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Development of Formative Assessment Based on the TarL Approach on the Material of Forces Around Us for Fourth Grade Students of SDS Islam Al-Furqon Pamekasan

Reskiya Ramadani[1]*, Ika Dian Rahmawati[2]
Elementary School Teacher Education Study Program, Faculty of Teacher Training and Education, Trunodjoyo University, Madura
Email:
220611100008@student.trunojoyo.ac.id*; ika.rahmawati@trunojoyo.ac.id.

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Development, Formative Assessment, TaRL, Style, Interactive Multimedia.

Abstract: This study aims to develop a formative assessment based on the Teaching at the Right Level (TaRL) approach on the topic of forces around us for fourth-grade students at SDS Islam Al-Furqon Pamekasan. The assessment was designed by grouping students into low, medium, and high ability levels. The instrument consisted of multiple-choice questions presented through interactive multimedia, adjusted to students' readiness levels, and implemented through diagnostic assessment, grouping, testing, and feedback stages.
This study used Research and Development (R&D) with the 4D model: define, design, development, and disseminate. The research subjects involved 5 students in the limited trial stage and 20 students in the implementation stage. The instruments included expert validation sheets, student response questionnaires, and learning outcome tests. Data were analyzed using percentage formulas and interpreted based on validity, attractiveness, and effectiveness criteria.
The results showed that the developed product was valid, attractive, and effective. Validation scores were 78.3% from language experts (valid), 83.3% from material experts (very valid), and 89% from assessment experts (very valid). After revision, the limited trial and implementation both showed 100% learning achievement. Student responses also indicated high attractiveness, with 89% in the limited trial and 97% in the implementation stage. The disseminate stage was carried out through scientific publication and introduction of the product to other schools. Therefore, the TaRL-based formative assessment is feasible for use in science learning because it can improve students' understanding of force concepts and learning motivation through interactive multimedia.

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INTRODUCTION

Education plays a key role in improving the quality of human life and is crucial in promoting a vibrant lifestyle for the nation and state (Ministry of National Education, 2003). Entering the 21st century, education emphasizes the importance of mastering critical thinking, collaboration, communication, and

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creativity (the 4Cs) as core competencies that need to be developed in students (Trilling & Fadel, 2009). To achieve this, teachers are required to implement innovative learning and assessment strategies that align with technological developments. One crucial component of learning is formative assessment.

Formative assessment plays a significant role in improving the quality of learning because it provides feedback that helps students refine their understanding and skills (Black & Wiliam, 1998). Through this assessment, students can determine their level of mastery of the material, identify areas they do not understand, and identify errors that need to be corrected to prevent misconceptions from continuing to the next stage. Furthermore, formative assessment can also increase learning motivation because students focus not only on the final result but also on understanding the learning process. For teachers, the results of this assessment serve as a basis for adjusting learning strategies to better suit students' needs.

However, interviews and observations with the fourth-grade homeroom teacher at Al-Furqon Islamic Elementary School in Pamekasan, Mrs. Endang Yuliawati Ningsih, S.Pd., indicate that students still experience difficulties in completing assessment questions. They consider the story questions too long, the language difficult to understand, and the conventional assessment format, leading to boredom and decreased motivation to learn. As a result, student learning outcomes vary, with many failing to achieve completion. On the other hand, students tend to be more attracted to technology-based assessments because they are perceived as more engaging and easier to understand.

With the advancement of the digital era, assessments are no longer limited to paper-based media but can be combined with technology, one example being interactive multimedia. Based on observations at Al-Furqon Islamic Elementary School in Pamekasan, many teachers have not optimized the use of digital-based formative assessments, resulting in students not receiving engaging and adaptive evaluation experiences. Therefore, the use of interactive multimedia in assessments can be an alternative solution to increase student motivation and engagement.

Furthermore, differences in ability among students is also a factor contributing to low assessment results. Each student has different characteristics and learning needs, resulting in varying academic abilities. In a class, some students grasp material quickly, while others take longer. This is partly due to a mismatch between student ability levels and established learning outcomes (Suarti & Astuti, 2023). To address this issue, a learning approach tailored to student abilities and needs is needed, namely the Teaching at the Right Level (TaRL) approach.Pendekatan TaRL merupakan strategi pembelajaran yang berfokus pada kesiapan belajar siswa, bukan pada tingkat kelas (Kemendikbud, 2023).

