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Development of Kahoot-Based Learning Evaluation Instruments on Plant Parts Material

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Abstract:

This study aimed to develop and examine the feasibility and effectiveness of a Kahoot-based learning evaluation instrument on the topic of plant body parts for fourth-grade elementary students. The study was motivated by the continued reliance on conventional paper-based evaluation tools, which tend to limit student engagement, motivation, and conceptual understanding. A Research and Development (R&D) approach was employed using the ADDIE model, encompassing the stages of Analysis, Design, Development, Implementation, and Evaluation. Data were collected through observations, interviews, expert validation sheets, student response questionnaires, and pre-test and post-test instruments. Product validation involved media experts, language experts, and subject matter experts to ensure the quality of the evaluation instrument in terms of content accuracy, language clarity, and media design. The validation results indicated that the developed instrument achieved a very high level of feasibility. Student responses also demonstrated strong acceptance and positive engagement with the Kahoot-based evaluation. In terms of effectiveness, the results showed a substantial improvement in students' learning outcomes, as reflected by a notable increase in post-test scores compared to pre-test scores and a high N-gain category. These findings suggest that the Kahoot-based evaluation instrument is not only pedagogically appropriate but also effective in enhancing student motivation and learning achievement. Therefore, the integration of game-based digital evaluation tools such as Kahoot can serve as a viable alternative to traditional assessment methods and contribute to more interactive and meaningful learning evaluation practices in elementary education.

Key Words: *Learning Evaluation, Kahoot, Learning Outcomes*

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INTRODUCTION

The rapid advancement of science and digital technology has significantly reshaped educational practices, particularly in the areas of teaching, learning, and assessment. In contemporary educational settings, technology is no longer positioned merely as a supporting tool but has become an integral component in enhancing instructional quality and learning outcomes. Digital integration in education plays a critical role in fostering student engagement, motivation, and higher-order thinking skills, especially at the primary education level where foundational competencies are developed (Amir et al., 2025; Li et al., 2025; Silvanus & Simuja, 2025). However, despite the growing availability of digital

tools, learning evaluation practices in many elementary schools remain dominated by conventional paper-based assessments that emphasize memorization rather than conceptual understanding (Ndomondo, 2024; Oliveira, 2025; Walker et al., 2022). This condition is also evident in Indonesian elementary schools, where teachers often rely on printed tests and manual grading systems, limiting opportunities for interactive feedback and student-centered assessment (Djiwandono & Ginting, 2025; Nurkamto et al., 2021; Sa'i & Nugroho, 2025). As a result, students frequently experience reduced motivation and engagement during evaluation activities, which may negatively affect their learning outcomes and overall learning experience (Butler, 2025; Fisher et al., 2025; Pat-El et al., 2024). These challenges highlight the urgent need for innovative evaluation approaches that align with the characteristics of young learners and the demands of digital-era education.

Existing studies have widely explored the use of digital tools and gamification in educational assessment, revealing several recurring themes. One prominent theme is the positive impact of game-based learning platforms on student motivation and participation (Nadeem et al., 2023; D. Park & Shin, 2025). Research has shown that applications such as Kahoot create competitive yet enjoyable learning environments that encourage active student involvement and sustained attention. Another recurring theme concerns the role of digital evaluation tools in providing immediate feedback, which supports formative assessment and helps learners identify their strengths and weaknesses more effectively (Lowe et al., 2024; Sfez, 2025; Tensen et al., 2025). Prior studies also indicate that digital assessment platforms can assist teachers in managing evaluation processes more efficiently, particularly in terms of automatic scoring and data collection (Cui, 2024; LI Wanjun et al., 2021; Wang & Zhang, 2025). Nevertheless, most of these studies focus on secondary or higher education contexts, with limited attention given to elementary-level learning evaluation. Moreover, many existing works emphasize the effectiveness of Kahoot as a learning medium rather than as a systematically developed and validated evaluation instrument. This suggests that while the benefits of Kahoot are well acknowledged, its potential as a structured assessment tool in primary education remains underexplored.

