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Development and Validation of a Quizalize-Based Digital Assessment for Learning Motivation and Critical Thinking in Elementary IPAS Learning

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ABSTRACT

Purpose: This study addressed the need for an interactive digital assessment instrument to measure elementary students' learning motivation and critical thinking skills in IPAS learning. It aimed to develop and validate a Quizalize-based digital assessment instrument for fourth-grade students. **Methods:** A Research and Development (R&D) approach using the ADDIE model was employed, comprising analysis, design, development, implementation, and evaluation. Data were collected through observations, interviews, expert validation sheets, student response questionnaires, an ARCS-based learning motivation questionnaire, and a HOTS-based critical thinking test. The field try-out involved 30 fourth-grade students at SDN Gayam, Bogorejo District, Blora Regency, selected through saturated sampling. Data were analyzed using descriptive percentage analysis and Cronbach's Alpha to examine validity, feasibility, practicality, and reliability. **Findings:** Expert validation yielded a feasibility score of 91.11%, while the practicality test produced 90.21%. Cronbach's Alpha coefficients were 0.934 for the learning motivation questionnaire and 0.911 for the critical thinking test, indicating high internal consistency. These results demonstrate that the developed instrument met the criteria for feasibility, practicality, and reliability. **Research Implications:** The Quizalize-based digital assessment provides an interactive and practical alternative for measuring learning motivation and critical thinking in elementary IPAS learning and supports structured assessment and immediate feedback. **Originality:** The originality lies in integrating learning motivation and HOTS-based critical thinking measurement within a single Quizalize-based digital assessment framework featuring automated scoring and interactive feedback.

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INTRODUCTION

Educational assessment has evolved from a process primarily concerned with measuring student achievement into an evidence-based practice that supports instructional decision-making. Contemporary assessment emphasizes the collection of valid and reliable evidence to identify students' learning needs and inform subsequent instruction (Sakdiah et al., 2023). Formative assessment further highlights the importance of using assessment information continuously to monitor learning and provide feedback (Goertzen & Schils, 2023). Therefore, the quality of an assessment instrument requires appropriate validity, reliability, and alignment between the instrument and the competencies being measured.

The development of digital technology has expanded opportunities for implementing assessment in more interactive and efficient ways. Digital assessment platforms can facilitate data collection, scoring, feedback, and the organization of assessment results. Learning analytics, for example, can support the interpretation of student learning data in digital environments (Chen et al., 2023). Gamified assessment platforms can also incorporate interactive features, such as immediate feedback, scoring, and game-like activities, which may encourage students to participate more actively in assessment activities (Zhang and Crawford 2024; Cigdem et al. 2024). However, the use of digital or gamified platforms does not automatically establish the validity or reliability of the assessment instruments implemented through them. The assessment content, indicators, scoring procedures, and measurement evidence must still be appropriately developed and evaluated.

Learning motivation and critical thinking are important dimensions of student learning that require appropriate assessment. Learning motivation is related to students' willingness, persistence, and engagement in learning activities, whereas critical thinking involves processes such as interpretation, analysis, evaluation, inference, and explanation. These competencies are particularly relevant in elementary education because students

are developing foundational learning habits and reasoning abilities (Julianto et al., 2023). Previous studies have reported that technology-supported and inquiry-oriented learning environments can provide opportunities for students to engage in problem solving and higher-order thinking (Saputra et al., 2025); (Susilawati & Supriyatno, 2023). Nevertheless, evidence concerning these constructs does not necessarily indicate that the digital platforms used in such studies function as validated assessment instruments.

This issue is relevant to the implementation of the Merdeka Curriculum in Indonesia, which emphasizes meaningful learning, inquiry, collaboration, creativity, and higher-order thinking (Afifa et al., 2024). In elementary schools, IPAS provides opportunities for students to explore natural and social phenomena through contextual learning experiences. Consequently, assessment in IPAS needs to provide information not only about students' cognitive achievement but also about relevant learning characteristics, including motivation and higher-order thinking. Digital assessment platforms may provide a practical environment for administering such assessments while supporting efficient scoring and feedback (Fitria & Rosana, 2023).