In practice, students are grouped based on their actual abilities so that learning and assessment can be provided according to their individual achievement levels. Prior to this, teachers need to conduct diagnostic assessments to identify students' needs, abilities, and learning characteristics (Mayudana, 2020). This ensures that the learning and assessment process is more effective and targeted.

Based on these various issues, it is necessary to develop formative assessments tailored to students' ability levels through the TaRL approach and supported by digital media such as interactive multimedia to make them more engaging, interactive, and relevant to current developments. Therefore, this study aims to develop a formative assessment based on the TaRL approach, supported by interactive multimedia, that is appropriate to the characteristics of elementary school students and can increase student motivation and understanding in science learning.

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RESEARCH METHODS

a) Type of research

This type of research is called research and development (R&D). This research creates and produces a format-based assessment tool based on the TaRL product currently being developed (Sugiyono, 2008, p. 25). This research was conducted with the aim of developing a TaRL-based formative assessment on the topic of forces around us for fourth-grade students at SDS Islam Al-Furqon Pamekasan..

b) Prosedur Penelitian

This research procedure represents each stage or step taken by the researcher during the product development process. The research product used by the researcher aligns with the research and development model used, namely the 4D Thiagarajan research and development model. The research procedure used in developing a formative assessment based on the TaRL approach assisted by Kahoot in learning in grade IV of SDS Islam Al-Furqon Pamekasan is as follows:

1. *Define*

At this stage, researchers conducted an initial needs analysis in the field to identify the fundamental reasons for developing a TaRL-based formative assessment for the topic of forces around us. The analysis involved several activities, including curriculum analysis, student characteristics analysis, and teacher needs analysis. The curriculum currently used by grade IV of SDS Islam Al-Furqon Pamekasan is the independent curriculum, in accordance with Decree No. 046/H/KR/2025 of the Head of the Education Standards, Curriculum, and Assessment Agency of the Ministry of Primary and Secondary Education concerning Learning Outcomes in Early Childhood, Elementary Education, and Secondary Education. This analysis aimed to determine competency achievement indicators that would form the basis for developing formative assessment questions.

Furthermore, a student characteristics analysis was conducted to understand students' initial abilities, cognitive development levels, and readiness to use technology-based media, considering that the use of interactive multimedia requires basic digital literacy skills. A teacher needs analysis was also conducted by reviewing obstacles encountered in implementing formative assessments, such as limited question variety, limited media, and difficulties in assessing student learning achievement quickly and interactively. The results of this stage provide an overview that a formative assessment is needed that is digital, interactive, and capable of providing instant feedback for both students and teachers.

2. *Design*

At this stage, the researcher designs the initial product of the TaRL-based formative assessment approach on the material of forces around us based on the results of the analysis that has been carried out. The activities carried out include determining indicators of competency achievement, compiling question grids, and compiling question items according to the steps of the TaRL approach according to the students' initial abilities. The questions are then designed in the form of multiple choices that are suitable for the interactive multimedia format. In addition, the researcher will also compile other research instruments such as expert validation sheets (material, language, and

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assessment) to assess the validity of the product, as well as student questionnaires to measure the product's attractiveness. At this stage, procedures for using interactive multimedia in learning activities are also designed, for example, the assessment is carried out after the teacher delivers science material to determine the extent to which students understand the concepts taught. The result of this stage is the initial design of the TaRL-based formative assessment on the material of forces around us that is ready to be tested for its feasibility.

3. *Development*

This stage represents the realization of the previously developed product design. Formative assessment products, using the TaRL approach, in the form of interactive questions, are entered into an interactive multimedia platform and then validated by subject matter experts, language experts, and assessment experts.



Source: Canva App

This validation aims to assess the quality of the product in terms of content, construction, language, and media display. The validation results are used as a basis for revisions so that the developed product is increasingly suitable for use. After the validation and revision process, a limited trial was conducted in grade IV of SDS Islam Al-Furqon Pamekasan to determine the attractiveness and effectiveness of the TaRL-based formative assessment on the material of forces around us. Data were obtained from the results of student work on interactive multimedia, student response questionnaires regarding their ease of use and involvement. From this data, it can be analyzed whether the developed product is practical to use in learning and effective in improving student learning outcomes in science subjects.

4. *Disseminate*

At this stage, the TaRL-based formative assessment product on the topic of forces around us, which has been declared valid, engaging, and effective, is then disseminated. This dissemination can be done through scientific activities, such as publishing scientific articles in educational journals. The goal of this stage is for the resulting product to be useful not only in the school where the research was conducted but also to be accessible and usable by others who wish to implement formative assessment using interactive multimedia.

