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Development of HOTS-Based Assessment Instruments for Evaluating Rhythmic Movement in Elementary Schools

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ABSTRACT

This research is motivated by the importance of The importance of HOTS is one of the essential competencies that students must master in facing the challenges of 21st century education, so it is necessary for teachers to develop HOTS-based assessment instruments. The purpose of this study is (1) Describe validity HOTS-based assessment instruments as evaluating rhythmic movement in elementary schools; (2) Describes practicality and (3) Testing the effectiveness. The research used is 4-D model development research. The instruments used were questionnaires and tests. Based on the results of the research conducted, it was found that HOTS-based assessment instruments for evaluating rhythmic movement in elementary schools. The validity of the instrument is supported by expert assessment which shows that the instrument is in accordance with the objectives of the HOTS assessment. In addition, this instrument has been proven effective in improving students' understanding in significantly improving students' cognitive and psychomotor abilities.

***Keywords*:**

Instrument; HOTS; Evaluating.

ABSTRAK

Penelitian ini dilatarbelakangi oleh pentingnya HOTS merupakan salah satu kompetensi esensial yang harus dikuasai peserta didik dalam menghadapi tantangan pendidikan abad 21, sehingga perlu bagi guru untuk mengembangkan instrumen asesmen berbasis HOTS. Tujuan penelitian ini adalah (1) Mendeskripsikan keabsahan instrumen asesmen berbasis HOTS sebagai penilaian gerak ritmik di sekolah dasar; (2) Mendeskripsikan kepraktisan dan (3) Menguji keefektifannya. Penelitian yang digunakan

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adalah penelitian pengembangan model 4-D. Instrumen yang digunakan adalah angket dan tes. Berdasarkan hasil penelitian yang dilakukan diperoleh instrumen asesmen berbasis HOTS untuk penilaian gerak ritmik di sekolah dasar. Keabsahan instrumen didukung oleh penilaian ahli yang menunjukkan bahwa instrumen telah sesuai dengan tujuan asesmen HOTS. Selain itu instrumen ini terbukti efektif dalam meningkatkan pemahaman peserta didik dalam meningkatkan kemampuan kognitif dan psikomotorik peserta didik secara signifikan.

***Kata kunci*:**

Instrumen; HOTS; Evaluasi.

1. Introduction

High Order Thinking Skills (HOTS) is one of the essential competencies that students must master in facing the challenges of 21st century education. HOTS not only involves students' ability to remember information, but also to analyze, evaluate, and create new solutions in complex situations (Adijaya et al., 2023). The development of skills in education is crucial as it promotes critical, creative, and innovative thinking among students when it comes to problem-solving. A report from the Organisation for Economic Co-operation and Development (OECD) titled "Future of Education and Skills 2030" highlights that fostering higher-order thinking skills can prepare students with essential competencies for the future, such as complex problem-solving and effective decision-making. (OECD, 2019).

HOTS itself can be defined as a cognitive ability that goes beyond simply remembering or understanding information, but also includes the ability to analyze, evaluate, and create something new based on existing knowledge. (Chandio et al., 2021). These skills focus on the development of complex cognitive competencies that empower students to tackle unstructured problems, think critically, and make well-informed decisions through a comprehensive evaluation of various situations. In the realm of education, Higher-Order Thinking Skills (HOTS) are crucial because they facilitate deeper and more reflective learning, encouraging students to connect the concepts they have learned to real-life scenarios. (Drenoyianni & Kourtis, 2022).

According to Hadzhikoleva et al (2019), the application of HOTS in learning allows students to develop broader thinking skills, such as problem solving, logical reasoning, and creativity. These skills are very relevant in today's education world because they not only serve to improve learning outcomes, but also prepare students to face challenges in the increasingly complex world of work and social life. Study by Driana, E (2019) also emphasized that students who are able to master HOTS tend to be more independent in learning and have the ability to think critically in evaluating information, especially in the digital era where access to information is so broad (Kemdikbud, 2022).

In the context of basic education, HOTS skills have been the focus of various international studies. One of the studies conducted by Driana & Ernawat (2019) emphasizes that the integration of HOTS in the basic education curriculum is able to facilitate students to be more involved in the in-depth learning process, which is not only limited to conceptual understanding but also to its

application in real situations. In addition, a study by Kim & Hong (2020) also shows that HOTS-based learning has a positive impact on increasing student motivation and engagement, especially when applied in learning activities that emphasize exploration, collaboration, and the use of information technology.

