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Evaluation of Science Learning with Teaching at the Right Level Approach: A Systematic Literature Review

Suriza Putri[1,2], Festiyed[1], Fatni Mufit
[1]Master of Physics Education, Universitas Negeri Padang, Jl. Prof. Dr. Hamka, Air Tawar Barat, Padang, Sumatera Barat

[2]E-mail: surizaputri97@gmail.com

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Abstrak. This study aims to assess the effectiveness of the Teaching at the Right Level (TaRL) approach in education through a systematic literature review. TaRL is a teaching method that is tailored to the individual abilities of learners. It ensures that every learner receives an education that is appropriate to their ability level. This review analyzed articles from academic journals published between 2018-2024, obtained through Google Scholar with the keywords "Teaching at the Right Level", 'TaRL', and "learning evaluation". The review was supported by the inclusion criteria of articles addressing the implementation and evaluation of TaRL, while opinion articles and unpublished reports were excluded. Based on the search results, 18 relevant articles were obtained. The results of the analysis show that the TaRL approach is effectively applied in science learning at the elementary, junior high and high school levels. This approach is proven to be able to improve learning outcomes, motivation, activeness, and communication skills of students. The success can be seen through various forms of evaluation and learning strategies that are systematically applied in the research cycle.

Keywords: effectiveness, literature review, teaching at the right level

1. Introduction

The concept of individual development is closely related to education. The role of education in acquiring knowledge is inseparable in everyday life. Education plays an important role in forming a strong foundation for individual potential from early childhood to higher education [1]. Through education, individuals not only acquire academic knowledge, but also develop practical skills, moral values, and critical thinking abilities that are needed in facing life's challenges [2]. In addition, education also has a significant role in shaping individual character or personality [3]. This impact makes a positive contribution to society and the surrounding environment. Education is considered an influential factor in a person's growth, change and condition [4].

Achieving quality education requires efforts through an effective learning process. Learning provides a deep understanding of things. Every learning experience has an impact on its acceptance personally in the form of achieving the goals obtained. The learning process is an effort made deliberately by educators to convey knowledge, organize and create a learning environment with various methods so that students can learn effectively and efficiently and achieve optimal results [5]. In learning, interaction between students and educators and quality learning resources is needed [6].

The learning guidelines applied by each individual are closely related to the development of the current curriculum. The achievement of students in learning can be known from the development and also the progress of the educational process in the classroom through evaluations conducted [7]. Learning evaluation has an important role in collecting data and information about students' learning abilities [8]. According to Sudirman, et al. stated that for an educator, learning evaluation is useful in making future decisions to determine whether or not students are successful in the learning process [9]. In addition, evaluation can also be used to develop science curriculum. Through an understanding of the

basics of evaluation, it can help curriculum developers to design what evaluations are appropriate and in line with theoretical studies [10].

Evaluation should be ongoing and involve a variety of activities including tests, questionnaires, interview guidelines, observation guidelines and others [11]. Evaluation results are used to improve the quality of more effective learning [12] especially in science learning. It is necessary to choose the right evaluation method that suits the learning objectives. In addition, evaluation results should be used to improve learning and not just for assessment.

Teaching at the Right Level (TaRL) is an individualized, results-oriented teaching approach designed to help all learners reach their full potential [13]. TaRL differs from traditional teaching methods that usually group learners by their age or grade. In TaRL, learners are grouped by ability level, so they can learn at an appropriate level. [14]. TaRL is based on several key principles, namely: each learner is a unique individual with different abilities and learning needs. Learning should be learner-centered and results-oriented. Teachers should provide continuous feedback and support to learners.

TaRL has high relevance in the field of education in Indonesia, where there is still a significant learning gap between learners. The implementation of TaRL in Indonesia still faces some challenges, such as teacher training, learner grouping, and resource provision. However, TaRL also has several opportunities that can be utilized, such as improving learner learning outcomes, reducing educational disparities, and empowering teachers.

This study aims to evaluate the TaRL learning method and its impact on learners' learning outcomes, identify factors that influence the effectiveness of TaRL, and provide recommendations for effective TaRL implementation in Indonesia. The results of this study are expected to benefit education policy makers, teachers, and education researchers.