Despite the growing body of literature on digital learning evaluation, several research gaps remain evident. First, there is a lack of studies that adopt a comprehensive Research and Development approach to design, validate, and test digital evaluation instruments specifically for elementary school students. Second, existing research often evaluates the effectiveness of Kahoot in general terms without grounding the instrument in curriculum-based learning objectives and indicators. Third, few studies integrate expert validation processes involving media, language, and subject matter specialists to ensure the feasibility and pedagogical appropriateness of the developed instruments. In the context of Indonesian primary education, particularly under the Merdeka Curriculum, these gaps become more pronounced, as teachers are expected to implement flexible and student-centered assessment strategies. Therefore, this study offers

novelty by developing a Kahoot-based learning evaluation instrument that is systematically designed, empirically validated, and contextually aligned with the IPAS curriculum, focusing on the topic of plant body parts.

The purpose of this study is to develop, validate, and evaluate the effectiveness of a Kahoot-based learning evaluation instrument for fourth-grade students at SDN Pengasinan 2, Bekasi City. Specifically, the study aims to assess the feasibility of the developed instrument through expert validation involving media, language, and material experts, to examine students' responses toward its implementation, and to determine its effectiveness in improving learning outcomes. By addressing these objectives, the study seeks to contribute to the existing literature on digital learning evaluation by providing empirical evidence on the applicability of Kahoot as a structured assessment tool in elementary education. In addition to its academic contribution, this research also offers practical value for teachers and schools by presenting an alternative evaluation model that is interactive, efficient, and aligned with students' learning characteristics.

This study focuses on exploring how a digital game-based evaluation instrument can enhance students' engagement and learning achievement when systematically developed using the ADDIE model. Through a qualitative and quantitative integration within the R&D framework, the research emphasizes the importance of needs analysis, expert validation, and iterative refinement in producing a reliable evaluation instrument. By examining teacher practices, student responses, and learning outcomes, this study provides a comprehensive understanding of digital evaluation implementation at the elementary level. The discussion that follows elaborates on the methodological approach employed to develop and validate the instrument, thereby offering insights into how digital evaluation tools can be effectively integrated into primary school learning environments.

RESEARCH METHODS

This research was conducted in the context of elementary education, where learning evaluation practices are still predominantly conventional and have not fully integrated digital technology to support student engagement and formative feedback (Karaman, 2021; Skedsmo & Huber, 2024; Sri Mertasari & Candiasa, 2022). The study was carried out at SD Negeri Pengasinan 2, Bekasi City, Indonesia, an elementary school implementing the Merdeka Curriculum and representing typical assessment practices in primary education. This condition reveals a gap between current pedagogical demands and assessment practices implemented in classrooms, particularly in science-based subjects that require conceptual understanding and active student participation (Akcan, 2022; Altunışık et al., 2023; Ojo, 2024). To address this gap, the study adopted a Research and Development (R&D) approach using the ADDIE model, which consists of the stages of Analysis, Design, Development, Implementation, and Evaluation (Lee & Lee, 2025; Saeidnia et al., 2022; Wahira et al., 2023). The ADDIE

model was selected because it provides a structured yet flexible framework that supports systematic product development, validation, revision, and field testing (Bin Mohd Aris & Mansor, 2023; Gwak & Kim, 2023; S. Park & Yoon, 2021). To clarify the methodological stages applied in this study, the ADDIE model framework that guided the development process is illustrated in **Figure 1**.