Rhythmic movement, utilized as a component of the Physical Education, Sports, and Health (PJOK) curriculum in elementary schools, can serve as an effective tool for developing Higher Order Thinking Skills (HOTS). This form of movement, which incorporates physical skills, coordination, and an awareness of patterns and rhythms, presents significant opportunities for both cognitive and motor development in students. According to research by García-Hermoso et al (2020), rhythmic movement activities can strengthen motor skills while improving critical and reflective thinking skills in children student. By integrating HOTS-based assessment instruments into rhythmic movement practices, student it is expected that students will not only be able to follow movements mechanically, but also develop a deep understanding of movement concepts, and be able to evaluate and create innovative movement variations.

While numerous studies have highlighted the significance of higher-order thinking skills (HOTS) implementation across various disciplines, its application within Physical Education and Health (PJOK), particularly concerning rhythmic movement materials in elementary schools, remains limited. This limitation underscores the necessity for developing assessment instruments that evaluate not only the physical aspects but also the cognitive and motor skills of students. Conventional assessment tools, which typically focus solely on recalling basic facts and concepts, often fail to capture more intricate cognitive dimensions such as analysis, synthesis, and evaluation. (Walid et al., 2019). Assessment instruments specifically designed for HOTS must be able to measure students' abilities in solving real problems, thinking critically, and producing original creative ideas. According to research Shanti et al (2022), the use of HOTS-based assessment tools has been proven to provide a more accurate picture of students' cognitive abilities, while encouraging them to be more actively involved in the learning process in a comprehensive and reflective manner.

In addition, the validity and reliability of the assessment instruments for HOTS are crucial factors that must be considered. According to a study by Setiawan et al. (2021), a good assessment tool should not only be able to measure factual knowledge, but also evaluate higher thinking processes, including students' ability to evaluate and interpret information critically. Valid and reliable assessment tools will help teachers understand the extent to which students are able to apply critical and creative thinking skills in various situations, while providing constructive feedback for improving the learning process in the future (Urbina & Monks, 2020). In the context of basic education, the development of specific instruments, such as in rhythmic movement material, is very important so that HOTS abilities developed by students can be measured accurately. Assessment instruments that are able to evaluate HOTS in physical activities such as rhythmic movement must consider cognitive, affective, and psychomotor dimensions in a balanced manner. (Oktaviana & Susiaty, 2020).

Previous research on the development of HOTS-based assessment tools has shown significant results in improving the quality of learning evaluation. Jansen, & Möller (2022) highlighted that HOTS-based assessments allow educators to measure students' ability to think critically, analyze, and synthesize information, compared to traditional assessments that tend to only test the ability to

remember and understand. This study also revealed that HOTS-based assessment instruments can facilitate students in applying the knowledge learned to solve complex problems, making it more relevant to real-life challenges.

Furthermore, a study conducted by Zulfiani et al. (2023) showed that the development of HOTS assessment tools had a positive impact on students' cognitive abilities. The instruments developed in this study were aimed at evaluating students' analytical and evaluative skills across various subjects, including mathematics and science. The findings revealed that students assessed with Higher Order Thinking Skills (HOTS)-based instruments exhibited significant improvements in critical thinking and problem-solving abilities. Furthermore, these students demonstrated a better understanding of abstract concepts compared to those evaluated with traditional assessment methods. Another study by Yudha (2023) emphasizes the importance of validity and reliability in developing HOTS-based assessment tools. Yu et al. have developed an empirically validated assessment tool grounded in higher-order thinking skills (HOTS) that is applicable across diverse learning contexts. This study underscores the importance of having valid and reliable instruments that accurately reflect the higher-order cognitive skills being assessed, such as the ability to evaluate arguments or devise creative solutions to complex problems. Additionally, the findings indicate that HOTS-based assessments can enhance student engagement by promoting more reflective and collaborative learning experiences.

