table 6, the results of hypothesis testing using the Mann Whitney test show that the Asymp. sig. (2 − tailed) of 0.000 < 0.05. These results indicate that there is a significant difference in improving the learning outcomes of experimental class students compared to the control class.

The research results showed that there was a significant difference in the learning outcomes of students who used the TaRL approach (experimental class) with students who used the conventional approach (control class). This shows that learning with the TaRL approach makes learning meaningful so that it can fulfill learning outcomes which makes learning outcomes increase (Yogica, et. Al., 2020; Damayanti, et. al., 2022; Mangesti, et. Al., 2023). This is also in line with research results which show that the TaRL approach is an approach that will help teachers to overcome the diversity of students' literacy and numeracy levels or abilities so that learning outcomes will increase (Cahyono, 2022; Rosyidah, et al., 2022).

CONCLUSION

Based on the results of data analysis and research discussion, it can be concluded that learning using the teaching at the right level (TaRL) approach is more effective than conventional learning. This is evident from the average posttest score for the experimental class being higher, namely 86.91, compared to the average posttest score for the control class, namely 73.17. This is in line with the average N-Gain score in the experimental class, which produces 0.53 medium criteria, while the average n-gain score for the control class produces 0.29 low criteria. Apart from that, based on the results of the hypothesis test, the value of Asymp. sig. (2 − tailed) of 0.000 < 0.05 which indicates that there is a significant difference in increasing the learning outcomes of experimental class students compared to the control class. So it can be concluded that the TaRL approach is effective on the learning outcomes of MAN 1 Lamongan students on geometric transformation material.

Although research results show that the TaRL approach is effective in improving student learning outcomes, other efforts and innovations are still needed. Learning innovations that can combine the TaRL approach with other learning approaches so that they can maintain student learning outcomes that have been completed and can improve student learning outcomes that have not yet reached completion.

REFERENCES

Abidin, Y., Mulyati, T., & Yunansah, H. (2021). Pembelajaran Literasi: Strategi Meningkatkan Kemampuan Literasi Matematika, Sains, Membaca, dan Menulis. Bumi Aksara.

Cahyono, S. D., (2022). Melalui Model Teaching at Right Level (TARL) Metode Pemberian Tugas untuk Meningkatkan Motivasi dan Hasil Belajar Peserta Didik Perencanaan Usaha Pengolahan Makanan Awetan dari Bahan Pangan Nabati di Kelas X MIA 3 MAN 2 Payakumbuh Semester. *6*(2), 12407–12418.

Damayanti, M., Sipayung, R., Simarmata, E. J., & Silaban, P. J. (2022). Pengaruh Model Quantum Teaching Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Matematika Kelas V Sd. JURNAL PAJAR (Pendidikan Dan Pengajaran), 6(5), 1284–1292.

Hasriadi.(2022). Strategi Pembelajaran. Bantul: Mata Kata Inspirasi

Magdalena, I., Hidayah, A., & Safitri, T. (2021). Analisis Kemampuan Peserta Didik Pada Ranah Kognitif, Afektif, Psikomotorik Siswa Kelas II B SDN Kunciran 5 Tanggerang. *Jurnal Pendidikan Dan Ilmu Sosial*, 7(2), 48–62. https://ejournal.stitpn.ac.id/index.php/nusantara

Mangesthi, V. P., Setyawati, R. D., & Miyono, N. (2023). Pengaruh Pendekatan TaRL terhadap Hasil Belajar Matematika Siswa Kelas IVB di SDN Karanganyar Gunung 02. Jurnal Pendidikan Tambusai, *3*(1), 19097–19104. https://ejournal.stitpn.ac.id/index.php/nusantara

Maulani, F. I., & Zanthy, L. S. (2020). *Analisis kesulitan siswa dalam menyelesaikan soal materi transformasi geometri*. *5*, 16–25.

Meilawati, D. F. (2020). Analisis Pemahaman Konsep Matematis Siswa Kelas 4 Sekolah Dasar. Seminar Nasional Pendidikan, 158–166.

Muammar. (2022). *Prosiding Konferensi Nasional PD-PGMI Se Indonesia Prodi PGMI FITK UIN Sunan Kalijaga Yogyakarta Yogyakarta 9-11 September 2022*. *September*, 43–56.

Nahak, S. (2022). Eksplorasi Etnomatematika Pada Permainan Tradisional Congklak. *7*(2), 1–9.

Ningrum, M. C., Juwono, B., & Sucahyo, I. (2023). Implementasi Pendekatan TaRL untuk Meningkatkan Motivasi Belajar Peserta Didik pada Pembelajaran Fisika. PENDIPA Journal of Science Education, 7 (1), 94-99.

Rosyidah, A. N. K., Husniati, Widodo, arif, & Khair, B. N. (2022). Persepsi Guru Terhadap Implementasi Pembelajaran Literasi Numerasi Pada Masa Pandemi Covid-19 Di Sdn Darek Lombok Tengah. Journal of Elementary Education, 5(1), 53–58. https://journal.ikipsiliwangi.ac.id/index.php/collase/article/view/9979

Suriansyah, A. (2011). Landasan Pendidkan. *Comdes*, 1. http://idr.uin-antasari.ac.id/6633/1/Buku Landasan Pendidikan.pdf

Wahyuni, S. (2023). Analisis Kesulitan Siswa pada Mata Pelajaran Transformasi Geometri dalam Meningkatkan Kemampuan Koneksi Matematika Siswa. *Journal Mathematics Education Sigma, 4(1), 55-62.*

Yogica, R., Muttaqiin, A., & Fitri, R. (2020). Metodologi Pembelajaran: Strategi, Pendekatan, Model, Metode Pembelajaran. IRDH Book Publisher.