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Implementation of Local Wisdom-based Teaching at the Right Level (TaRL) Approach to Improve Students' Learning Outcomes

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Abstract

This study aims to implement the local wisdom-based Teaching at the Right Level (TaRL) approach to improve students' learning outcomes. This study used a class action research approach. Findings indicate that the average percentage of student learning outcomes in cycle 1 reached in the excellent category with the percentage of 22, the good category with the percentage of 7, the moderate category was 15%, and the bad category was 22%. In cycle II, the learning outcomes of students reached an increase indicating scores in the very good category of 37%, in the good category of 7%, in the moderate category of 22%, and in the bad category of 7%. The results of the implementation show that there was a significant increase in the learning outcomes of fourth grade students of SDN Tegal Gede 3 Jember. In cycle 1, there was an increase of 48% in learner completeness, which then increased to 70% in cycle II. To conclude, the implementation of local wisdom-based Teaching at the Right Level (TaRL) approach is able to improve students' learning outcomes.

Keywords: learning outcomes, local wisdom, TaRL approach

INTRODUCTION

The digital era has had a major impact on various aspects of education, including at the basic education level. This transformation opens up new opportunities in the learning process, especially in mathematics. Technology acts as an effective tool in improving students' understanding of basic concepts (Dinçer, 2024). One of the important concepts taught in primary school is integers. With the presence of technology, students can learn integers through a more interactive and fun approach (Aguilar & Kang, 2023). Educational applications specifically designed for mathematics learning provide a more visual and practical learning experience. In addition, digital-based educational games can motivate students to be more active in understanding the material (Dilling et al., 2024; Voigt et al., 2020). Online learning platforms also allow students to access learning resources anytime and anywhere. Through the utilization of this technology, it is expected that student learning outcomes in mathematics can improve significantly (Mukhlis et al., 2023; Thurm & Barzel, 2022).

Although the utilization of technology in learning mathematics in the digital era has shown great potential in improving students' understanding, its application at the basic education level is uneven.

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Not all schools have adequate access to technological devices and digital resources. In addition, there are still limitations in teachers' competence in effectively integrating technology into the learning of numerical numbers. Many of the available educational apps and platforms focus more on advanced math concepts, while there is limited content specifically designed for basic concepts such as integers. There is also a lack of research on the effectiveness of technology in learning integers in various primary school contexts. Therefore, there is a need for a more in-depth and contextualized study on how technology can be adapted and optimally utilized to improve students' understanding of integers in the primary education environment.

The results of initial observations through cognitive diagnostic tests showed the difficulties experienced by some fourth-grade students of SDN Tegal Gede 3 Jember in understanding the concept of integers. This difficulty affects the low learning outcomes of students on related materials. Numbers are one of the basic concepts in mathematics that must be mastered from an early age. Students' inability to understand this concept can lead to difficulties in learning more complex mathematics material at the next level. Low understanding of integers also has the potential to reduce students' confidence in mathematics. Therefore, it is necessary to intervene to improve students' understanding of integers. A more innovative approach that is suitable for students' characteristics can be a solution to overcome this problem (Wardhani & Rifa'i, 2022).

One solution to the above problems is by conducting the Teaching at the Right Level (TaRL) approach in the learning process. The Teaching at the Right Level (TaRL) approach has been proven effective in improving students' understanding of basic mathematics concepts in various countries (Nahdiatul Najah et al., 2024). TaRL emphasises teaching tailored to students' level of understanding, so that each student gets help according to their needs (Banerjee et al., 2020; Yohannes & Chen, 2024). Thus, this approach can help students who have difficulty in understanding the subject matter. To support the implementation of TaRL, the use of technology in learning can be an effective solution. One tool that can be used is Wordwall, an interactive learning application that allows teachers to create various educational games. Word wall can help students learn in a fun and interactive way, thus increasing their motivation and interest in learning (Davis, 2021).