Overall, these studies underscore the importance of HOTS-based assessment tools in supporting more holistic educational goals. The development of these instruments not only measures learning outcomes more comprehensively, but also encourages students to develop higher-order thinking skills that are essential in their professional and social lives. (Al-Gaseem et al., 2020). Specifically, the objectives of this research include (1) Describing the validity HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement in elementary schools; (2) Describes practicality HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement in elementary schools; and (3) Testing the effectivenessHOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement in elementary schools.

2. Methods

2.1. Research Design

This research is a type of research and development or Research and Development (R&D), namely research that is applied to produce certain products and test the effectiveness of the resulting products. (Johnson & Christensen, 2024). The products that will be developed in this research are: HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement. The design in this study uses a 4-D development model. According to Maydiantoro, (2021), the 4-D development model stands for define, design, development, and dissemination. Below is a picture of the 4-D stages.

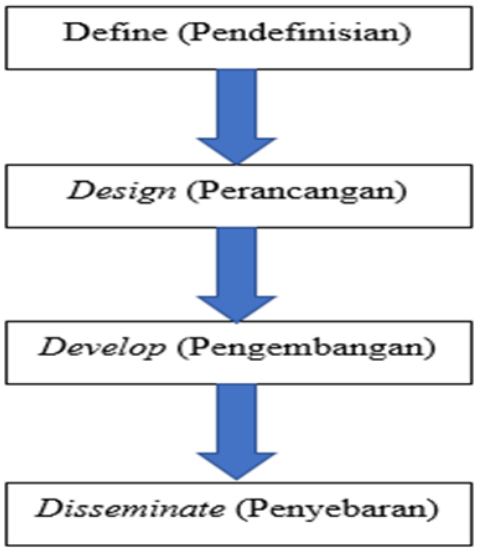

Figure 1. Development Model 4-D

2.2 Participants

This research was conducted at SDN Kasihan 03 Jember during the odd semester of the 2024/2025 Academic Year, with the subjects being fifth-grade students. The study utilized random sampling, aimed at ensuring that the selected sample accurately represents the characteristics of the population being analyzed. The rationale for choosing these research subjects includes the fact that 1) fifth-grade students have reached a more advanced stage of cognitive development compared to earlier grades, in alignment with developmental theory. Piaget (1972), where students aged 10-11 years are at the concrete operational stage towards formal operational. At this stage, students are starting to be able to think logically and analytically, and can solve more complex problems, which are an important basis for applying high-level thinking skills (HOTS); (2) The Merdeka curriculum in grade V of elementary schools in Indonesia, especially in the Physical Education subject, already includes rhythmic movement skills as part of arts and sports learning (Ministry of Education, Culture, Research and Technology, 2022). At this level, students begin to be directed to not only understand the movements technically, but also to be able to create and evaluate their own movements; and (3) Fifth grade students are expected to have a higher level of independence and responsibility in learning. Students tend to be more ready to engage in self-evaluation and reflection, which are important aspects in HOTS-based assessment. Therefore, fifth grade elementary school students were chosen as research subjects because at this stage they have the ability to be actively involved in the evaluation process and can provide feedback relevant to the instruments develop (Alkhatib, 2019).

2.3 Data Types and Sources

This study utilizes both primary and secondary data sources. The primary data includes validation results (validity), questionnaires (practicality), and tests (effectiveness). In contrast, secondary data encompasses relevant documents that bolster this research. The collected data types consist of both qualitative and quantitative information.

2.4 Data Collection

Data collection techniques in this study were questionnaires, tests, and documentation. A questionnaire is a data collection technique carried out by giving a set of questions/statements to respondents to answer. (Hikmawati, 2020). According to Cohen et al (2007), questionnaires have the advantage of not requiring researchers to be present in the field and the data collected is easy to analyze. In this research, questionnaires will be distributed to both teachers and students to gather their responses regarding the use of HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement. A questionnaire will serve as the instrument for this purpose. In educational research, this technique is employed to collect quantitative data. (Cohen et al., 2007). In the context of this research, the researcher provided a test instrument to determine the effectiveness of the HOTS-based assessment instrument as an evaluation tool for understanding and practicing rhythmic movement.