Despite these developments, previous research on digital and gamified platforms has predominantly examined their use as learning media, instructional support, or tools for increasing engagement and learning outcomes. Studies involving Quizalize have similarly emphasized its use in gamified or technology-supported learning activities rather than the systematic development and validation of an assessment instrument that integrates multiple learner constructs (I. A. Putri & Susanti, 2026). This distinction is important because the use of a digital platform for assessment does not, by itself, demonstrate that the resulting instrument possesses adequate validity, reliability, or practicality. Therefore, further development research is needed to establish the quality of assessment instruments implemented through such platforms.

Another limitation concerns the separation of affective and higher-order cognitive assessment. Learning motivation and critical thinking are frequently examined as separate variables, resulting in assessment data that may provide only partial information about students' learning characteristics (Atika & Purbosari, 2026). An assessment framework that brings these two constructs together can provide teachers with more structured information concerning students' motivational characteristics and higher-order cognitive skills (Psyllou et al., 2023). However, such integration requires clear construct definitions, appropriate indicators, and separate measurement instruments for each construct (Utaminingsih et al., 2023).

Based on this gap, the present study develops a Quizalize-based digital assessment instrument for elementary IPAS learning that integrates two assessment components: an ARCS-based questionnaire for measuring learning motivation and a HOTS-based test for measuring critical thinking skills (Hsu et al., 2022). Quizalize functions in this study as a digital platform for administering the assessment, organizing responses, scoring, and providing digital feedback, rather than as a learning intervention. The quality of the developed instrument is examined through expert validation, practicality testing, and internal consistency analysis (Lestari, 2023). Thus, the contribution of this study is not the transformation of Quizalize into a psychometric instrument, but the development and evaluation of assessment instruments implemented through Quizalize for measuring learning motivation and critical thinking within elementary IPAS learning (Schellekens et al., 2024).

Accordingly, this study aims to develop a Quizalize-based digital assessment instrument for elementary IPAS learning and to examine its validity, feasibility, practicality, and reliability (Mejia & Sargent, 2023). The study specifically focuses on the quality of the developed assessment instruments and does not seek to determine the causal effect of Quizalize on students' learning motivation or critical thinking skills (Kessels et al., 2024).

METHOD

Research Design

This study employed a Research and Development (R&D) design using the ADDIE model, consisting of five stages: analysis, design, development, implementation, and evaluation. The ADDIE model was selected because it provides a systematic framework for developing and refining educational assessment instruments (Li & Sun, 2024; Spatioti et al., 2022). The study focused on developing a Quizalize-based digital assessment instrument for measuring learning motivation and critical thinking skills in elementary IPAS learning (Black & Wiliam, 2023). Quizalize functioned as a digital platform for administering the assessment, organizing responses, scoring, and providing digital feedback, rather than as a learning intervention. Therefore, the study did not employ an experimental or quasi-experimental design and did not aim to examine the causal effect of Quizalize on students' learning outcomes. The quality of the developed instrument was examined through expert validation, field try-out, practicality assessment, and internal consistency analysis.

Research Setting and Participants

The study was conducted at SDN Gayam, Bogorejo District, Blora Regency, Central Java, Indonesia, during the 2025/2026 academic year. The participants consisted of all 30 fourth-grade students enrolled in IPAS learning. Saturated sampling was used because the entire population was included in the field try-out. The field try-out was conducted to examine the practicality and internal consistency of the developed assessment instruments rather than to compare learning outcomes between groups. Before data collection, permission was obtained from the school principal and classroom teacher. Parents or guardians were informed about the research activities, and participation

was conducted with appropriate consent. Student data were treated confidentially and used only for research purposes.

Development Procedures

The Quizalize-based digital assessment instrument was developed through the five ADDIE stages. In the analysis stage, classroom observations, teacher interviews, student needs analysis, and curriculum analysis were conducted to identify existing assessment practices and the need for a digital assessment instrument in IPAS learning.

In the design stage, the constructs, indicators, item specifications, assessment formats, scoring procedures, and instrument blueprints were prepared. Learning motivation was operationalized using the ARCS framework, comprising attention, relevance, confidence, and satisfaction. Critical thinking was operationalized through interpretation, analysis, evaluation, inference, and explanation (Li & Sun, 2024).

In the development stage, the assessment instruments were developed and integrated into Quizalize. The development included the preparation of the learning motivation questionnaire and HOTS-based critical thinking test, followed by content and media expert review. Expert feedback was used to revise the content, item clarity, language, scoring procedures, and digital presentation (Kurniawan et al., 2024).