2. Method

The research method used was a literature review to identify, evaluate and synthesize existing research on the application of Teaching at the Right Level (TaRL) approach in learning. The research began by identifying relevant sources based on the inclusion and exclusion criteria. The inclusion criteria included studies that focused on the application and evaluation of the TaRL approach and were published in academic journals. The search for published articles was conducted from 2018 to 2024. The data source was google scholar as the main base for searching articles using the keywords “Teaching at the Right Level,” “TaRL,” and “learning evaluation”. The exclusion criteria included opinion articles, unpublished reports, and studies that were not relevant to the topic. The following article search steps are available in the scheme below:

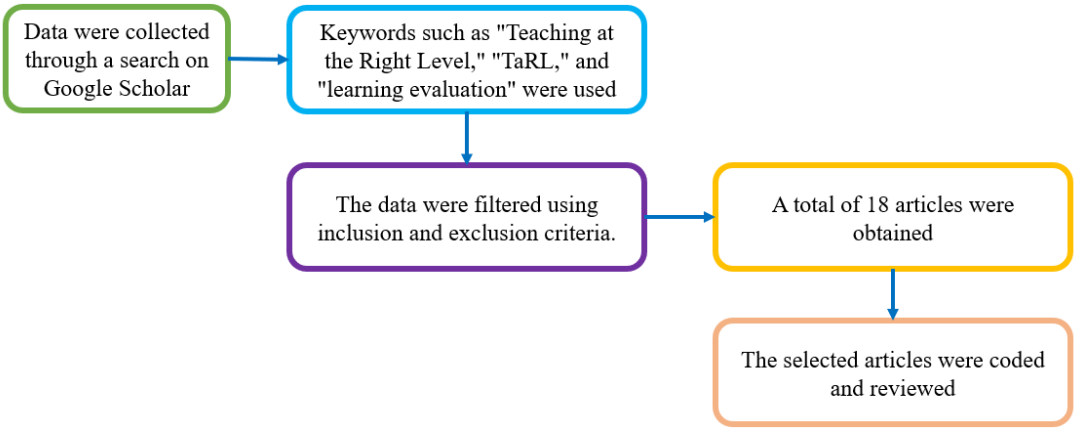

Figure 1. Article search steps.

The articles obtained were coded and described to capture the key information. Next, the articles were reviewed and categorized based on the learning outcomes and objectives of the Teaching at the Right Level (TaRL) approach.

3. Results and Discussion

3.1. *Result*

The literature review research identified and analyzed 18 articles related to the application of Teaching at the Right Level (TaRL) approach in science learning. The 18 articles are provided in Table 1 with a description of the article code, author, year of publication, education level, subject and type of curriculum applied.

Table 1. Description of articles obtained.

Article Code	Author	Year	Education Level	Subjects	Curriculum
A1	Darna, Pariabti, Nasmur MT. K	2024	Middle School	Science	Merdeka
A2	Fauziah N, Army A, Yuliana B	2023	High School	Chemistry	2013
A3	Nuruldin A.I, Ramlawati, Halijah	2023	Middle School	Science	-
A4	Fitri M, Abdul H, Ernie	2024	Middle School	Science	Merdeka
A5	Agung W.N., Vnda P.P, Wildan N. F	2024	Elmentary School	Science	Merdeka
A6	Arinil, M.L., Ramlawati, Martiningsi	2024	Middle School	Science	-
A7	Irfan A.I., Fadhila U.J., Qadriati, Munadia I	2024	Middle School	Science	Merdeka
A8	Melinda CN, Budi J, Imam S	2023	High School	Physics	-
A9	Ainur R, Suratno, Yeni VE	2024	High School	Biology	Merdeka
A10	Nur I, Joko W	2023	Middle School	Science	Merdeka
A11	Nurul I; Muhammad JD; Mansur	2023	High School	Chemistry	Merdeka
A12	Yulinda KD; Alimuddin; Suryanti T	2024	Middle School	Science	-
A13	Feronica AG, Tri N, Arif W	2024	Middle School	Science	-
A14	Maghfirotus S, Retno M, Ani R	2024	Middle School	Science	-
A15	Desy RP, Wachidatul LY, R. Bekti K	2024	Middle School	Science	-
A16	Maghfirotun N, Prapti NR, Ani R	2024	Middle School	Science	-
A17	Iim M, Yetmi, Dewi H	2024	High School	Chemistry	2013
A18	Nuzulia Q, Indah S, Nugrahaningsih WH	2024	Middle School	Science	Merdeka

Based on the table above, it can be seen that the inclusion criteria in the article search were set from 2018 to 2024. However, the articles found only came from 2023 and 2024 with a total of 18 articles discussing the application of the TaRL approach in science learning. A total of 13 articles were published in 2024, while the other 5 articles were published in 2023. This indicates an increased attention to the TaRL approach in recent years.

The variety of educational levels that apply the TaRL approach in science learning covers from elementary to high school. Of the 18 articles, the majority were applied at the Junior High School level with 12 articles focusing on science subjects. Furthermore, the high school level was recorded in 5 articles with a subject focus divided into Biology, Physics, and Chemistry. Of the three subjects, the TaRL approach was mostly applied to Chemistry with 3 articles, while Physics and Biology had only one article each. Meanwhile, at the primary school level, there is only one article that discusses the application of TaRL in science subjects. This shows that the TaRL approach is most widely applied at the junior high school level, especially in science learning.