2.5 Data Analysis

The data gathered in this study will be analyzed to assess the validity, practicality, and effectiveness of HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement. The analysis will utilize the following formula to evaluate the validation results of the HOTS-based assessment instruments in this context.

$$P = \frac{\sum x}{\sum xi} \times 100\%$$

Information:
P = Product validity
∑x = Score achieved
∑xi = Maximum score that can be achieved
Source: Suharsimi (2016)

The calculation results using the formula above are then confirmed with the product validity criteria in the following table.

Table 1. Product Validity Criteria

Score Range	Validity Criteria
81.00 -100	Very worthy
61.00 - 80.99	Worthy
41.00 - 60.99	Decent enough
21.00 - 40.99	Not worth it
0 - 20.99	Very inadequate

Source: Mashud (2021)

Furthermore HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement The developed product can be tested further if it reaches at least the feasible category or obtains a score of ≥ 61 and makes revisions according to the notes provided by the validator.

Analysis of data from teacher response questionnaires and students are done with the following formula.

$$P = \frac{F}{N} \times 100\%$$

Information:
P = Teacher and student responses
F = Score achieved
N = Maximum score that can be achieved
Source: Sugiyono (2017)

The calculation results using the formula above are then confirmed with the product practicality criteria in the following table.

Table 2. Product Practicality Criteria

Score Range	Practicality Criteria
81.00 - 100	Very practical
71.00 - 80.99	Practical
61.00 - 70.99	Quite practical
41.00 - 60.99	Not practical
0 - 40.99	Very impractical

Source: Mashud (2021)

Analysis of effectiveness test result data HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement done with the following.

$$ER = \frac{MX_1 - MX_2}{\left[\frac{MX_1 - MX_2}{2}\right]} \times 100\ \%$$

Information:
ER = Level relative effectiveness
MX1 = Meanor the average value of the control group
MX2 = Meanor the average of the experimental group
Source:Masyhud (2021)

The paired t-test above was conducted with the help of SPSS software by comparing data before and after treatment from one sample group. The results of the calculations using the formula above will then be confirmed with the product effectiveness criteria in the following tab**le**.

Table 3. Product Effectiveness Criteria

Score Range	Criteria Effectiveness
81.00%-100%	Very high
61.00%-80.00%	Tall

Score Range	Criteria Effectiveness
41.00%-60.99%	Currently
21.00%-40.99%	Low
0%-20.99%	Very low

Source: Mashud (2021)

3. Results and Discussion

3.1 Validation Test Results HOTS-Based Assessment Instruments as Evaluation Tools for Understanding and Practicing Rhythmic Movement

Below, the researcher presents the validation results. HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement.

Table 4. Validation Results

Aspect	Sub-aspects	V1	V2	V3	Average	Percentage	Criteria
Construct validity	Integration with HOTS theory	4	4.3	4.3	4.2	84%	Very valid
	Suitability of the question item structure	4.7	4.3	4.3	4.4	88%	Very valid
	Consistency and relevance between components	4.4	4.2	4.4	4.3	86%	Very valid
Validity of content	Completeness of the measured material	4	4	5	4.3	86%	Very valid
	Compliance with student development	4	4.3	4.3	4.2	84%	Very valid
	Clarity and appropriateness of the question items	4.7	4.3	4.3	4.4	88%	Very valid
Legibility	Readability level of question items	4	4	5	4.3	86%	Very valid
	Level of explanation and instructions	4	4.3	4.3	4.2	84%	Very valid
Language	Clarity of language used	4.7	4.3	4.3	4.4	88%	Very valid
	Harmony of use of terms	4.4	4.2	4.4	4.3	86%	Very valid
Average						86%	Very valid

According to the evaluation from the validators presented in Table 4, the HOTS-based assessment has been categorized as highly valid as a tool for understanding and practicing rhythmic movement, achieving an average validity percentage of 86%. Both the construct and content validity,

along with the instrument's readability and language, have been deemed satisfactory. Therefore, this assessment is deemed appropriate for testing elementary school students' understanding and practice of rhythmic movement within the HOTS framework.

3.2 Results of Practicality Test HOTS-Based Assessment Instruments as Evaluation Tools for Understanding and Practicing Rhythmic Movement

Below, the researcher presents the results of the practicality test through the responses given by the teacher to HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement.