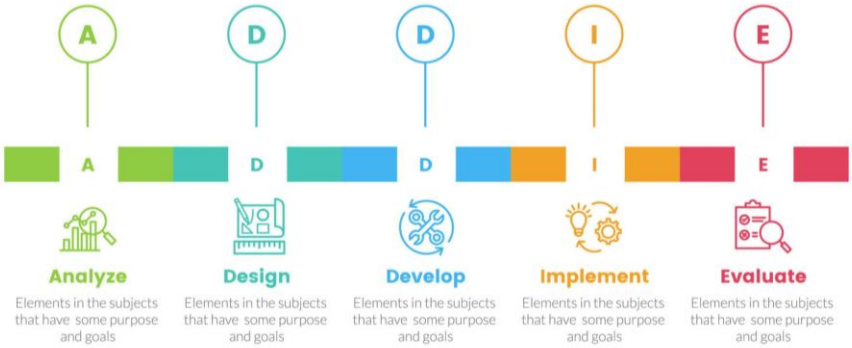


Figure 1. The ADDIE Research and Development Model

Following the ADDIE framework, product development was carried out through sequential and iterative stages (Kim & Nam, 2025; mostafa et al., 2024; Spatioti et al., 2022). The analysis stage involved identifying evaluation-related challenges through classroom observations and semi-structured interviews with teachers to capture authentic instructional needs. In the design stage, learning objectives, indicators, and assessment formats were systematically mapped to produce an initial prototype of the digital evaluation instrument. The development stage focused on refining the prototype into a functional product, which was then subjected to expert validation involving media experts, language experts, and subject matter experts. Data collection methods were selected to align with each development stage, including questionnaires and interview guides for needs analysis, expert validation sheets to assess content validity and media quality, and student response questionnaires to evaluate usability. Additionally, pre-test and post-test instruments were administered during the implementation stage to examine the product's effectiveness in improving learning outcomes. The integration of multiple data sources ensured a comprehensive and rigorous development process.

Product validation and data analysis were conducted to determine the validity, practicality, and effectiveness of the developed evaluation instrument. Expert validation data were analyzed using descriptive statistical techniques, such as mean scores and percentage values, to categorize feasibility levels based on established criteria. These results served as the basis for targeted revisions prior to field implementation. To evaluate effectiveness, pre-test and post-test scores were analyzed using paired sample t-tests to identify statistically significant improvements in student learning outcomes following the use of the product (Afifah et al., 2022; Jing & M, 2025; Saghafi et al., 2024). Student

questionnaire data were analyzed descriptively to assess practicality and user acceptance. To enhance the credibility of the findings, triangulation was applied by comparing expert judgments, student feedback, and learning outcome data (Eijkelboom et al., 2023; Jansen et al., 2024; Vieira & Girona-García, 2023). Through this systematic analysis, the study ensured that the developed product was theoretically grounded, empirically validated, and practically viable for classroom application.

RESULTS AND DISCUSSION

Results

This research developed a learning evaluation model using the Kahoot application for the topic "Parts of Plants" in the IPAS subject. The evaluation aimed to strengthen students' understanding of plant parts, their functions, and their roles in sustaining life. The development process followed the systematic ADDIE model, consisting of Analysis, Design, Development, Implementation, and Evaluation stages.

Analysis

Teacher Requirements Analysis

The teacher needs analysis showed that evaluation activities were still dominated by printed tests and manual scoring. Digital-based evaluation tools were not yet implemented, and multimedia elements such as images, videos, or audio were rarely used. Based on the interview, the teacher stated that students' motivation varies and tends to decrease when evaluation questions are considered difficult. The teacher also expressed the need for a more practical and engaging evaluation instrument and agreed that Kahoot could be used as an interactive medium to improve student participation and motivation. The summary of the teacher needs analysis is shown in **Table 1**.

Table 1. Summary of Teacher Needs Analysis

Aspect	Key Findings
Current evaluation practice	Mostly printed tests, worksheets, and oral questioning
Use of multimedia	Limited use of images/video/audio in evaluation
Digital evaluation	Not implemented due to limited technological facilities and classroom constraints
Student condition	Motivation varies; some students need more time
Teacher expectation	Needs practical, engaging evaluation tools
Teacher response to Kahoot	Agreed and interested in using Kahoot

Student Analysis

Classroom observations showed that students relied mainly on textbooks and had limited engagement during learning activities. The lack of varied teaching methods resulted in minimal understanding of real-life applications of the material. Therefore, the researcher aimed to develop a technology-based evaluation instrument to create a more engaging and diverse learning experience.

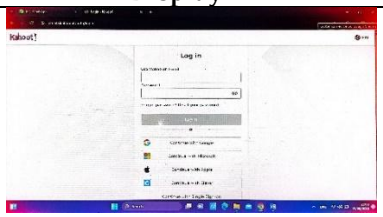
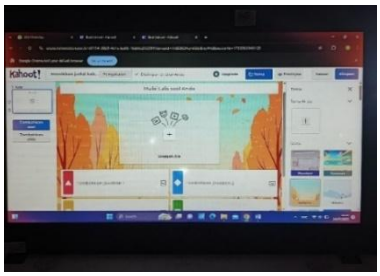
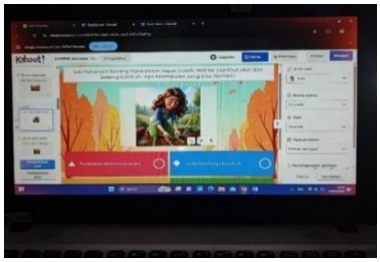
Curriculum Analysis