In the implementation stage, the revised instrument was administered to 30 fourth-grade students in a classroom assessment context. This field try-out was conducted to obtain student responses and measurement data for examining practicality and internal consistency. No instructional treatment or comparison between experimental and control groups was conducted. In the evaluation stage, expert feedback, student responses, and reliability results were reviewed to identify aspects requiring revision. The final product was subsequently refined based on the findings from the development process (R. A. Putri et al., 2023).

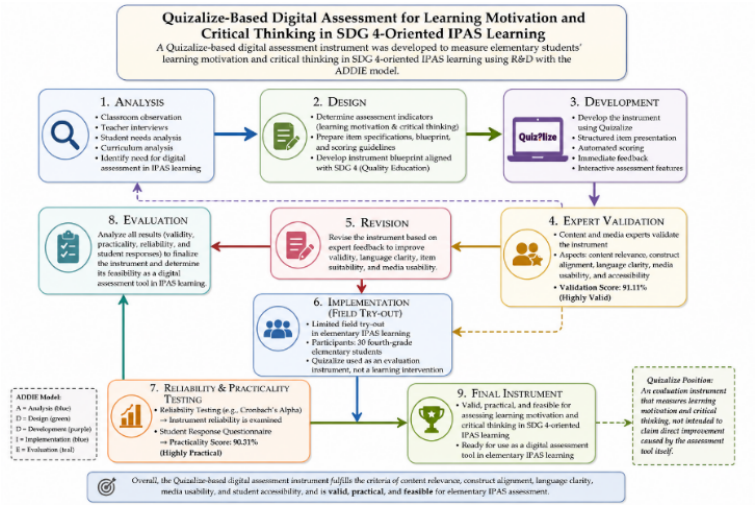


Figure 1. Development Procedure of the Quizalize-Based Digital Assessment Instrument (Sari et al., 2024)

Research InstrumentsFive instruments were used in the study. The learning motivation questionnaire consisted of 20 items based on the ARCS model. The critical thinking skills test consisted of 15 HOTS-based items covering interpretation, analysis, evaluation, inference, and explanation. A 16-item student response questionnaire was used to assess the practicality of the digital assessment. In addition, content and media expert validation sheets were used to evaluate the relevance, clarity, construct alignment, suitability, and digital feasibility of the developed assessment.

The learning motivation questionnaire used response categories appropriate to the ARCS indicators, while the critical thinking test used predetermined scoring criteria based on the expected responses. The assessment instruments were administered through Quizalize, which was configured to present the assessment items, record student responses, calculate scores where applicable, and provide digital feedback (Rahmawati et al., 2024). The details are presented in Table 1.

Table 1. Research Instruments

Instrument	Number of Items	Respondents	Purpose
Learning Motivation Questionnaire	20	Grade IV students	To measure students' learning motivation
Critical Thinking Skills Test (HOTS)	15	Grade IV students	To measure students' critical thinking skills
Student Response Questionnaire	16	Grade IV students	To assess the practicality of the developed instrument
Content Expert Validation Sheet	17	Content experts	To assess content validity and material feasibility
Media Expert Validation Sheet	19	Media experts	To evaluate media feasibility and usability

The learning motivation questionnaire was developed based on the ARCS motivational model, which includes attention, relevance, confidence, and satisfaction (Putra et al., 2024). The critical thinking skills test was developed based on critical thinking indicators, including interpretation, analysis, evaluation, inference, and explanation. The student response questionnaire was used to examine the practicality of the developed instrument, while content and media expert validation sheets were used to assess the validity and feasibility of the Quizalize-based digital assessment instrument.

Validity and Reliability Testing

Content and media validity were examined through expert judgment. The validation criteria included content relevance, construct alignment, language clarity, item suitability, assessment presentation, and digital usability. The obtained validation score was calculated descriptively as a percentage of the maximum possible score. The overall validation result was 91.11%, indicating that the developed assessment was considered highly feasible by the participating experts (Arifin & Wulandari, 2023).

Because the study involved limited expert participation, the validation result is interpreted as evidence of expert-based content and media feasibility rather than comprehensive psychometric construct validity. The study did not conduct factor analysis or other advanced construct-validation procedures.