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By going through the four stages of the 4D model, this research is expected to produce a development product in the form of a TaRL-based formative assessment on the topic of forces around us that is not only theoretically feasible but also practically useful in improving the quality of science learning in elementary schools. It is hoped that this final product will enable teachers to conduct formative analysis in a more interactive, engaging, and beneficial manner to enhance learning and encourage student participation in the learning process.

c) Data Collection Techniques

This research uses observation methods, interviews, expert validation, student responses, and limited trial product learning outcomes and implementation.

d) Teknik Analisis Data

The data analysis used in this study is a combination of qualitative and quantitative data analysis.

RESEARCH RESULT

a) *Define*

In the initial stage of the research, the researchers conducted a needs analysis to identify the problems faced in the learning and assessment process at SDS Islam Al-Furqon Pamekasan. This stage was carried out through classroom observations, interviews with the fourth-grade homeroom teacher, and analysis of students' learning conditions, especially in science subjects on the material of forces around us. The observations were conducted in the fourth-grade classroom taught by Mrs. Endang Yuliawati Ningsih, S.Pd., as the classroom teacher. The purpose of this stage was to obtain detailed information regarding the learning problems experienced by students and teachers so that the developed product would truly match students' needs and classroom conditions.

Based on the results of interviews and observations, it was found that many students experienced difficulties when working on assessment questions provided by the teacher. Students often complained that the questions were too long, difficult to understand, and used language that was too complex for their level of comprehension. Most of the assessment questions were presented in a conventional paper-based format, causing students to feel bored and less motivated during the evaluation process. In addition, students tended to become passive because they only focused on completing written tasks without interactive learning experiences. This condition affected students' learning outcomes, as shown by the varying scores obtained by students, ranging from low, medium, to high achievement levels. Some students were able to answer questions well, while others still struggled to understand basic concepts related to force and motion.

The teacher also explained that differences in students' abilities became one of the main challenges in conducting assessments. In one classroom, students had different levels of understanding and learning readiness. Some students were able to understand science concepts quickly, while others required more guidance and simpler explanations. However, the assessments used in class were still generalized and had not yet been adjusted to students' individual ability levels. As a result, students with lower abilities often felt left behind and less confident when completing assessments. This finding

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indicates that a more adaptive assessment approach is needed to accommodate students' varying abilities and learning characteristics.

Furthermore, the results of observations showed that students were more interested and enthusiastic when learning activities involved technology-based media. Students preferred assessments presented through digital and interactive media because they were considered more attractive, enjoyable, and easier to understand compared to traditional paper-based tests. Interactive multimedia was able to attract students' attention through visual displays, animations, and interactive question formats, making students more active and motivated in participating in learning activities. This finding is important because elementary school students generally have high curiosity and are more interested in visual and interactive learning experiences.

Based on these findings, the researchers identified the need to develop a formative assessment that is more interactive, adaptive, and suitable for students' ability levels. Therefore, the Teaching at the Right Level (TaRL) approach was chosen because it emphasizes learning and assessment based on students' actual readiness rather than grade level alone. Through this approach, students can be grouped according to their learning abilities so that the assessment process becomes more effective and meaningful. The formative assessment was also integrated with interactive multimedia to increase student engagement and motivation during the learning process.

In addition, at this stage the researchers conducted curriculum analysis to ensure that the developed assessment aligned with the Independent Curriculum used at SDS Islam Al-Furqon Pamekasan. The analysis focused on the learning outcomes and competency indicators related to the science topic of forces around us for fourth-grade students. Student characteristics analysis was also carried out to identify students' cognitive development levels, learning styles, and readiness in using digital technology. The results showed that most students were already familiar with the use of simple digital devices, making interactive multimedia suitable for implementation in classroom assessments.