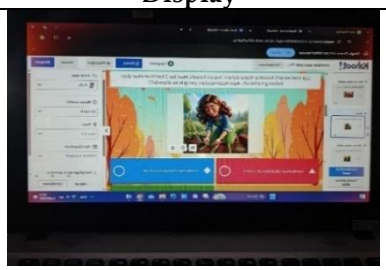
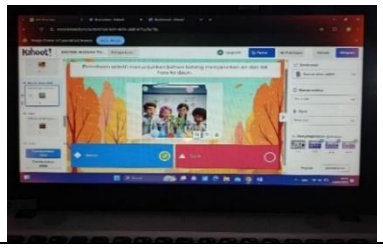
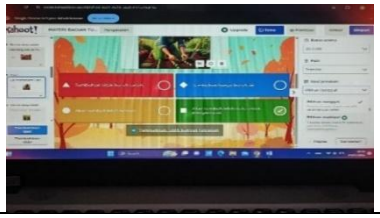
SDN Pengasinan 2, particularly grade IV, implements the Merdeka Curriculum. Teachers use the IPAS (Science and Social Studies) textbook as the main learning and assessment resource. This study focuses on Chapter 1: Plants, the Source of Life on Earth, as the selected learning material.

Design

In the design stage, the researcher created a Kahoot-based evaluation instrument aligned with learning objectives and indicators. The questions, validation sheets, and student response questionnaires were carefully prepared. The Kahoot design includes visuals, sound, and music to make learning more engaging and accessible via digital devices. The overall design of the Kahoot-based evaluation instrument is presented in **Table 2**.

Table 2. Product Design for Learning Assessment Using Kahoot

Display	Description
	The first step in creating a learning evaluation using Kahoot is to open the website https://kahoot.com and log in using a previously registered account.
	After successfully logging in, click the Create button to start making a new quiz as a learning evaluation instrument.
	The question creation panel displays a field to type the question, provides four answer choices, and allows you to mark the correct answer. On the right side, there are settings for time limits and points for each question as needed.
	Once the questions are created, supporting media such as images or videos can be added to make the questions more engaging and easier to understand.

Display	Description
	There is also a timer and points setting feature to adjust the duration and scoring weight based on the students' speed and accuracy in answering.
	When the quiz is run, the interface is interactive; in both live and assignment modes, students can view the questions on the main screen and respond using their own devices such as mobile phones, tablets, or laptops.
	The answer choices appear in red, blue, yellow, and green — a distinctive feature of Kahoot that makes the evaluation process more engaging and enhances students' active participation in learning.

Development

Media Expert

The media expert validation was conducted to evaluate the feasibility of the Kahoot-based evaluation instrument in terms of visual appearance, readability, layout, ease of access, and user convenience. This validation focused on ensuring that the media design was attractive, interactive, and suitable for Grade IV elementary school students. The results of the media expert validation are presented in **Table 3**.

Table 3. First Validation Results by Media Experts

No	Indicator	Score
1	The attractiveness of the front page (cover) in the Kahoot media	4
2	Ease of accessing the learning evaluation website using Kahoot	4
3	The attractiveness of the learning evaluation template using Kahoot	4
4	Accuracy of text size in the product, making it easier to read	3
5	Accuracy of image and text placement	3
6	Ease of user access via mobile phone or laptop	3
7	Ease of use of the learning evaluation using Kahoot	4
8	Ease of user access via mobile phone or laptop	4
9	Appropriateness of the duration for completing the learning evaluation	4
10	Accuracy of text size in the product, making it easier to read	4
Total Score		**37**
Average		**50**
Average Percentage of Total Validity		**74%**

Based on the media expert's assessment, the Kahoot-based evaluation instrument achieved a feasibility score of 74%, which falls into the "fairly feasible" category. However, several revisions were recommended to enhance the product's quality prior to field testing. A summary of the advice and revisions proposed by the media experts is presented in **Table 4**, while the implementation of these recommendations, illustrated through a comparison of the instrument before and after revision, is shown in **Table 5**.