In addition, the integration of local wisdom in learning can provide a more relevant context for students (Khusniati et al., 2023). Local wisdom includes values, culture, and traditions that exist in the environment around students, which can be used as learning resources (Nugroho, 2023; Mufidati, 2021). By linking subject matter with local wisdom, students can more easily understand and apply the concepts learned in everyday life (Arianda, T., et al., 2021; Hasanah & Rasyid, 2024). With this background, this study aims to

implement the TaRL approach assisted by Word wall based on local wisdom in learning integers in class IV SDN Tegal Gede 3 Jember. It is expected that through this approach, students' learning outcomes can improve well, and students can better understand and master the concept of small numbers. This research is also expected to contribute to the development of learning models that are innovative and relevant to the needs of students.

METHOD

This research uses a classroom action research approach as a method to overcome problems in learning. This study is a research approach that focuses on improving learning practices through continuous intervention. In this context, the research subjects were fourth grade students with a total of 26 students at SDN Tegal Gede 3 Jember. The research was conducted during July - August, in the odd semester of the 2024/2025 academic year. In the classroom action research, research is carried out through a series of well-planned and planned actions to improve learning outcomes. The main instrument used was a learning outcome test, which was then analyzed using the normalized gain (N-gain) formula to evaluate the level of improvement in students' answer scores after the intervention was carried out. This analysis provides a comprehensive picture of the effectiveness of the actions taken in improving learning in the class. Thus, assessment in this classroom action research not only aims to measure learning outcomes, but also to provide useful feedback in designing and implementing more effective interventions in the future.

The design of classroom action research in this study refers to the design according to Kurt Lewin's opinion. This classroom action research model consists of four components, namely: Planning, Acting, Observing, and Reflecting. In the planning step, the questionnaire and learning tools that will be used in the classroom are compiled, the action step is to carry out learning activities, then make observations of the learning activities that have been carried out and then reflect to find out the shortcomings and advantages of the learning activities that have been carried out as material for improvement for the next meeting. This took place during two learning cycles and each cycle was given a questionnaire of motivation to learn Mathematics to students to determine the increase in learning motivation. The cycle of classroom action research activities according to Kurt Lewin's strategy can be described as follows in figure 1.

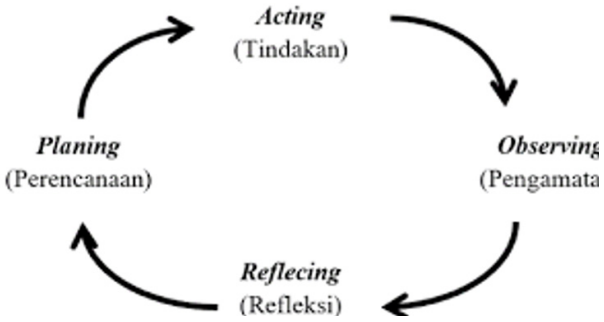

Figure 1. Kurt Levin's Research Model

In this study, the main instrument used to measure learning outcomes was a test. This learning outcome test is designed to evaluate students' understanding in certain cognitive aspects relevant to the learning material. Giving learning

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outcome tests involves measuring students' ability to understand, remember, and apply the concepts taught. After the test is conducted, the data obtained will be analyzed quantitatively using descriptive statistical methods. Descriptive statistical analysis will be used to summarize and describe the data obtained from the learning outcomes test. This includes calculating the mean, median, mode, and standard deviation of the scores obtained by students. By using descriptive statistics, researchers can present comprehensive information about the level of student understanding in the cognitive aspects tested through the learning outcomes test. The results of this analysis will provide a clear picture of students' achievement in learning, which can be used as a basis for evaluating the effectiveness of the interventions conducted during the study.

RESULT AND DISCUSSION

a. Pre-cycle

Based on pre-class activities carried out on 19 July 2024, it is known that there are problems in learning in class IV SDN Tegal Gede 3 Jember. The problem is that students lack learning outcomes in Mathematics subjects. Students are active during the learning process, but when a formative assessment test is carried out, students cannot answer the questions given, as evidenced by the observation that students are given questions that they have learned before the results obtained Most of them forget the material that has been given. The low learning outcomes of students are evidenced by the average classical completeness of students of 19% while those who are not complete are 81%.