Overall, the define stage provided a clear description of the problems and needs in the learning process. The findings confirmed that conventional assessments were less effective in motivating students and accommodating differences in ability levels. Therefore, the development of a formative assessment based on the TaRL approach assisted by interactive multimedia was considered necessary to create a more engaging, adaptive, and meaningful assessment process for fourth-grade students at SDS Islam Al-Furqon Pamekasan

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b) *Design*

The next step is product design. This stage aims to design the developed media. At this stage, researchers began to design a product in the form of a formative assessment in accordance with the TaRL approach according to the characteristics of fourth-grade students at SDS Islam Al-Furqon Pamekasan. Product design is a step taken after identifying the problem and considering all the information that has been obtained. Then, the results of observations, interviews, and diagnostic scores of students in fourth grade SDS Islam Al-Furqon Pamekasan are analyzed. The results of the analysis and stages of designing formative assessment questions based on the TaRL approach are as follows:

1. Analysis of the Ability Levels of Fourth Grade Students at Al-Furqon Islamic Elementary School, Pamekasan

TaRL student ability level	Student Ability Level of Al-Furqon Islamic Elementary School Pamekasan	Development of Student Ability Levels at Al-Furqon Islamic Elementary School in Pamekasan Based on the TaRL Approach
Group A	At the initial level, students are still at the basic stage, that is, they still do not understand the basic concepts of the material, and the sentences with questions presented.	**At this stage, students still have a basic understanding.** • Students are only able to recognize simple concepts of force, such as pushing, pulling, or falling objects. They cannot yet explain the relationship between force and motion.
Group B	At the intermediate level, students have read simple sentences but not yet completely fluently, but in terms of the concept of understanding the material with the questions presented, they are starting to be able to understand it quite well.	**At this stage, students begin to develop a better understanding.** • Students are able to relate everyday events to simple concepts of force and motion (e.g., a bicycle stops due to the brakes, a ball rolls and stops due to friction). However, students are not yet fully fluent in understanding more complex concepts.
Group C	At the advanced level, students are able to read long texts with good understanding, and can master the concept of understanding the material with more complex questions presented.	**At this stage, students have reached a higher level of understanding.** • Students can solve problems and some word problems involving force, motion, velocity, acceleration, and friction.

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		• Students can analyze everyday phenomena using the concepts of force and motion in greater depth and with more complex language.

2. Instructions for completing formative assessments based on the TaRL approach on the material on forces around us

1. Read each question carefully before answering!
2. Choose the most correct answer from the four available options (a, b, c, or d)!
3. Work carefully and pay attention to every key word in the question!
4. You have 20 minutes to complete the questions!
5. Collaborating or copying from your friends' answers is prohibited!

3. Results of the Analysis of Grouping of Grade IV Students Based on Initial Diagnostic Results Using the TaRL Approach

Test Implementation		
Group 1 (Low)	**Group 2 (Medium)**	**Group 3 (High)**
1. Ainur Ridha Salam	1. Jazilatun Nikmah	1. Qonita Aurelia P
2. Bagas Sebastian A	2. Zulvierma Abellia Zulya	2. Adiba Hubbyyanti Pradana
3. Dafa Zarir Ramadhani	3. Raynaldo Dwi R	3. Moh. Caesar A.N
4. Misbahul Arifin Al-jufri	4. Aprilia Naifatur Rofidah	4. Syikh Ach Zaka K
5. Araya Karuna M	5. Moh. Ashil A	5. Annisa Ayu Wulandari
6. Arashi Kurnia M	6. Ahmad Riski Maulana	6. Faiz Reidho
7. Annisa Sawalia	7. Najwa Wilda Fajria	
Uji Limited/target testing /sasaran		
Group 1 (Low)	**Group 2 (Medium)**	**Group 3 (High)**
1. Suhwan Kholiki	1. Zahwa Madinatus S	1. Najwa Khaira Wilda
	2. Rahma Syarifa N.A	2. Zaidan Annabail Qudsy

4. Compiling formative assessment instruments into interactive multimedia using Canva



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c) *Development* (Pengembangan)

In the development phase, researchers analyzed formative assessments based on the TaRL approach on materials. Linguists, content experts, and assessment experts are three expert individuals who validate the styles around us. During the validation process, the language, materials, and assessments were reviewed to ensure that the assessment format met higher standards. The validator results are listed below:

1. Material validation

No	Description	Score
1.	Formative assessment is able to provide clear material	4
2.	The material is relevant to the learning objectives that students must achieve.	5
3.	Examples of explanations relevant to the competencies that must be achieved	3
4.	The material is arranged by taking into account the students' ability level.	5
5.	The depth of the material is appropriate to the student's development level.	5
6.	The material is suitable for use as a learning resource for students.	4
7.	Interactive multimedia helps students understand the concept of force in depth.	4
8.	The material describes the relationship between force and the direction, motion, and shape of an object.	4
9.	The material description is sufficient to meet the material requirements.	4
10.	Examples of materials used are relevant to everyday life.	4
11.	Interactive multimedia encourages student interaction during the learning process.	4
12.	Interactive multimedia encourages student interaction during the learning process.	4
Total Score Obtained (Tse)		50
Maximum Score (Tsh)		60
Presentation		83,3%
Criteria		**Valid**

$$Va = \frac{Tse}{Tsh} \times 100\%$$
$$= \frac{50}{60} x\ 100\%$$
$$= 83{,}3\%$$

Based on the table above, which presents the results of the material validation, the validity percentage was 83.3%. This indicates that the TaRL-based formative assessment of the material on forces around us in learning in grade IV of SDS Islam Al-Furqon Pamekasan is a "valid assessment".