Table 4. Advice and Improvements by Media Experts

No	Suggestion	Revision
1	The writing of text or font type in the image should be made clear, high in contrast, and easy for students to read.	The font type or style used in the images on Kahoot should be adjusted to ensure the text is easy for students to read.
2	Presenting material through videos can help students better understand the learning content in a fun and interactive way.	The audio in the learning video should be adjusted in terms of clarity and intonation so that the message can be effectively delivered to students.

Table 5. Advice and Improvements by Media Experts

Before Revision	After Revision
	
The text display "I AM A PART OF THE PLANT BODY" was considered less attractive to students. The font used looked common and was slightly difficult for students to read.	The font type or style used in the images on Kahoot should be adjusted to ensure the text is easy for students to read.

Following the implementation of the recommended revisions, a second media expert validation was conducted to assess the extent to which the quality of the Kahoot-based evaluation instrument had improved. This validation focused on key aspects such as visual attractiveness, accuracy of text size and placement, accessibility via various devices, and overall usability of the evaluation media. Using consistent evaluation criteria, the second validation provides a clearer picture of the effectiveness of the revision process. The detailed results of this validation are presented in **Table 6**.

Table 6. Second Validation Results by Media Experts

No	Indicator	Score
1	The attractiveness of the front page (cover) in the Kahoot media	5
2	Ease of accessing the learning evaluation website using Kahoot	5
3	The attractiveness of the learning evaluation template using Kahoot	5
4	Accuracy of text size in the product, making it easier to read	4
5	Accuracy of image and text placement	5
6	Ease of user access via mobile phone or laptop	4
7	Ease of use of the learning evaluation using Kahoot	5

No	Indicator	Score
8	Ease of user access via mobile phone or laptop	5
9	Appropriateness of the duration for completing the learning evaluation	5
10	Accuracy of text size in the product, making it easier to read	5
	Total Score	48
	Average	50
	Average Percentage of Total Validity	96%

Language Expert

The language expert validation was conducted to assess the linguistic quality of the Kahoot-based evaluation instrument, including accuracy of spelling and punctuation, sentence structure, clarity of language, consistency of terms, and appropriateness of language for Grade IV students. The initial validation indicated several linguistic issues, such as inaccurate punctuation, inconsistent sentence structure, and duplicate items. Revisions were made to improve linguistic accuracy, sentence effectiveness, and clarity in accordance with the Indonesian Spelling Guidelines (PUEBI).

After revision, the language expert validation results showed a substantial improvement, indicating that the instrument met linguistic standards and was suitable for classroom use. The final validation results from the language expert are presented in **Table 7**.

Table 7. Language Expert Validation Results After Revision

No	Indicator	Score
1	Accuracy in the use of Indonesian language according to PUEBI (Indonesian Spelling Guidelines)	**5**
2	Appropriateness of language with the characteristics of students	**4**
3	Ease for students to understand the language well	**5**
4	Accuracy of punctuation in sentence writing	**5**
5	Accuracy of sentence structure	**5**
6	Consistency in the use of terms and symbols	**5**
7	Accuracy of grammar and sentence construction	**5**
8	Appropriateness of language with the concept of the material	**5**
9	Effectiveness of sentences according to spelling rules	**5**
10	Clarity of the language used	**5**
	Total Score	**64**
	Average	**65**
	Average Percentage of Total Validity	**98%**

The results shown in **Table 7** indicate that the Kahoot-based learning evaluation instrument demonstrates an excellent level of linguistic feasibility. The language expert awarded a total score of 64 out of a maximum score of 65, which corresponds to a feasibility percentage of 98 percent. This result places the instrument in the very feasible category and reflects a high level of compliance with established linguistic standards. An examination of individual indicators shows that nearly all aspects of language use received the highest score.

Indicators related to spelling accuracy based on PUEBI, punctuation, sentence structure, grammatical accuracy, consistency in the use of terms and symbols, sentence effectiveness, and overall clarity all achieved optimal ratings. These results indicate that the language used in the evaluation instrument is clear, precise, and appropriate for fourth-grade students.

The only indicator that received a slightly lower score was the appropriateness of language with respect to student characteristics. This suggests that, although the language is generally suitable and understandable, minor adjustments could further enhance alignment with the diverse abilities of students. Nevertheless, this aspect does not reduce the overall clarity or effectiveness of the instrument. In summary, the language expert validation confirms that the revised Kahoot-based learning evaluation instrument meets linguistic requirements and is ready for classroom implementation without the need for further revision.