b. Cycle 1

In cycle 1 it was carried out in 3 meetings. Before carrying out research actions, the authors prepare all research needs, such as lesson plans using the Problem-based learning model, teaching materials, student worksheet, research instruments in the form of learning tests. The learning material raised is the material of numerical numbers up to 10,000. at the first meeting there were two learning objectives, namely (1) reading and writing numerical numbers up to 10,000, (2) place value and number composition. The second meeting is (3) comparing and sorting integers up to 10,000. the third meeting (4) addition of integers up to 1000. The first meeting was conducted in cycle 1, which consisted of two meetings. The first meeting was held on 23 July 2024. It can be explained that in cycle 1 the average score was produced but still not satisfactory, this can be seen from the learning outcomes obtained as follows table 1:

Table 1. N-Gain Criteria for Students' Concept Mastery

Multiple Choice	Value
Number of learners	27
Lowest score	40
Highest score	100
Number of learners who have completed	13
Number of students who did not complete	14
Average class score	61
Percentage of completeness %	48%

TReflection is carried out to improve class action in the next cycle. The results

of the reflection were that students were less careful in working and were in a hurry because they saw some friends who finished first. As an improvement for the next cycle, researchers should increase instructions and expectations regarding the thoroughness and quality of the task. The time allocated for each activity will be adjusted to ensure students are not rushed. I will also reduce the pressure arising from watching friends by emphasizing the importance of the learning process and quality of work. Supervision will be tightened, and additional support will be provided for students who need it. In addition, I will provide exercises in time management and task simulations to help students learn to manage time effectively.

c. Cycle 2

In cycle 2 there were two meetings. Before carrying out research actions, the author prepared all research needs, such as teaching modules using the Teaching at the Right Level (TaRL) approach, teaching materials, student worksheet, and research instruments in the form of learning outcomes tests. The learning material raised is the addition of small numbers up to 1000. At the first meeting, there were three learning objectives, namely; (1) Through group discussions, students were able to apply the concept of addition of random numbers up to 1000 by calculating the total production of cow's milk from several farms in Rembangan correctly. (Cognitive- C3), (2) Through class discussions, learners are able to analyze data on the number of farms and typical cow's milk production in Rembangan by comparing production results between several farms (Cognitive- C4), (3) Through group presentations, learners are able to evaluate the results of cow's milk production from several farms in Rembangan (Cognitive- C5). In the second meeting there were two learning objectives achieved, namely: (1) Students are able to analyze and identify patterns of increasing the production of typical Rembangan cow's milk from several farms, (2) Students are able to formulate contextual problems involving the summation of the amount of milk production of typical Rembangan cows from several farms, then solve the problem using effective summation strategies, and provide suggestions for increasing production based on the calculation results. Implementation of Action in cycle 2, which consisted of two meetings. The first meeting was held on 30 July 2024, and the second meeting was held on 6 August 2024. The implementation of the research still refers to the syntax of the learning model used. It can be explained that in cycle 2 the average score was produced and was satisfactory, this can be seen from the results obtained as follows tabel 2.

Table 2. Average Class Values

Multiple Choice	Value
Number of learners	27
Lowest score	60
Highest score	100
Number of learners who have completed	19
Number of students who did not complete	8
Average class score	68
Percentage of completeness %	70%

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Based on the table 3 that 27 learners there are as many as 19 people have reached the minimum completeness. Reflection on cycle 2 where students are more interested in interactive learning media in the form of word wall games. So that continuous innovation is needed regarding the use of these interactive games in each material.

Table 3. Categorization of Student Learning Outcomes

Category	Value interval	Cycle 1	Cycle II
Very high	93-100	22%	37%
High	84 – 92	7%	7%
Middle	75 - 83	15%	22%
Low	<75	22%	7%

The results of data analysis of learning outcomes during the application of the TaRL approach show that the average percentage of student learning outcomes in cycle 1 has not been maximized in mastery of the material. This can be seen from the percentage of students who scored in the very good category of 22%, then the percentage of students who scored in the good category was 7%. Furthermore, students who scored in the good enough category were 15%, and students who were in the poor category were 22%. In cycle II, the learning outcomes of students experienced an increase, seen in the percentage of students getting scores in the very good category of 37%, in the good category 7%, in the good enough category had a percentage of 22%, and in the poor category of 7%.