Table 5. Teacher Response Results

Aspect	Sub-aspects	G VA	G VB	Average	Percentage	Criteria
Ease of use	Integration with HOTS theory	4.3	4.3	4.3	86%	Very practical
	Suitability of the question item structure	4	4.5	4.25	85%	Very practical
Execution time	Consistency and relevance between components	4.5	4.25	4,375	87.5%	Very practical
Instrument suitability	Completeness of the measured material	4.5	4.25	4,375	87.5%	Very practical
	Compliance with student development	4	4.4	4.2	84%	Very practical
User convenience	Clarity and appropriateness of the question items	4.5	4	4.25	85%	Very practical
Student response	Level of explanation and instructions	4.3	4.3	4.3	86%	Very practical
Average					86%	Very practical

Based on the information presented in Table 5, it can be concluded that the teachers' responses to the HOTS-based assessment instruments, used for evaluating the understanding and practice of rhythmic movement, fall into the very practical category, with an average percentage of 86%. The teachers find the instrument easy to understand, timely to implement, and relevant to the learning objectives. Their feedback suggests that this assessment tool is practical for use in physical education activities within the classroom.

Below, the researcher presents the results of the practicality test through the responses given by students to HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement.

Table 6. Student Response Results

Aspect	Sub-aspects	Many students answered				Percentage	Criteria
		SS	S	TS	STS		
Ease of use	Are the questions in the instrument easy to understand?	23	5	2		92.5%	Very practical
	Is the instrument easy to use when working on rhythmic motion problems?	23	4	3		91.6%	Very practical
Clarity of questions and instructions	Are the instructions for completing the questions clear and easy to understand?	26	3	1		95.8%	Very practical
	Do you feel comfortable working on problems based on this instrument?	24	3	3		95%	Very practical
Suitability of materials	Are the questions given in accordance with the rhythmic movement lesson?	27	3			97.5%	Very practical
Relevance to learning	Do these questions help you understand the rhythmic movement material better?	24	3	3		95%	Very practical
Student participation level	Do you feel actively involved while using this instrument?	23	4	3		91.6%	Very practical
Average						94%	Very practical

Based on the data presented in Table 6, it can be concluded that students responded positively to the HOTS-based assessment instrument as an evaluation tool for understanding and practicing rhythmic movement, achieving a very practical rating with an average percentage of 94%. This instrument is user-friendly, aligns with the material studied, and enhances students' comprehension of rhythmic movements. The favorable feedback from students indicates that practical instruments effectively promote participation and understanding in the learning of rhythmic movements.

3.3 Results of Effectiveness Test HOTS-Based Assessment Instruments as Evaluation Tools for Understanding and Practicing Rhythmic Movement

Next, the researcher conducted an effectiveness test on HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movementwhich is specifically intended for students. The results of the test calculated using the relative effectiveness level formula can be seen as follows. It is known that the results of the experiment are that the average value of the control group is 74.25 and the average value of the experimental group is 86, then:

$$ER = \frac{MX_1 - MX_2}{\left[\frac{MX_1 - MX_2}{2}\right]} \times 100\%$$

$$\frac{30.98 - 47.08}{\frac{30.98 + 47.08}{2}} \times 100\%$$

$$= \frac{16.1}{39.03} \times 100\%$$

$$= 41.25\%$$

Based on the calculation results above, the relative effectiveness level was obtained as 41.25%. Referring to the effectiveness criteria table, then HOTS-based assessment instruments as evaluation tools for understanding and practicing rhythmic movement which was developed has a moderate level of effectiveness.

3.4 Validity HOTS-Based Assessment Instruments as Evaluation Tools for Understanding and Practicing Rhythmic Movement

The research findings indicate that the HOTS-based assessment instrument, designed for evaluating the understanding and practice of rhythmic movements in elementary schools, has been validated by expert reviewers. The validity criteria achieved demonstrate that the instrument meets the established standards for accuracy and precision in measuring student abilities. This validity is important because, as explained by Robert, Miller & Gronlund (2009), a valid assessment instrument must be able to accurately measure the cognitive abilities to be evaluated, in this case high-level thinking skills and students' understanding of rhythmic movement.

