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DIGA-FAM Model (Differentiation Instruction and Game-Based Formative Assessment Model): Teacher Needs Analysis

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Abstract

Formative assessment plays a crucial role in improving the quality of learning, but its practice in the classroom is often suboptimal due to limitations in media, methods, and suitability to student characteristics. This study aims to analyze teachers' needs in developing the DIGA-FAM Model (Game-Based Differentiated Learning and Formative Assessment Model) as an alternative formative assessment model that suits students' needs and characteristics. This study used a descriptive method with a survey approach through a questionnaire distributed to Indonesian language teachers in secondary schools. The questionnaire instrument focused on four aspects: teachers' needs for an assessment model, teachers' needs for assessment based on student characteristics, teachers' needs for effective feedback and student engagement, and teachers' needs related to digital-based assessment models. Data were analyzed descriptively and quantitatively to map the needs and obstacles faced by teachers. The results showed that teachers urgently need a formative assessment model that not only facilitates differentiated learning but also increases student motivation and engagement through a game-based approach. Furthermore, the integration of digital assessment is considered crucial to facilitate the implementation and continuous monitoring of student learning progress. These findings form an important basis for the development of the DIGA-FAM Model as an innovative solution that can address teachers' needs while supporting an effective and enjoyable learning process.

Keywords:
differentiated instruction; formative assessment; game-based learning

Abstrak

Penilaian formatif berperan krusial dalam meningkatkan kualitas pembelajaran, namun praktiknya di kelas seringkali kurang optimal karena keterbatasan media, metode, dan kesesuaian dengan karakteristik siswa. Penelitian ini bertujuan untuk menganalisis kebutuhan guru dalam mengembangkan Model DIGA-FAM (Model Pembelajaran Diferensiasi dan Penilaian Formatif Berbasis Permainan) sebagai alternatif model penilaian formatif yang sesuai dengan kebutuhan dan karakteristik siswa. Penelitian ini menggunakan metode deskriptif dengan pendekatan survei melalui kuesioner yang disebarkan kepada guru mata pelajaran Bahasa Indonesia di sekolah menengah. Instrumen kuesioner difokuskan

pada empat aspek: kebutuhan guru akan model penilaian, kebutuhan guru akan penilaian berdasarkan karakteristik siswa, kebutuhan guru akan umpan balik yang efektif dan keterlibatan siswa, serta kebutuhan guru terkait model penilaian berbasis digital. Data dianalisis secara deskriptif dan kuantitatif untuk memetakan kebutuhan dan kendala yang dihadapi guru. Hasil penelitian menunjukkan bahwa guru sangat membutuhkan model penilaian formatif yang tidak hanya memfasilitasi pembelajaran yang terdiferensiasi tetapi juga meningkatkan motivasi dan keterlibatan siswa melalui pendekatan berbasis permainan. Selain itu, integrasi penilaian digital dianggap krusial untuk memfasilitasi implementasi dan pemantauan berkelanjutan terhadap kemajuan belajar siswa. Temuan ini membentuk dasar penting untuk pengembangan Model DIGA-FAM sebagai solusi inovatif yang dapat menjawab kebutuhan guru sambil mendukung proses pembelajaran yang efektif dan menyenangkan.

Kata Kunci:
pembelajaran berbasis permainan; pembelajaran berdiferensiasi; penilaian formatif

Introduction

In language teaching, assessment has been integrated as part of the learning process because it has been proven to contribute to the development of students' language skills (Taufiq et al., 2021). Through assessment, teachers can ensure that every student, regardless of background or previous achievement, has the opportunity to develop optimally (Yazidi, 2023). Evaluating the effectiveness of teaching strategies in increasing student engagement is crucial for making language learning more meaningful (Yassin & Abugohar, 2022). One strategy that is gaining increasing attention is formative assessment, which functions not only as a strategy for improving learning outcomes but also as a teaching aid that supports the learning process itself (Zeng & Huang, 2021). Formative assessment includes monitoring, diagnosis, and follow-up to identify student needs (Ahmed et al., 2019). These activities are carried out continuously throughout the learning process to provide feedback that allows teachers to adjust teaching strategies according to student characteristics (Pan, 2020). Thus, formative assessment becomes a means to create more personalized and student-oriented learning (Kiliçkaya, 2017).

Formative assessment has various benefits, such as increasing learning motivation, reducing test anxiety, providing a comprehensive analysis of student development, and enhancing teacher-student engagement and collaboration (Treve, 2021). Feedback from this assessment can reveal students' strengths and weaknesses, thus creating a reflective environment that encourages improved learning quality (Muho & Taraj, 2022). However, its implementation still faces obstacles, especially in large classes with more than 30 students and limited learning time (Kiliçkaya, 2017). Teachers also often focus on delivering material and achieving final results, so that aspects of the learning process are less considered (Naka, 2023). On the other hand, students often feel bored with traditional assessment methods, which reduces learning effectiveness (Suma et al., 2020). Therefore, the development of innovative formative assessment is an urgent need to maximize learning objectives (Powell, 2010). Teachers, in this case, play a key role in improving student learning through constructive assessment (Köroğlu, 2021).