2. Linguist validation

No	Description	Score
1.	The language in the questions is easy for students to understand	4
2.	Effectiveness of sentences in questions	4
3.	Sentence structure according to the level of student language development	4
4.	Each question has clear and easy to understand instructions.	4
5.	Use of spelling according to EYD (Improved Spelling) rules	4
6.	Grammar (sentence structure) is correct and effective	4
7.	Use of punctuation in accordance with Indonesian language rules	4
8.	There are no punctuation errors	3
9.	The language used is communicative and appropriate to the context of science learning.	4

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10.	The language used does not cause ambiguity or confusion for students.	4
11.	The language used is able to stimulate students' curiosity	4
12.	Language according to the developmental level of students in elementary school	4
Total Score Obtained (Tse)		47
Maximum Score (Tsh)		60
Presentation		78,3%
Criteria		**Valid**
$Va = \frac{Tse}{Tsh} \times 100\%$ $= \frac{47}{60} \times 100\%$ $= 78{,}3\%$		

Based on the table above, which presents the results of the language validation, the validity percentage was 78.3%. This indicates that the TaRL-based formative assessment of the material on forces around us in learning in grade IV of SDS Islam Al-Furqon Pamekasan is a "valid assessment".

3. Assessment validation

No	Description	Score
1.	Formative assessment according to learning outcomes in phase B of grade IV	4
2.	Assessment indicators according to cognitive competencies	5
3.	Assessment is able to measure mastery of the concept of style as a whole	4
4.	Assessment questions can be used to see students' learning progress.	5
5.	The formulation of questions uses clear sentences and does not give rise to double meanings.	4
6.	Instructions for working on questions are easy for students to understand	5
7.	Assessment questions are differentiated according to the students' ability level between group 1, group 2, and group 3.	5
8.	Formative assessment can be used to provide feedback for teachers and students.	4
9.	Assessments are designed to help students understand their mistakes.	4
10.	Assessment takes into account differences in students' learning ability levels in accordance with the TaRL approach.	5
11.	Displaying assessments using multimedia can help students understand questions in a more interesting way.	4
12.	Formative assessment according to learning outcomes in phase B of grade IV	4
Total Score Obtained (Tse)		49
Maximum Score (Tsh)		55
Presentation		89%
Criteria		**Very Valid**
$Va = \frac{Tse}{Tsh} \times 100\%$ $= \frac{49}{60} \times 100\%$ $= 89\%$		

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Based on the table above, which presents the assessment validation results, the validity percentage was 89%. This indicates that the TaRL-based formative assessment of the material on forces around us in learning in grade IV of SDS Islam Al-Furqon Pamekasan is a "valid assessment."

4. Limited trial results and implementation

a) Limited trial

No	Student name	Score	Achievement	Jenis Gender
1	Suhwan Kholiki..	85	**achieved**	L
2	Zahwa Madinatus Sauqiyah…	95	**achieved**	P
3	Rahma Syarifa Nur Azizah…	95	**achieved**	P
4	Najwa Khaira Wilda…	100	**achieved**	P
5	Zaidan Annabail Qudsy.	100	**achieved**	L