Based on classroom observations before the implementation of the research cycle, it was seen that students were less active in learning. During learning activities, students tend to learn individually and do not form groups, so that cooperation exercises and the ability to collaborate are not realized. Previous learning results showed that fourth grade students of SDN Tegal Gede 3 Jember were in the low category as evidenced by the average classical completeness of students of 19% while those who did not complete 81%. From the initial findings before the research began, it was identified that the main problem in the class was the low mathematics learning outcomes. Therefore, learning planning was carried out by compiling Teaching Modules or learning tools for one cycle, with a total of one meeting. The learning model used remained the same as the previous model, namely using the Problem Based Learning Model with the Teaching at the Right Level Approach.

Based on the results of data analysis of learning outcomes during the application of the TaRL approach, the average percentage of student learning outcomes in cycle I shows that mastery of the material has not been maximized. This can be seen from the percentage of students who scored very well at 22%, then the percentage of students who scored in the good category was 7%. Furthermore, students who scored in the good enough category were 15%, and students who were in the poor category were 22%. In cycle II, the learning outcomes of students experienced an increase seen in the percentage of students scoring in the excellent category of 37%, in the good category 7%, in the good enough category had a percentage of 22%, and in

the poor category of 7%.

Based on the results obtained through the student learning outcomes test, it is known that there is an increase in learning outcomes in learning Mathematics on the Material of Enumerated Numbers. The application of the Teaching at the Right Level approach. (TaRL) approach assisted by Word wall games based on local wisdom, has improved students' learning outcomes. This is in line with research showing that the use of game-based learning strategies can increase student engagement and motivation, and help them understand concepts better (Suyadi & Selvi, 2022). In addition, the TaRL approach that focuses on students' ability levels ensures that each student gets learning according to their needs, so that learning outcomes become more optimal (Banerjee et al., 2021). Thus, the results that have increased in cycle II are as the researchers' expectations have been achieved, so this research is no longer continued because it has achieved the expected results.

CONCLUSION

Based on the results of classroom action research conducted by applying the Teaching at the Right Level (TaRL) approach assisted by local wisdom-based Word wall, there was a significant increase in the learning outcomes of fourth grade students of SDN Tegal Gede 3 Jember. In cycle 1, there was an increase of 48% in the completeness of students, which then increased to 70% in cycle II. This shows that the application of the Tarl approach aided by Word wall based on local wisdom has succeeded in increasing the level of understanding and achievement of students in the material of Numbers in Class IV SDN Tegal Gede 3 Jember. These results illustrate the effectiveness of the Tarl approach and also the effectiveness of interactive media, namely Word wall, which is packaged by incorporating Jember local wisdom, has proven to be an effective strategy in improving the quality of learning and student academic achievement in Mathematics.

REFERENCES

Aguilar, J. J., & Kang, S. (2023). Innovating with in-service mathematics teachers' professional development: The intersection among mixed-reality simulations, approximation-of-practice, and technology-acceptance. International Electronic Journal of Mathematics Education, 18(4), em0750. https://doi.org/10.29333/iejme/13628

Arianda, T., Mas'ula, D., Femelia, I., & Mukhlis, M. (2021). Efektifitas Media Quiz di Masa Pandemi Covid-19. ARITMATIKA: Jurnal Riset Pendidikan Matematika, 2(2), 79-86.

Banerjee, A., Banerji, R., Duflo, E., Glennerster, R., & Khemani, S. (2020). The Impact of Teaching at the Right Level (TaRL) in India. Cambridge, MA: MIT.

Banerjee, A., Cole, S., Duflo, E., & Linden, L. (2021). "Teaching at the Right Level: Evidence from Randomized Evaluations." Journal of Development Economics.

Davis, R. (2021). Interactive Learning Tools and Their Impact on Student Engagement. Journal of Educational Technology, 32(4), 15-27.