Reliability was examined using Cronbach's Alpha to assess the internal consistency of the learning motivation questionnaire and the critical thinking skills test. The motivation questionnaire obtained an Alpha coefficient of 0.934, while the critical thinking test obtained a coefficient of 0.911. Both coefficients exceeded the commonly used minimum criterion of 0.70, indicating high internal consistency (Suryani & Mahendra, 2024).

Data Collection

Data collection included classroom observation, semi-structured teacher interviews, expert validation, student response questionnaires, the learning motivation questionnaire, the critical thinking skills test, and documentation (Waluyo & Uska, 2024). Observation and interviews were conducted during the analysis stage to identify assessment needs and classroom conditions. Expert validation was conducted before the field try-out, and the resulting feedback was used to revise the instrument. During the field try-out, all 30 students completed the digital assessment and student response questionnaire. The motivation questionnaire and critical thinking test were administered as measurement instruments rather than as pretest and posttest measures. Therefore, the resulting scores were not interpreted as evidence of learning improvement or as an effect of Quizalize ((Parsons et al., 2024).

Data Analysis Techniques

Quantitative data were analyzed descriptively. Expert validation and student practicality responses were converted into percentages using the following formula:

$$Percentage = \frac{Obtained\ score}{Maximum\ score} \times 100$$

The resulting percentages were interpreted according to the predetermined feasibility and practicality criteria. Reliability data from the learning motivation questionnaire and critical thinking test were analyzed using Cronbach's Alpha. Qualitative comments from experts, teachers, and students were analyzed descriptively and used to identify revisions needed to improve the developed instrument. No inferential analysis was conducted to compare experimental and control groups or to determine the causal effect of Quizalize because the study did not employ an experimental or quasi-experimental design (Ulyani et al., 2023).

Practicality data were obtained from student response questionnaires completed by 30 students and analyzed using a percentage formula to determine the usability and accessibility of the developed instrument in elementary IPAS assessment. Reliability data were analyzed using Cronbach's Alpha to examine the internal consistency of the learning motivation questionnaire and the critical thinking skills test. Qualitative feedback from experts, teachers, and students was analyzed descriptively and used as the basis for revising and finalizing the instrument (Safira et al., 2024).

Table 2. Data Analysis Techniques

Data	Source	Analysis Technique	Output
Expert validation	Content and media experts	Descriptive percentage analysis	Instrument validity and feasibility
Student response questionnaire	30 Grade IV students	Descriptive percentage analysis	Instrument practicality
Learning motivation questionnaire	30 Grade IV students	Cronbach's Alpha	Internal consistency of motivation instrument
Critical thinking skills test	30 Grade IV students	Cronbach's Alpha	Internal consistency of critical thinking instrument
Expert, teacher, and student feedback	Experts, teacher, and students	Descriptive qualitative analysis	Revision and final refinement

Overall, these procedures ensured that the Quizalize-based digital assessment instrument was systematically evaluated and finalized based on validity, reliability, practicality, and feasibility as an assessment tool for IPAS learning.

RESULTS

Needs Analysis and Product Development

The development process began with a needs analysis at SDN Gayam involving classroom observation and interviews with the fourth-grade teacher and 30 students. The analysis identified predominantly conventional learning activities, paper-based assessment practices, and students' difficulties in analyzing problems, constructing logical arguments, drawing conclusions, and responding to higher-order thinking tasks. Teachers and students consequently indicated the need for a more interactive digital assessment instrument capable of measuring learning motivation and critical thinking skills.

Based on these findings, Quizalize was selected as the digital assessment platform because it supports interactive quizzes, automatic scoring, immediate feedback, and gamified features suitable for elementary students. The product was then designed through an assessment blueprint, an ARCS-based learning motivation questionnaire, HOTS-based critical thinking items, scoring guidelines, and an assessment flow. The prototype integrated the assessment items, supporting images, scoring settings, feedback, and digital presentation features into Quizalize. The resulting product included a login page, quiz dashboard, assessment questions, leaderboard, and feedback interface to facilitate digital assessment administration and provide structured assessment results for teachers.



Figure 2. Needs Analysis Activities at SDN Gayam

Based on the identified needs, the assessment instrument was designed by preparing the assessment blueprint, learning motivation questionnaire, HOTS-based critical thinking items, scoring rubric, and Quizalize assessment flow. The prototype was then developed by integrating assessment items, instructional images, feedback settings, and automatic scoring into the Quizalize platform.