Subject Matter Expert

The subject matter expert validation was conducted to assess the feasibility of the Kahoot-based learning evaluation instrument in terms of content accuracy, relevance to learning objectives, and alignment with curriculum standards. The validation focused on the suitability of the material on plant body parts, clarity of presentation, and effectiveness of the evaluation instrument in supporting student learning.

As presented in **Table 8**, the subject matter expert awarded a total score of 49 out of a maximum score of 55, resulting in a feasibility percentage of 89 percent. This score places the instrument in the feasible category. Most indicators related to content quality received high scores, particularly the alignment of learning objectives with the Teaching Implementation Plan, the relevance of material to learning outcomes, and the completeness of the content. These results indicate that the material presented in the evaluation instrument is consistent with curriculum requirements and adequately represents the intended learning content. Several indicators, including language appropriateness, grammatical accuracy, and the use of images, received slightly lower scores. This suggests that minor improvements could further enhance clarity, although these aspects do not reduce the overall suitability of the instrument for classroom implementation.

Table 8. Subject Matter Expert Validation Results

No	Indicator	Score
1	Alignment of learning objectives with ATP	5
2	Relevance of material to learning outcomes (CP) and learning objectives (TP)	5
3	Completeness of material based on learning outcomes (CP)	5
4	Appropriateness of language with the material concept	4
5	Clarity of the template according to the material	5
6	Accuracy of grammar and sentence structure	4
7	Accuracy of material concepts	4

8	Appropriateness of images to clarify the material	4
9	Appropriateness of evaluation questions using standard language	4
10	Student engagement in the evaluation process	4
11	Effectiveness of the evaluation instrument	5
	Total Score	**49**
	Maximum Score	**55**
	Feasibility Percentage	**89%**
	Category	**Feasible**

The overall feasibility of the Kahoot-based learning evaluation instrument was determined based on assessments from media experts, language experts, and subject matter experts. After the revision process, the validation results showed consistently high feasibility scores across all expert groups. A summary of the expert validation results after revision is presented in **Table 9**. The feasibility percentages ranged from 87 percent to 98 percent, with an overall average feasibility score of 94 percent, which falls into the very feasible category.

Table 9. Summary of Expert Validation Results After Revision

Validator	Number of Items	Maximum Score	Score Obtained	Feasibility (%)	Category
Media Expert 1	10	50	48	96%	Very feasible
Media Expert 2	10	50	49	98%	Very feasible
Language Expert 1	13	65	63	96%	Very feasible
Language Expert 2	13	65	64	98%	Very feasible
Subject Matter Expert 1	11	55	48	87%	Feasible
Subject Matter Expert 2	11	55	49	89%	Feasible
Average				**94%**	**Very feasible**

Based on these results, the Kahoot-based learning evaluation instrument meets the required standards in terms of content, language, and media design. Therefore, the instrument is considered highly suitable for implementation in elementary school learning evaluation.

Implementation

The implementation stage involved testing the developed Kahoot-based evaluation instrument on 33 fourth-grade students at SD Negeri Pengasinan 2, Bekasi. The trial aimed to assess students' responses to using the Kahoot application in learning evaluation. Students engaged with the material through a PowerPoint presentation and completed the Kahoot quiz independently under

the researcher's guidance. Afterward, all participants filled out a questionnaire consisting of 12 questions to evaluate their experiences and responses. Departing from this, the Recapitulation of Student Responses is as shown in **Table 10**.

Table 10. Recapitulation of Student Responses

Responses	Total Score	Maximum Score	Percentage (%)	Average Percentage
R1	54	60	100%	90%
R2	50	60	100%	83%
R3	54	60	100%	90%
R4	50	60	100%	83%
R5	58	60	100%	96%
R6	55	60	100%	98%
R7	59	60	100%	91%
R8	57	60	100%	95%
R9	57	60	100%	95%
R10	49	60	100%	81%
R11	51	60	100%	85%
R12	49	60	100%	81%
R13	53	60	100%	88%
R14	60	60	100%	100%
R15	51	60	100%	85%
R16	52	60	100%	86%
R17	49	60	100%	81%
R18	57	60	100%	95%
R19	57	60	100%	95%
R20	51	60	100%	85%
R21	50	60	100%	83%
R22	58	60	100%	96%
R23	56	60	100%	93%
R24	55	60	100%	91%
R25	56	60	100%	93%
R26	56	60	100%	93%
R27	52	60	100%	86%
R28	54	60	100%	90%
R29	55	60	100%	91%
R30	57	60	100%	95%
R31	58	60	100%	96%
R32	59	60	100%	98%
R33	59	60	100%	98%
Average Percentage				**90,48%**