The learning approaches used in the articles analyzed show alignment with the curriculum. There are 10 articles that contain information about the curriculum. A total of 8 articles use the Merdeka Curriculum, while the other 2 articles use the 2013 Curriculum. This finding reflects the broader application of Merdeka Curriculum in the context of applying the TaRL approach, suggesting that this approach is in line with education policies that focus on flexibility and learner-centered learning.

3.2. *Discussion*

Each learner has a different perspective and level of understanding in learning a material. Some have understood, some still do not understand, and some have not been able to understand learning at all. This

difference is a challenge in the process of achieving knowledge at school. So that an adaptive learning approach is needed and in accordance with the needs of students.

One approach that is relevant and aligned with the direction of education policy that emphasizes learner-centered learning is Teaching at the Right Level (TaRL). This approach undergoes changes and improvements that are based on systematically collected data. The aim is to ensure that the information obtained is valid and reliable, not just based on prejudice, conjecture or feelings related to the changes and improvements made [15].

This literature study research was conducted by grouping the 18 articles against the evaluation of the results and objectives achieved and is available in Figure 2. The achievements in the learning process include 4 classifications, namely learning outcomes, activeness, motivation, and student communication in carrying out learning through the TaRL approach to science learning.

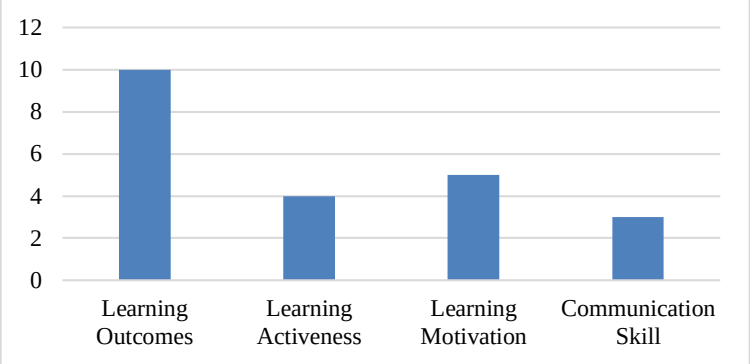

Figure 2. Evaluation chart of outcomes and objectives achieved.

Based on the figure above, the learning outcomes and objectives evaluation graph shows 22 achievements. This happens because some articles discuss more than one achievement of learning outcomes and objectives through the TaRL approach. In addition, the graph shows that the evaluation of learning outcomes is the most dominant achievement, with 10 articles found. Meanwhile, the lowest aspect is learner communication with 3 articles discussed.

3.2.1. Achievement of Learning Outcomes

Learning outcomes are one of the most researched achievements related to the application of the TaRL approach. As evidenced in 10 of the 18 articles analyzed, namely A1, A2, A4, A5, A6, A9, A11, A15, A17, and A18. All of these studies used a type of Classroom Action Research (PTK) consisting of four stages, namely planning, action, observation, and reflection. The four stages were carried out in two cycles to monitor the improvement of students' learning outcomes.

In the TaRL approach, evaluation of learning outcomes generally begins with a cognitive diagnostic assessment to map the learners' initial level of understanding. The source of this diagnostic assessment varies, for example, it comes from daily test scores and the Midterm Examination. [16][17]. Some studies also integrate non-cognitive evaluations to match learners' learning styles with the approach being applied [17][18]. This evaluation of results is used as a grouping of students according to their abilities.

The majority of evaluation instruments used are written tests, with several variations in the form and media of implementation. Some use conventional multiple choice, description and multiple choice questions with digital platforms such as Quizizz as an instrument for evaluating learning outcomes [16][18][19][20]. The evaluation on this instrument aims to determine the development of the learners' position in the TaRL approach applied.

The results in the first cycle generally showed that most students had not achieved learning and classical completeness. Some of the contributing factors included students' unfamiliarity with the learning approach, unclear objectives and flow of learning activities, and the implementation time of science learning which was at the end of the school schedule [16][18][21]. In addition, students look less

active, passive, shy to express their opinions, and some even use cellphones while learning [22]. Ineffective group work, because the number of members is too large and the questions are considered difficult for students to understand [17][23].

In response to these challenges, improvements were made in the second cycle. The improvement strategy included forming small groups (4-5 people), simplifying the LKPD and learning media, motivating students to express their opinions, and explaining the flow and learning objectives. Educators also focus more on guiding students with low abilities, as well as using simple practical media adapted to relevant learning models, to make learning more interesting [16] [19] [24] [21] [23].

Based on these ten articles, it is known that the TaRL approach is generally combined with learning models such as Discovery Learning, Problem Based Learning, and Project Based Learning. The three learning models that are most widely applied with the TaRL approach are Problem Based Learning.