In theory, the validity of HOTS assessment instruments is closely related to the instrument's ability to measure various aspects of complex thinking, such as analysis, evaluation, and synthesis (Brookhart, 2010). In this study, the assessment instrument developed not only measures students' ability to understand the basic concept of rhythmic movement, but also evaluates students' ability to apply the concept in more complex and creative situations. This is in line with the findings of Retnawati et al. (2018), which states that HOTS-based assessments must be able to evaluate students' abilities in critical thinking and problem solving in authentic learning contexts.

The assessment carried out by the validator also includes the aspect of reliability, namely the consistency of the instrument in producing stable results over time (Crocker & Algina, 1986). A valid assessment instrument is characterized by high reliability, meaning it consistently produces accurate results across various situations and at different times. When assessing rhythmic movement, this involves evaluating both psychomotor skills and cognitive abilities, so the instrument must effectively measure both dimensions. The results of the study show that the developed instrument exhibits adequate reliability, indicating that it can be trusted to continuously assess students' understanding and practice of rhythmic movement.

In addition, the development of this HOTS assessment instrument also refers to the principles of authentic assessment, where students are not only tested based on memorization or ability to

remember, but are also given the opportunity to apply their understanding in real and relevant activities (Darling-Hammond et al., 2020). In the context of rhythmic movement, assessment is not only limited to theoretical understanding, but also to practical skills involving movement coordination, creativity, and reflection on the activities carried out. The results of this study support previous studies showing that HOTS-based assessment is more effective in increasing student engagement and providing a more comprehensive picture of student abilities (Zohar & Dori, 2003).

The findings of this study underscore the significance of utilizing HOTS-based assessment tools to gain a more comprehensive understanding of students' abilities. Employing valid and reliable instruments ensures that high-level thinking skills can be accurately assessed, particularly in contexts that emphasize practical skills like rhythmic movement. These results aim to serve as a reference for the development of additional HOTS-based assessment tools, both in PJOK subjects and other areas of learning.

3.5 Practicality HOTS-Based Assessment Instruments as Evaluation Tools for Understanding and Practicing Rhythmic Movement

Based on research findings, the HOTS-based assessment instrument designed for evaluating the understanding and practice of rhythmic movement in elementary schools has demonstrated practical effectiveness, as indicated by assessments from both teachers and students through a questionnaire. This practical criterion suggests that the instrument is not only theoretically valid but also user-friendly in a classroom setting. Both teachers and students provided positive feedback regarding the developed instrument, highlighting its appropriateness and ease of use in the evaluation process.

The practicality of an assessment instrument is crucial as it directly impacts its implementation in educational settings. Effective instruments are those that are user-friendly for both teachers and students, without necessitating additional time or complex tools. Moreover, these instruments should be suitable for a variety of classroom environments, whether fully equipped or with limited resources. In this study, teachers indicated that the HOTS-based assessment instrument that was developed was straightforward to understand, did not require substantial modifications to learning plans, and could be executed within a reasonable timeframe. Practicality assessment theory, namely the practicality of an instrument is measured by ease of use, time efficiency, and clarity of instructions given to the user Suharsimi (2006).

From the student's perspective, this tool is perceived as easy to comprehend and aligns well with their learning activities. Students believe that this instrument not only evaluates their understanding of rhythmic movement theory but also allows them to showcase the practical skills they have acquired. This aspect is crucial, as higher-order thinking skills (HOTS) assessment necessitates that students not only recall information but also apply it in real-world contexts. (Brookhart, 2010). The results of this study support the findings Darling-Hammond et al (2020), which emphasizes that practical instruments for students are instruments that enable them to be actively involved in the assessment process, integrate practical knowledge and skills, and provide challenges that are appropriate to their abilities.

Educators who utilize the instrument share perspectives indicating its applicability across different learning models, including both cooperative and individual approaches. Furthermore, the questionnaire demonstrates that this instrument effectively measures students' abilities comprehensively, addressing both their conceptual understanding and motor skills. This is very important because, according to Schulz & FitzPatrick (2016), one of the challenges in HOTS assessment is ensuring that the instrument can be used flexibly in various learning settings and is able to measure cognitive and psychomotor dimensions holistically.