Classical Learning Achievement

$P = \frac{\sum students\ who\ achieved\ learning}{\sum student} x100\%$

$P = \frac{\sum 5}{\sum 5} x100\%$

P= 100%

Criteria= Archieved

b) Test implementation

No	Student name	Score	Achievement	Gender
1	Anisa Ayu Wulandari.	85	**achieved**	P
2	Annisa Syawalia.	90	**achieved**	P
3	Adiba Hubbiyanti Pradana..	90	**achieved**	P
4	Ainur Ridha Salam.	95	**achieved**	L
5	Aprilia Naifatur Rofidah.	80	**achieved**	P
6	Moh. Ashil Amanullah..	95	**achieved**	L
7	Bagas Sebastian Ariyansyah..	90	**achieved**	L
8	Moh. Caesar Akbar Nurdafa..	90	**achieved**	L
9	Moh. Dafa Zarir Ramadhani.	85	**achieved**	L
10	Faiz Reidho.	80	**achieved**	L
11	Ahmad Riski Maulana..	90	**achieved**	L
12	Jazilatun Nikmah.	85	**achieved**	P
13	Misbahul Arifin Al Jufri.	80	**achieved**	L
14	Najwa Wilda Fajria.	80	**achieved**	P
15	Qonita Aurelia Putri	100	**achieved**	P
16	Arashi Kurnia Maulidi.	85	**achieved**	L
17	Araya Karuna Maulidi.	85	**achieved**	L
18	Raynaldo Dwi Rahmansyah..	90	**achieved**	L
19	Syikh Ach Zaka Kamlan..	95	**achieved**	L
20	Zulvierma Abelia Zulva.	90	**achieved**	P

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K Classical Learning Achievement

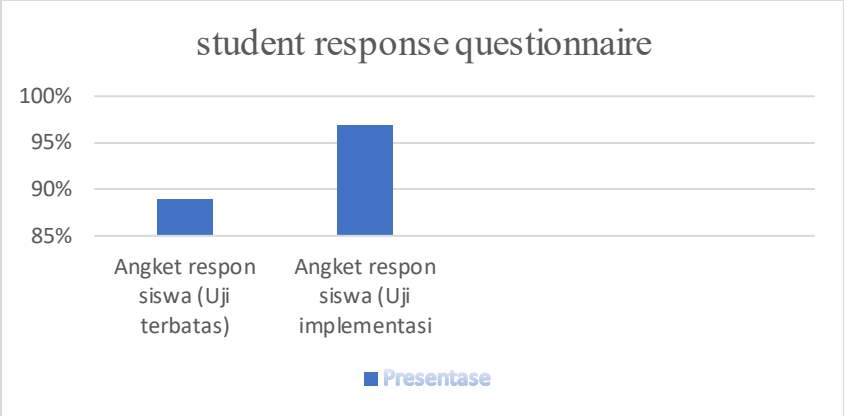
$P = \frac{\sum students\ who\ achieved\ learning}{\sum student} x100\%$

$P = \frac{\sum 20}{\sum 20} x100\%$

P= 100%

Criteria= Archieved

5. Results of student response questionnaires to determine the attractiveness of the assessment



The results of the student response questionnaire showed that this assessment product was very engaging, with a limited test percentage of 89% and an implementation test percentage of 97%, categorized as very engaging. Students considered the interactive multimedia display attractive, easy to use, and made them more enthusiastic about working on the questions. They also felt that grouping by ability level was very helpful in understanding the questions according to the appropriate level of difficulty. These findings confirm that the assessment product is not only valid in design but also interesting and liked by students when implemented.

d) *Dissaminate*

This stage aims to disseminate the TaRL-based formative assessment product on the topic of forces around us, which has been declared valid, engaging, and effective. In this research, dissemination can be carried out on a limited basis and implemented, namely:

- Creating a scientific publication in the Education journal so that the product can be used as a reference by others who wish to apply the TaRL-based formative assessment to the topic of forces around us.
- Dissemination will also be carried out in other schools in the Bangkalan area, specifically at MIS Baitur Rohman.

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DISCUSSION

This study aimed to develop a formative assessment based on the Teaching at the Right Level (TaRL) approach on the topic of forces around us for fourth-grade students at SDS Islam Al-Furqon Pamekasan. The developed assessment was designed by considering students' learning readiness and integrating interactive multimedia to create a more engaging learning experience. The discussion of this research focuses on the validity, attractiveness, and effectiveness of the developed product, as well as its contribution to science learning in elementary school.

The results of the study indicate that the TaRL-based formative assessment product met the criteria of validity based on expert judgments. Validation from the language expert obtained a score of 78.3%, which was categorized as valid. This result shows that the language used in the assessment instrument was appropriate for elementary school students' cognitive and linguistic development. The expert considered that most of the sentences were communicative, easy to understand, and in accordance with Indonesian language rules. However, several revisions were suggested, particularly regarding punctuation, sentence effectiveness, and simplification of several question statements to avoid ambiguity. After the revision process, the questions became clearer and more understandable for students. This finding supports the idea that language clarity is essential in formative assessment because students' understanding of instructions strongly affects their ability to answer questions correctly.