Overall, from the ten articles, it can be stated that the improved strategies in the second cycle improved learning outcomes compared to the first cycle. This indicates that the TaRL approach, especially when combined with appropriate diagnostic evaluation and synchronous learning models, is effective in improving students' learning outcomes in science learning.

3.2.2. Learning Activeness

Evaluation of students' learning activeness in learning science through the TaRL approach is discussed in four articles, namely A3, A7, A15, and A17. The four articles are similar in terms of the method used, namely Classroom Action Research (PTK), with a total of two to three cycles. Based on the evaluation results in each cycle, students learning activeness showed an increase from the previous cycle.

Measurement of students' learning activeness is done through direct observation using an observation sheet as an instrument to evaluate students' activeness. The indicators used include listening to the teacher's explanation, asking questions, discussing in groups, and conveying ideas [25]. The evaluation was carried out in two cycles, with improvements in the second cycle in the form of simplifying the material, using image media, and simplifying the Learner Worksheet (LKPD), so as to encourage the formation of learning activeness with self-confidence, as well as dividing groups from the beginning of learning activities to reduce student confusion [21] [23].

In addition, in the research of Ismail, et al. (2024), Students' learning activeness increased through three cycles. Evaluation was conducted using observation with indicators such as participation in group work, asking or answering questions, and completing tasks. The increase in activeness occurred gradually, namely the first cycle showed low enthusiasm and attention. However, after improvements were made through out-of-class learning, group discussions, hands-on experiments, ice breaking, and gamification, students became more active. This shows that learning is more fun and effective than conventional approaches [26].

3.2.3. Learning Motivation

Learner motivation is one of the aspects analyzed in the TaRL approach implementation study. There are five articles namely A5, A8, A10, A11, and A12 that discuss increasing learning motivation through this approach. All of these studies used Classroom Action Research (PTK) with the number of cycles varying from two to four.

Research by Nugroho, et al. (2024), Izzah, et al. (2023), Dwipayanti, et al. (2024), Inayati and Waluyo (2023) showed that motivation evaluation was carried out using a questionnaire sheet consisting of positive and negative statements. The evaluation was carried out for 2 cycles. The questionnaire instrument contains indicators such as enthusiasm, curiosity, independence, patience and concentration [27].

The increase in students' learning motivation is obtained through the application of the TaRL approach-based learning model which is designed in an interesting and systematic way. One of the factors that support this increase is the teacher's activity in conveying learning objectives. In the first cycle, motivation was still low because educators had not explained the learning objectives clearly, so that students were less enthusiastic in participating in activities [18] [28]. In addition, the learning

activities integrated in the teaching module are also equipped with stimulus in the form of images and animations as well as simplifying the Learner Worksheet (LKPD), which has proven effective in encouraging students' interest and active involvement in the learning process [29].

Overall, the five articles show that the TaRL approach is able to have a positive impact on increasing students' learning motivation in science learning. Evaluation is carried out systematically through questionnaire instruments, observation and reflection in each cycle, resulting in a consistent increase in motivation over time.

3.2.4. Communication Skills

The communication aspect of learners in applying the TaRL approach to science learning is discussed in three articles, namely articles A13, A14, and A16. The three studies used the type of Classroom Action Research (PTK) with two cycles. Communication evaluation was conducted through various methods such as questionnaires, observation, direct observation, interviews, and documentation.

Learner communication is shown through confidence when presenting in class. The results of the first cycle showed that students' presentations were still not smooth, so in the second cycle improvements were made such as making mind maps which were then presented, as well as reducing the number of members in the group [30][31]. The results show that learners with high cognitive abilities experience faster improvement in communication skills than learners with moderate abilities. After being given treatment, learners with medium ability experience improvement in communication and can match learners with high cognitive ability [30].

In addition, in the second cycle there was a TaRL approach combined with a specific learning model that helped to improve learners' communication skills. This improvement was also supported by technological advances and online media, which were used in the form of a game approach to explore and apply knowledge [31] [32]. Overall, the results of the three articles show that the TaRL approach can significantly improve communication skills. It has been evaluated in each cycle and can be adapted to different groups of learners.

4. Conclusion

Overall, these studies have found that the TaRL approach to science learning in primary, middle and high schools is effective in improving learners' learning engagement, learning motivation and communication skills in science classrooms through various evaluation methods and structured interventions. The TaRL approach has been shown to significantly improve students learning outcomes through the application of various learning models and appropriate evaluation, suggesting that it is effective in addressing various learning challenges in the classroom. Systematic and reflective evaluation supports the conclusion that TaRL not only improves learning outcomes, but also motivates and activates learners, and improves their communication skills in the learning environment. Therefore, the TaRL approach has great potential to be applied more widely in competency-based learning systems and 21st century needs.

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