Dilling, F., Köster, J. & Vogler, A. (2024) Beliefs of Undergraduate Mathematics Education Students in a Teacher Education Program about Visual

DOI : http://doi.org/10.35719/mass.v5i2.208

Programming in Mathematics Classes. Int. J. Res. Undergrad. Math. Ed. 10, 700–731. https://doi.org/10.1007/s40753-024-00248-0

Dinçer, S. . (2024). Bridging the gap in technology integration in education: An examination of science teachers' competencies and needs. Journal of Turkish Science Education, 21(4), 620-634. https://doi.org/10.36681/tused.2024.033

Fitnanto, M. & Dewi, L. (2024). Pendekatan Differensiasi dalam Pembelajaran di Sekolah Dasar. Bandung: CV Global Media.

Hasanah, R., & Rasyid, A. N. (2024). Development of The Merdeka Curriculum Teaching Module based on the Local Wisdom of Bondowoso Batik . Indonesian Journal of Mathematics and Natural Science Education, 5(1), 61–75. https://doi.org/10.35719/mass.v5i1.156

Hidayati, N. (2020). Kearifan Lokal dalam Pendidikan: Konsep dan Implementasi di Sekolah Dasar. Surabaya: Universitas Negeri Surabaya Press.

Khusniati, M., Heriyanti, A. P., Aryani, N. P., Fariz, T. R., & Harjunowibowo, D. (2023). Indigenous science constructs based on Troso woven fabric local wisdom: a study in ethnoscience and ethnoecology: Research Article. Journal of Turkish Science Education, 20(3), 549-566. https://doi.org/10.36681/tused.2023.031

Mufidati, D., & Mukhlis, M. (2021). Pengembangan modul matematika berbasis masalah dalam menumbuhkan kemampuan penalaran siswa pada materi perbandingan kelas VII. ARITMATIKA: Jurnal Riset Pendidikan Matematika, 2(2), 87-99.

Mukhlis, M., Femelia, I., & Apriyono, F. (2023, December). Higher-Order Thinking Skills Through Problem-Based Learning Model Integrated with STEAM (Science, Technology, Engineering, Arts, and Mathematics) Approach in Solve-problems SPLTV (Three-Variable Linear Equation System). In 2nd Annual Conference of Islamic Education 2023 (ACIE 2023) (pp. 78-82). Atlantis Press.

Nahdiatul Najah, Jabu, B., & Basri, M. (2024). The Implementation of Teaching at the Right Level (TARL) Approach in Teaching Reading at Senior High School. International Journal of Language, Education, and Literature, 1(2), 95–101. Retrieved from http://journal.unm.ac.id/index.php/IJLEL/article/view/4301

Nugroho, A. (2023). Kearifan Lokal dalam Pendidikan: Implementasi dan Manfaatnya. Yogyakarta: Pustaka Belajar.

Purwanto, E. (2021). Penggunaan Media Interaktif dalam Meningkatkan Motivasi Belajar Siswa. Jurnal Teknologi Pendidikan, 23(2), 115-130.

Sudjana, N. (2020). Penilaian Hasil Proses Belajar Mengajar. Bandung: Remaja Rosdakarya.

Suyadi & Selvi, A. (2022). "Penggunaan Pembelajaran Berbasis Permainan dalam Meningkatkan Keterlibatan Siswa." Jurnal Pendidikan.

Thurm, D., & Barzel, B. (2022). Teaching mathematics with technology: A multidimensional analysis of teacher beliefs. Educational Studies in Mathematics, 109, 41–63. https://doi.org/10.1007/s10649-021-10072-x

Voigt, M., Fredriksen, H., & Rasmussen, C. (2020). Leveraging the design heuristics of realistic mathematics education and culturally responsive pedagogy to create a richer flipped classroom calculus curriculum. ZDM Mathematics Education, 52(5), 1051–1062.

Wardhani, R., & Rifa'i, A. (2022). Analisis Kesulitan Belajar Matematika pada Siswa Sekolah Dasar. Jurnal Pendidikan Dasar, 14(2), 55-66.

Yohannes, A., Chen, HL. (2024). The effect of flipped realistic mathematics education on students' achievement, mathematics self-efficacy and critical thinking tendency. Educ Inf Technol 29, 16177–16203. https://doi.org/10.1007/s10639-024-12502-8