The material expert validation obtained a score of 83.3%, categorized as very valid. This result indicates that the content of the assessment was relevant to the learning outcomes and competencies expected in science learning for grade IV students. The material on forces around us was presented systematically, beginning from simple concepts to more complex applications. The validator also assessed that the questions reflected students' daily experiences, such as pushing, pulling, friction, and object movement, making the learning process more contextual and meaningful. The organization of the assessment according to the TaRL grouping system was also considered appropriate because it adjusted the level of difficulty to students' ability levels. This finding aligns with the concept of TaRL proposed by Kemendikbud (2023), which emphasizes that learning and assessment should be adapted to students' actual readiness rather than solely based on grade level.

Furthermore, the validation from the assessment expert achieved a score of 89%, categorized as very valid. The expert considered that the formative assessment instrument had fulfilled important assessment principles, including clarity of indicators, suitability with cognitive competencies, and the ability to measure students' conceptual understanding comprehensively. The assessment was also considered capable of identifying students' learning progress because the questions were differentiated based on low, medium, and high ability groups. This differentiation is important because students have different levels of understanding and learning speeds. Through the TaRL approach, students were able to work on questions according to their readiness level, allowing them to learn gradually and avoid frustration caused by questions that are too difficult. In addition, the use of interactive multimedia provided instant feedback, which is one of the important characteristics of formative assessment according to Black and Wiliam (1998). Feedback allows students to recognize their mistakes and improve their understanding immediately.

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The development process also demonstrated that integrating interactive multimedia into formative assessment can increase students' motivation and engagement. Based on observations during implementation, students appeared more enthusiastic and active when completing the assessment through interactive media compared to conventional paper-based tests. This finding supports previous studies by Damayanti and Dewi (2021), Hermawati and Solihin (2023), and Sukiyanto et al. (2023), which stated that technology-based assessment media such as Kahoot! and interactive multimedia can create a more enjoyable learning atmosphere and improve student participation. Elementary school students generally prefer visual and interactive learning experiences, so the multimedia-based formative assessment developed in this study successfully attracted their attention and reduced boredom during evaluation activities.

The effectiveness of the developed product can be seen from the results of the limited trial and implementation stages. In the limited trial involving five students, all students achieved learning completeness with a percentage of 100%. Similarly, in the implementation stage involving twenty students, all students also achieved the learning criteria with a percentage of 100%. These results indicate that the TaRL-based formative assessment effectively helped students understand the concept of force. The grouping system based on ability levels allowed students to work on questions that matched their understanding, enabling them to answer gradually from simpler to more complex questions. Students in the low group focused on recognizing basic concepts of force, while students in the medium and high groups were challenged to analyze more complex situations involving motion, friction, and acceleration. This gradual learning process helped students build conceptual understanding more effectively.

Another important finding of this study is related to student responses toward the developed assessment. The student response questionnaire showed very high attractiveness levels, with 89% in the limited trial and 97% in the implementation stage. Most students stated that the assessment was interesting, easy to use, and enjoyable. They also mentioned that the interactive multimedia helped them understand the questions better because the display was visually appealing and more interactive than traditional assessments. Students also appreciated the grouping system because they felt the questions were appropriate to their ability level. This indicates that the TaRL approach not only supports academic achievement but also improves students' confidence and motivation in learning. When students are given tasks that match their readiness, they are more likely to feel capable and motivated to complete them successfully.

In addition, this study highlights the importance of diagnostic assessment before implementing the formative assessment. Through diagnostic assessment, teachers were able to identify students' initial abilities and classify them into suitable groups. This process ensured that the assessment activities were more targeted and effective. The findings support Mayudana's (2020) opinion that diagnostic assessment is essential for understanding students' learning needs and designing appropriate learning strategies. Without diagnostic assessment, teachers may provide the same level of questions to all students, which can result in learning gaps and reduced student confidence.

The results of this research also demonstrate that formative assessment based on the TaRL approach can serve as an alternative solution to overcome learning disparities in elementary school classrooms. In conventional learning, teachers often provide the same assessment to all students regardless of their different abilities. As a result, some students feel the questions are too difficult, while others feel they

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are too easy. Through TaRL-based grouping, students receive assessments according to their learning readiness, making the learning process more inclusive and adaptive. This approach is particularly relevant in the implementation of the independent curriculum, which emphasizes differentiated learning and student-centered instruction.