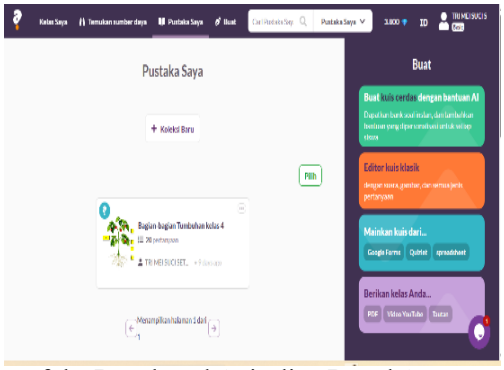


Figure 4. Interface of the Developed Quizalize-Based Assessment Instrument

Before classroom implementation, the prototype underwent expert validation involving one subject matter expert and one media expert. Several revisions were made based on the validators' recommendations, including improving language clarity, refining visual layout, adjusting interface consistency, and enhancing the presentation of assessment items. After revision, the instrument was considered suitable for classroom implementation.

The development of the Quizalize-based IPAS assessment instrument began with a needs analysis conducted at SDN Gayam. This stage involved classroom observations and interviews with the fourth-grade classroom teacher and 30 fourth-grade students. The purpose of the needs analysis was to identify existing assessment practices, students' learning conditions, and the necessity of developing a technology-based assessment instrument capable of measuring both learning motivation and critical thinking skills.

The observations revealed that IPAS instruction was still dominated by conventional teaching methods, particularly lectures and question-and-answer sessions. Learning media were limited to textbooks and whiteboards, which were insufficient to encourage students' active participation. Among the 30 students observed, only approximately seven students actively participated during classroom activities. Assessment practices were predominantly paper-based and had not integrated digital technology. Furthermore, students experienced difficulties in analyzing problems, identifying relevant information, constructing logical arguments, drawing conclusions, and solving higher-order thinking questions and preferred interactive assessment activities. The classroom teacher also acknowledged that technology-based assessment could increase students' learning motivation while simultaneously facilitating the development of critical thinking skills. Based on these findings, Quizalize was selected as the platform for developing the digital IPAS assessment instrument because it provides interactive quizzes, automatic scoring, immediate feedback, and a user-friendly interface suitable for elementary school students.

Product Validation Results

The feasibility of the developed instrument was evaluated by one subject matter expert and one media expert. The validation assessed content accuracy, alignment with curriculum objectives, assessment quality, language clarity, interface design, and technical usability.

Table 3. Expert Validation Results

Validator	Obtained Score	Maximum Score	Percentage	Category
Subject Matter Expert	79	85	92.94%	Highly Feasible
Media Expert	85	95	89.47%	Highly Feasible
Average	164	180	91.11%	Highly Feasible

The instrument achieved an overall feasibility score of 91.11%, indicating that it met the required standards for content validity, construct appropriateness, language clarity, visual presentation, and technical quality. Therefore, the product was considered appropriate for implementation in elementary IPAS learning.

Product Practicality Results

The practicality of the Quizalize-based IPAS assessment instrument was evaluated after implementation by 30 fourth-grade students using a response questionnaire consisting of 16 statements.

Table 4. Product Practicality Results

Component	Value
Number of Respondents	30 students
Number of Statements	16
Obtained Score	433
Maximum Score	480
Percentage	90.21%
Category	Highly Practical

The product obtained a practicality score of 90.21%, categorized as highly practical. The student responses indicated that the platform was accessible and relatively easy to operate. The interactive presentation, automatic scoring, immediate feedback, and gamified features were also perceived positively by students.

Table 5. Expert Validation Results

Validator	Obtained Score	Maximum Score	Percentage	Category
Subject-Matter Expert	79	85	92.94%	Highly Feasible
Media Expert	85	95	89.47%	Highly Feasible
Average	164	180	91.11%	Highly Feasible

The average expert evaluation score was 91.11%. The subject-matter expert provided a score of 92.94%, while the media expert provided 89.47%. These findings indicate that the developed product was considered highly feasible in terms of content and digital presentation. However, because the validation involved only one subject-matter expert and one media expert and was analyzed using descriptive percentages, the result is interpreted as expert-based feasibility evidence rather than comprehensive psychometric validity evidence.