The findings indicate that the practical criteria derived from teacher assessments and student feedback demonstrate a high level of acceptability for this instrument within elementary school settings. This tool is not only conceptually sound but also user-friendly in application, offering a comprehensive assessment experience for students while enabling teachers to effectively evaluate higher-order thinking skills (HOTS). The results of this study make a significant contribution to enhancing the quality of HOTS-based assessments in elementary schools, particularly in the context of PJOK subjects.

3.6 Effectiveness HOTS-Based Assessment Instruments as Evaluation Tools for Understanding and Practicing Rhythmic Movement

The findings of the study indicate that the HOTS-based assessment instrument developed has been effective in enhancing both the understanding and practice of rhythmic movement among elementary school students. This effectiveness is evidenced by a significant improvement in students' cognitive and psychomotor abilities following the use of the instrument in the evaluation process. These results align with the HOTS-based assessment theory, which posits that assessments demanding higher-order thinking—such as analysis, evaluation, and creativity—can lead to a deeper understanding of the material and a more effective application of that knowledge in practice. (Brookhart, 2010).

HOTS-based assessment possesses characteristics that effectively challenge students to think critically and reflectively. The instrument utilized in this study not only evaluates students' foundational understanding of rhythmic movement concepts but also encourages them to devise creative strategies for implementing these movements and to reflect on their own performance. This supports the view Anderson & Krathwohl (2001), which emphasizes that HOTS-based assessment encourages students to not only understand information factually, but also apply it in real contexts, which in this case is rhythmic movement practice.

In addition, this study shows that student evaluated using HOTS-based instruments were better able to demonstrate better movement mastery compared to traditional assessment approaches. This is in line with the findings Zohar & Dori (2003), who found that HOTS instruments increased students' engagement in the learning process and improved their ability to connect theory with practice. In the context of rhythmic movement, student those evaluated with this instrument are better able to demonstrate creativity in movement, better coordination, and reflective ability in evaluating their own performance.

The effectiveness of this instrument can also be attributed to the authentic assessment approach which emphasizes the importance of meaningful learning experiences (Darling-Hammond et al., 2020). In the developed instrument, students are not only presented with cognitive questions but also engage in tasks that require them to practice movements in more challenging contexts, such as through projects or group presentations. Therefore, this assessment of Higher-Order Thinking Skills (HOTS) evaluates not only students' knowledge but also their skills and attitudes in executing rhythmic movements, all of which are crucial elements of movement learning.

The instruments developed also reflect a student-centered learning approach, which allows students to take a more active role in the learning and evaluation process (Schulz & FitzPatrick, 2016). This is important in rhythmic movement learning, where students must be directly involved in developing their physical skills and applying movement knowledge independently. The HOTS-based assessment used in this study provides space for students to take the initiative, explore movement, and reflect on their achievements more critically.

The findings of this study demonstrate that assessment instruments based on Higher Order Thinking Skills (HOTS) are not only effective in evaluating students' understanding and practice of rhythmic movement but also in enhancing the overall quality of student learning. By employing tools that promote high-level thinking, students are encouraged to engage more profoundly in the learning process, improve their ability to connect theoretical concepts with practical applications, and develop greater creativity and reflective skills. This study makes a significant contribution to the literature on rhythmic movement education and reinforces the importance of integrating HOTS into the evaluation process.

4. Conclusion

Based on the research findings and the discussion presented, we can conclude that the HOTS-based assessment instrument developed for evaluating understanding and practicing rhythmic movement in elementary schools meets the criteria of being valid, practical, and effective. The validity of the instrument is reinforced by expert evaluations, which indicate that it aligns with the objectives of HOTS assessment and rhythmic movement learning. In terms of practicality, this instrument is user-friendly for teachers and has received positive feedback from students, as demonstrated by questionnaire results reflecting user satisfaction. Furthermore, the instrument has proven effective in significantly enhancing students' cognitive and psychomotor abilities.

The implications of these findings in education suggest that HOTS-based instruments can play a crucial role in facilitating deeper and more meaningful learning experiences, particularly in the context of PJOK education, such as rhythmic movement. These instruments promote critical, creative, and reflective thinking, which not only enhances conceptual understanding but also helps develop students' motor skills. Furthermore, HOTS-based assessment tools represent a significant innovation in educational evaluation, particularly for assessing high-level thinking skills, which are anticipated to elevate the quality of education in the future.

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