The trial results showed an average score of 90.48%, indicating that the Kahoot-based learning evaluation instrument was rated "excellent." This result demonstrates that the instrument is highly feasible for use in IPAS subjects without the need for further revision. Student questionnaire responses were also utilized to assess the practicality and acceptance of the developed Kahoot application. The overall validation outcomes obtained from experts and students are visually summarized in **Figure 2**, which illustrates the comparison of validation scores across different evaluator groups.

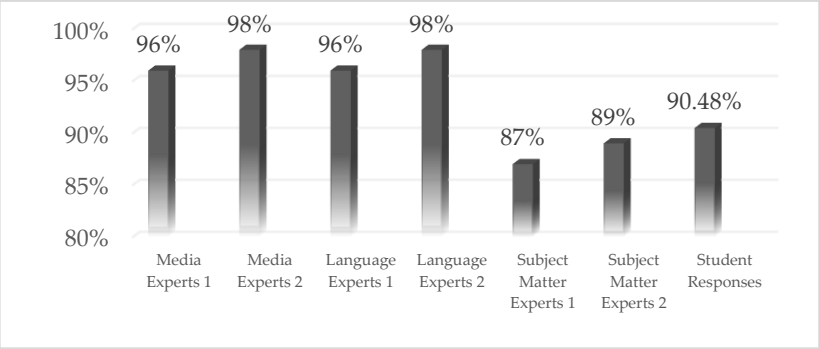


Figure 2. Graph of Validation Results by Experts and Student Responses

Figure 2 shows that the Kahoot-based evaluation instrument received very high validation results from all evaluators. Media experts and language experts provided excellent scores ranging from 96% to 98%, indicating that the design, technical quality, and language clarity of the instrument are highly appropriate. Subject matter experts also gave high scores (87%–89%), suggesting that the content is relevant and accurate with only minor improvements needed. In addition, student responses reached 90.48%, reflecting positive perceptions regarding ease of use, engagement, and learning support. Overall, these results indicate that the Kahoot-based evaluation instrument is highly feasible for classroom use, particularly in IPAS learning.

Evaluation

The evaluation stage aimed to examine the effectiveness of the Kahoot-based learning evaluation instrument by comparing students' pretest and posttest results. The tests were administered to 33 fourth-grade students, and the comparison was used to measure changes in students' learning outcomes after the implementation of the instrument. The recapitulation of the pretest and posttest results is presented in **Table 11**, which provides an overview of students' performance before and after using the Kahoot-based evaluation instrument.

Table 11. Recapitulation of Pretest and Posttest Results

Criteria	Pretest	Posttest
Number of Students	33	33
Highest Score	100	100
Lowest Score	50	85
Average Score	77.12	93.48
Average N-Gain	**0.72**	
Description	**High**	

Table 11 presents the comparison of students' pretest and posttest results after the implementation of the Kahoot-based evaluation instrument. The results show a clear improvement in students' learning outcomes, as indicated by the increase in the average score from 77.12 in the pretest to 93.48 in the posttest. In

addition, the lowest score increased substantially from 50 to 85, while the highest score remained consistent at 100, suggesting a more even distribution of student achievement. The calculated average N-gain of 0.72, which falls into the high category, indicates that the Kahoot-based evaluation instrument is highly effective in enhancing students' learning performance.

Discussion

This study revealed that the development of a Kahoot-based learning evaluation instrument on plant material significantly improved the quality of the learning process and outcomes of elementary school students. The main findings show that the developed instrument has a very high level of feasibility based on the validation of media, language, and material experts, and obtains positive responses from students. Empirically, the effectiveness of the instrument is shown by the increase in the average score from pretest to posttest with an N-Gain value of 0.72 which is in the high category. These findings indicate that digital-based evaluations not only serve as a measure of cognitive achievement, but also as a pedagogical stimulus that encourages active engagement, motivation, and concentration of students' learning. In addition, using Kahoot allows for instant feedback and a more contextual and enjoyable evaluation experience. From a process perspective, this study emphasizes that the integration of evaluation technology is able to shift the practice of conventional assessment that is passive to formative evaluation that is interactive and oriented towards meaningful learning. Thus, these findings affirm the urgency of learning evaluation innovation at the elementary school level, especially in the context of the implementation of the Independent Curriculum.