Reliability Results

The learning motivation questionnaire consisted of 20 items based on the ARCS framework, while the critical thinking test consisted of 15 HOTS-based items covering interpretation, analysis, evaluation, inference, and explanation. Both instruments were administered to the 30 students involved in the field try-out. Reliability analysis was conducted using Cronbach’s Alpha to examine their internal consistency.

Table 6. Reliability Results of the Assessment Instruments

Instrument	Number of Items	Respondents	Cronbach's Alpha	Interpretation
Learning Motivation Questionnaire	20	30	0.934	High Internal Consistency
Critical Thinking Skills Test	15	30	0.911	High Internal Consistency

The learning motivation questionnaire obtained a Cronbach's Alpha coefficient of 0.934, whereas the critical thinking skills test obtained a coefficient of 0.911. Both coefficients exceeded the commonly applied minimum criterion of 0.70, indicating high internal consistency of the two developed instruments.

Field Try-Out of the Assessment Instruments

The learning motivation questionnaire and critical thinking skills test were administered as assessment instruments during the field try-out. The purpose of their administration was to examine the functioning and internal consistency of the developed instruments within an authentic classroom assessment context. The obtained scores were not analyzed as pretest and posttest data, and no experimental or control groups were established. Therefore, the results are not interpreted as evidence of improvement in students' learning motivation or critical thinking skills and do not provide evidence of a causal effect of Quizalize. The field try-out therefore provides preliminary evidence concerning the usability and internal consistency of the developed assessment instruments. More extensive psychometric validation, such as item-level analysis, content validity indices involving multiple experts, item difficulty and discrimination analysis for the critical thinking test, and construct validation, would require additional data beyond the present field try-out.

Summary of Findings

Overall, the development process produced a Quizalize-based digital assessment instrument that was evaluated through expert review, student practicality responses, and internal consistency analysis. The overall expert feasibility score was 91.11%, the student practicality score was 90.21%, and Cronbach's Alpha coefficients were 0.934 for the learning motivation questionnaire and 0.911 for the critical thinking skills test. These findings provide evidence that the developed assessment has favorable expert-based feasibility, classroom practicality, and internal consistency. The findings should be interpreted as evidence concerning the quality of the developed assessment instrument, rather than as evidence of its effectiveness in improving student motivation or critical thinking.

DISCUSSION

The findings indicate that the Quizalize-based IPAS digital assessment instrument demonstrated favorable expert-based feasibility, practicality, and internal consistency. The overall expert evaluation score of 91.11% suggests that the developed product was considered appropriate in terms of content, assessment presentation, language, interface, and technical usability. The development process through ADDIE contributed to systematic refinement by connecting the identified assessment needs with instrument design, expert review, revision, and field try-out. This finding is consistent with the view that digital assessment requires alignment among assessment content, usability, and technological features to generate useful evidence for instructional decision-making. However, the 91.11% result should be interpreted as evidence of expert-based feasibility rather than comprehensive psychometric validity, because the present study involved only one subject-matter expert and one media expert and used descriptive percentage analysis.

The practicality score of 90.21% obtained from 30 fourth-grade students indicates that the developed assessment was generally accessible and manageable for classroom use. Students' positive responses were associated with the clarity of the digital interface, ease of operation, and availability of immediate digital feedback. These characteristics can reduce operational barriers during assessment administration and may help teachers implement digital assessment more efficiently. Similar research has emphasized the importance of usability and accessibility in technology-supported assessment environment. Nevertheless, students' positive responses should be understood as perceptions of usability and practicality rather than evidence that the platform caused changes in motivation or learning performance.

The reliability findings provide additional evidence concerning the internal consistency of the two assessment components. The learning motivation questionnaire obtained a Cronbach's Alpha coefficient of 0.934, while the critical thinking skills test obtained 0.911. These values indicate high internal consistency within the respective instruments. The results are relevant to the formative assessment perspective because reliable measurement can help teachers obtain more consistent information about students' responses and use that information to inform subsequent instructional decisions. In relation to the ARCS framework, the motivation questionnaire provides structured information concerning attention, relevance, confidence, and satisfaction. Similarly, the HOTS-based critical thinking assessment provides information related to interpretation, analysis, evaluation, inference, and explanation. Thus, the contribution of the developed product lies in bringing two distinct assessment components into a single digital assessment environment (Fraillon et al., 2023).