Despite the positive findings, this study still has several limitations. First, the research was conducted only in one school with a relatively small number of participants, so the results cannot yet be generalized to broader contexts. Second, the implementation focused only on the topic of forces around us in science learning. Therefore, future researchers are encouraged to test the effectiveness of TaRL-based formative assessments on other materials and subjects with larger populations. In addition, future studies may also explore the integration of other digital platforms and multimedia applications to create more innovative assessment experiences.

Overall, this study proves that the development of a formative assessment based on the TaRL approach assisted by interactive multimedia is capable of improving students' understanding, motivation, and engagement in science learning. The assessment product is valid, attractive, and effective for fourth-grade students at SDS Islam Al-Furqon Pamekasan. The findings suggest that adaptive assessments integrated with technology can become an innovative solution for improving the quality of learning and assessment in elementary schools.

CONCLUSION

Based on the results of the research and development process, it can be concluded that the formative assessment based on the Teaching at the Right Level (TaRL) approach on the material of forces around us for fourth-grade students at SDS Islam Al-Furqon Pamekasan was successfully developed and categorized as valid, attractive, and effective for use in science learning. The development process was carried out systematically using the 4D model consisting of define, design, development, and disseminate stages. Through these stages, the product was designed according to students' learning readiness and supported by interactive multimedia to create a more engaging and adaptive assessment experience.

The validity of the developed product was proven through expert validation involving language experts, material experts, and assessment experts. The language expert validation obtained a score of 78.3% categorized as valid, indicating that the language used in the assessment was communicative, understandable, and suitable for elementary school students' characteristics. Material expert validation obtained a score of 83.3% categorized as very valid, showing that the assessment content was relevant to learning outcomes and appropriately represented the concepts of forces around us. Meanwhile, the assessment expert validation achieved a score of 89% categorized as very valid, which demonstrated that the formative assessment fulfilled important assessment principles, including suitability with competencies, clarity of indicators, and differentiation according to students' ability levels. The revision process based on expert suggestions also improved the overall quality of the product, especially in terms of sentence structure, contextualization of questions, and appropriateness of difficulty levels.

The implementation results further demonstrated that the TaRL-based formative assessment was effective in improving students' understanding of science concepts. Both the limited trial involving five students and the implementation stage involving twenty students showed 100% learning achievement. This indicates that all students were able to achieve the expected learning criteria after using the developed assessment. The grouping of students into low, medium, and high ability levels allowed

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students to work on questions according to their readiness, enabling a more gradual and meaningful learning process. Students with lower abilities could focus on understanding basic concepts, while students with higher abilities were challenged to analyze more complex problems related to force and motion. Therefore, the TaRL approach proved effective in accommodating differences in students' abilities and supporting more inclusive learning.

In addition to improving learning outcomes, the developed assessment also succeeded in increasing students' motivation and engagement during the learning process. Student response questionnaires showed very positive results, with attractiveness percentages of 89% in the limited trial and 97% in the implementation stage. Students stated that the interactive multimedia display was interesting, enjoyable, and easy to use. They also felt more enthusiastic and motivated when completing assessments through digital interactive media compared to conventional paper-based assessments. The use of multimedia elements such as visual displays and interactive question formats helped students understand the material more easily and reduced feelings of boredom during evaluation activities. This finding indicates that technology integration in formative assessment can create a more enjoyable and student-centered learning atmosphere.

Furthermore, this study demonstrates that formative assessment based on the TaRL approach can become an innovative alternative for addressing learning differences among students in elementary school classrooms. Through diagnostic assessment and ability grouping, teachers can identify students' readiness levels and provide assessments that are more appropriate to their needs. This approach not only helps students achieve better academic outcomes but also increases their confidence and participation in the learning process. The developed product is therefore highly relevant to the implementation of the independent curriculum, which emphasizes differentiated learning and the optimization of student potential.

Overall, the findings of this study confirm that the TaRL-based formative assessment assisted by interactive multimedia is feasible and beneficial for science learning in elementary schools. The product can help teachers conduct assessments more effectively, provide meaningful feedback, and support students' conceptual understanding according to their ability levels. Therefore, this assessment product has strong potential to be implemented continuously in learning activities and developed further for broader educational contexts and different subject materials. Teachers are recommended to use TaRL-based assessments on an ongoing basis because they effectively adapt to student abilities and enhance understanding. Schools are expected to support this with adequate technological facilities. Future researchers can expand the scope to other materials and levels, and test on a broader scale.

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