The findings of this study strengthen and expand the literature on the use of digital technology in learning evaluation. In line with the findings Alsswey (2024), this study shows that Kahoot is effective in increasing student participation and learning motivation through a gamification approach. However, this study goes beyond previous studies by emphasizing the function of evaluation as an integral part of the learning process, not just a tool for measuring final outcomes. From perspective *Sensemaking Theory*, teachers in this study began to reinterpret the meaning of evaluation as a data-based reflective practice, where the results of evaluation are used to understand students' learning needs more adaptively (Day et al., 2022; Jiang et al., 2025; Tang et al., 2025). In contrast to previous research that focused on the secondary level, this study fills the literature gap by presenting empirical evidence in the context of elementary schools and the implementation of the Independent Curriculum (Çebi & Reisoğlu, 2023; Goddings, 2024; Wild & Schulze Heuling, 2021). In addition, this study responds to the contradictions in the literature related to the limitations of digital evaluation by showing that the design of the right instrument can still maintain the validity of the material and the achievement of learning objectives. Thus, this research contributes to bridging the discourse

between formative evaluation, educational technology, and pedagogical practice in primary education.

This research makes a significant contribution to the development of learning evaluation practices and theories in the field of education, especially in the context of basic education. The main contribution of this research lies in strengthening the learning evaluation paradigm as a pedagogical process that is formative, interactive, and oriented towards improving the quality of learning, not just measuring the final outcome. The findings of this study show that the use of gamification-based digital evaluation platforms, such as Kahoot, can increase student engagement, accelerate learning feedback, and support data-driven pedagogical decision-making (*data-informed instruction*). From a theoretical perspective, this study expands the study of learning evaluation by integrating digital technology into the framework *Sensemaking*, where teachers interpret the results of the evaluation reflectively to adjust the learning strategy (Dalsgaard & Ryberg, 2023; Gilliot & Sadallah, 2024; Liu, 2022). In addition, by using the *Activity Theory*, evaluation is understood as a systemic activity that involves interaction between subjects (teachers and students), tools (Kahoot), rules, and learning objectives (Camilleri, 2022; Fletcher, 2021; Vijayaraghavan, 2025). Thus, this research contributes to enriching the literature on digital learning evaluation and provides relevant practical models to be applied in the context of 21st century educational transformation and the implementation of the Independent Curriculum.

Broadly speaking, the results of this study show that the Kahoot-based learning evaluation instrument is a valid, effective, and relevant innovation to improve the quality of learning in elementary schools. The theoretical implications of this study lie in strengthening the evaluation paradigm as a formative, reflective, and participatory learning process. From the practical side, the results of the study provide concrete recommendations for teachers and school managers to integrate digital evaluation as part of adaptive and responsive learning management to the needs of students. In the context of education policy, this research supports the digital transformation agenda of education and the implementation of the Independent Curriculum that emphasizes student-centered learning. In the future, further research is suggested to explore the use of Kahoot in other subjects, combine it with authentic forms of assessment, and examine its impact on affective aspects and students' character. Thus, this research has a wide impact not only on learning practices, but also on the development of evaluation theory, educational technology, and Islamic education management in a sustainable manner.

CONCLUSION

This study set out to address the limited use of engaging and technology-supported evaluation instruments in elementary school learning, which often results in low student motivation and suboptimal assessment practices. The

findings demonstrate that the Kahoot-based learning evaluation instrument developed through a systematic design process is both feasible and effective, as evidenced by high expert validation scores, positive student responses, and a significant improvement in learning outcomes. These results reaffirm the importance of aligning evaluation practices with instructional goals while integrating digital tools that support active student participation and timely feedback. Beyond confirming its technical and pedagogical viability, the study highlights the broader potential of digital evaluation to strengthen data-informed decision making in classroom practice and educational management. The use of interactive assessment platforms can assist teachers in monitoring student progress more accurately and in adapting instruction to learners' needs. Future research may extend this work by applying similar evaluation models across different subjects or educational levels and by examining long-term impacts on teaching practices and institutional assessment systems.

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