From a theoretical perspective, the findings support the application of formative assessment principles in a digital context. Digital technology can facilitate the administration, scoring, and presentation of assessment evidence, but the quality of the resulting evidence still depends on the underlying constructs, item design, scoring procedures, and measurement quality. In this study, Quizalize served primarily as the technological environment through which the assessment instruments were administered. Therefore, features such as automatic scoring, immediate feedback, and gamified presentation should be interpreted as functional characteristics of the assessment platform rather than as empirically demonstrated mechanisms that improve students' motivation or critical thinking.

Several contextual factors may also have influenced the field try-out results. Students' previous experience with digital devices, differences in familiarity with online assessment, teacher assistance during administration, and the availability and stability of devices and internet connectivity may affect students' perceptions of practicality. A novelty effect may also occur when students encounter a digital assessment format that differs from their usual paper-based assessment. Consequently, the high practicality score should be interpreted within the context of the specific school and participant group rather than generalized to all elementary students.

The practical implication of the study is that teachers may use the Quizalize-based assessment to collect more structured information about students' learning motivation and critical thinking skills within an interactive digital environment. The resulting assessment evidence can potentially be reviewed alongside classroom observations and other learning evidence to identify areas requiring instructional attention. However, the instrument should be regarded as a supporting assessment tool rather than a substitute for broader teacher judgment or other forms of assessment.

The study also has several limitations. First, the field try-out involved only 30 fourth-grade students from a single elementary school, limiting the transferability of the findings to other populations and educational settings. Second, expert validation involved only one subject-matter expert and one media expert; therefore, the study provides limited evidence for content and media feasibility rather than comprehensive evidence of construct validity. Third, the study did not conduct item difficulty and discrimination analysis, factor analysis, or other advanced psychometric procedures. Fourth, no experimental or quasi-experimental comparison was conducted, so the findings cannot be used to conclude that Quizalize improves students' learning motivation or critical thinking. Future studies with larger and more diverse samples, multiple experts, item-level analysis, and additional validity evidence would strengthen the evaluation of the developed assessment instruments.

Regarding SDG 4, the findings may be discussed only in a general conceptual sense. The use of a digital assessment environment is consistent with efforts to support more accessible, structured, and technology-supported educational practices. However, because the present study did not directly measure SDG 4 indicators, the findings do not provide empirical evidence of an SDG 4 outcome. The connection to SDG 4 should therefore be understood as a broader educational context rather than as a directly tested research variable.

Overall, the study extends previous work by developing a Quizalize-based digital assessment that combines an ARCS-based learning motivation questionnaire and a HOTS-based critical thinking assessment within one digital environment. Rather than claiming that Quizalize itself produces improvements in student competencies, the study demonstrates that the platform can be used to administer assessment instruments that show favorable expert-based feasibility, practicality, and internal consistency. This distinction strengthens the methodological consistency of the study and clarifies its contribution as an instrument-development study.

CONCLUSION

This study developed a Quizalize-based digital assessment instrument for measuring elementary students' learning motivation and critical thinking skills in IPAS learning. The development process followed the ADDIE model and involved needs analysis, instrument design, product development, expert review, field try-out, and revision. The developed instrument obtained an overall expert-based feasibility score of 91.11% and a practicality score of 90.21% based on responses from 30 fourth-grade students. Reliability analysis also indicated high internal consistency, with Cronbach's Alpha coefficients of 0.934 for the learning motivation questionnaire and 0.911 for the critical thinking skills test.

These findings indicate that the developed assessment was considered feasible and practical for classroom use and demonstrated satisfactory internal consistency under the conditions of the field try-out. Quizalize provided a digital environment for administering assessment items, recording responses, scoring, and providing immediate feedback. The findings should not be interpreted as evidence that Quizalize causes improvements in students' learning motivation or critical thinking skills because the study did not employ an experimental or quasi-experimental design.

The study has several limitations, including the involvement of only 30 students from one elementary school and validation by one subject-matter expert and one media expert. In addition, advanced psychometric procedures, such as item difficulty and discrimination analysis, construct validation, and validation using a larger and more diverse sample, were not conducted. Therefore, further research should involve multiple experts, larger and more diverse samples, and additional psychometric analyses to strengthen the validity and generalizability of the

assessment instruments. Future studies may also examine the instrument across different grade levels, subjects, and educational settings.

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