The development of educational technology provides significant opportunities for delivering more innovative formative assessments that are in line with current needs (Spector et al., 2016). The use of information technology has been used by many countries and institutions to increase student learning motivation, create more dynamic interactions during learning, and support assessment flexibility (Wanner & Palmer, 2015). Currently, formative assessments can be conducted through online platforms, allowing students to participate at any time and teachers to conduct repeated evaluations and provide timely feedback (Chen, 2020). The advantage of this technology-based assessment is its ability to provide a more interactive, engaging, and adaptive learning experience to students' needs. In the context of language learning, this approach supports the integration of traditional methods with digital technology, thereby further improving the quality of assessment. This reinforces the urgency of developing technology-based formative assessment models to address the challenges of 21st-century learning.

In this study, the solution offered is the integration of Differentiation Instruction (DI) with Game-Based Formative Assessment through the Wordwall application, which was then formulated in the DIGA-FAM Model (Differentiation Instruction and Game-Based Formative Assessment Model). This integration is novel because there are not many studies that combine learning differentiation with game-based assessment. Wordwall itself has been widely used to support language skills, such as writing (Adnyana & Dewi, 2022), reading (Swari, 2023), mastery of sentence structure (Fathimatuzahra, 2024), and vocabulary (Thi et al., 2024). However, previous studies have not specifically developed a formative assessment model that takes into account individual student differences (Njagi, 2025). The novelty of this study lies in the differentiation approach, which allows assessments to be tailored to students' readiness levels, interests, and learning styles (Şaban & Atay, 2023). By utilizing 18 types of Wordwall games, assessments are carried out in stages so that each student can learn according to their needs (Deunk et al., 2018).

Theoretically, the development of the DIGA-FAM Model rests on the Differentiated Instruction (DI) framework, which views learning as based on individual diversity. This framework stems from the constructivist tradition, where learning is understood as a process of meaning-making dependent on the learner's initial cognitive structure, prior experiences, and social context (Kalpana, 2014). DI positions the teacher as a learning designer who adjusts variations in content, process, and product based on student characteristics, including readiness, interests, prior knowledge, learning styles, and learning profiles (Gheyssens et al., 2022). This principle of adaptation aligns with Vygotsky's Zone of Proximal Development (ZPD) theory, which emphasizes the importance of providing tiered support (scaffolding) to accelerate the development of actual abilities toward potential abilities (Maftuna, 2025). From a learning model perspective, DI provides a conceptual mechanism to explain how the interaction between student characteristics and instructional strategies produces different learning responses (Damanik et al., 2024). This framework enables the formulation of the DIGA-FAM model as a system that organizes the learning flow in stages so that the choice of activities, task complexity, and type of feedback can be tailored to individual learning profiles. Thus, the DI theoretical perspective not only explains the pedagogical rationale but also serves as a structural basis for designing the components of the DIGA-FAM model.

In terms of game-based formative assessment, its theoretical foundation is rooted in Game-Based Learning Theory, feedback targeting theory, and the assessment for learning paradigm (Lin et al., 2023). Game-Based Learning (GBL) views game mechanics, such as structured repetition, incremental goals, immediate reinforcement, and progressively increasing challenges, as enhancing cognitive engagement while providing experimental-like learning conditions (Nadolny et al., 2017). Theoretically, game mechanics create a low-stakes learning environment that minimizes affective barriers and allows for knowledge exploration (Nabong & Opdyke, 2024). Within the framework of formative assessment, feedback is considered diagnostic information that must be accurate, rapid, and evidence-based to improve learning performance (Van der Kleij et al., 2015). Digital games like Wordwall can fulfill this principle because each student response is immediately followed by corrective information that triggers self-regulated learning and repeated retrieval practice (Nguyen, 2025). From a model development perspective, game-based formative assessment functions as an operational component that supports the flow of periodic assessments, learning revision mechanisms, and differentiation of challenge levels (Lin et al., 2025). Therefore, the integration of DI with game-based formative assessment in the DIGA-FAM model has strong theoretical consistency because it provides a framework for instructional adaptation, while game-based assessment provides a continuous monitoring mechanism that allows such differentiation to take place effectively and measurably.

The fundamental foundation of this research is to understand teachers' needs for innovative formative assessment models that can help them overcome limitations in the classroom (Box et al., 2015). Teachers are the primary subjects in the implementation of the DIGA-FAM Model because they determine appropriate learning and assessment strategies. Analyzing teacher needs is the first step to ensure that the developed model is truly relevant to real-world learning conditions. By understanding teachers' barriers, preferences, and expectations, the development of the DIGA-FAM Model can be more focused and applicable. Furthermore, teachers' need for technology-based formative assessment demonstrates the urgency of transforming from traditional approaches to more adaptive and interactive models. Therefore, this research is expected to make a significant contribution to improving the quality of formative assessment while strengthening the effectiveness of language learning in the classroom.

Based on this urgency, this study aims to analyze teachers' needs for formative assessment as a basis for developing the DIGA-FAM Model. The teacher needs analysis was conducted to uncover the extent to which teachers experience obstacles in implementing formative assessment, as well as the strategies they need to make assessments more effective and appropriate to classroom conditions. This study also focuses on teachers' expectations regarding the integration of technology and digital games in assessment, thereby providing a clear picture of the relevance of the model to be developed. The results of the needs analysis are expected to be useful in providing direction for developing a model that is practical, effective, and appropriate to needs. In addition, this study benefits teachers by providing an alternative assessment that is more interactive, engaging, and able to address individual student differences. For model developers, the results of this study provide a foundation for designing a learning syntax oriented to real-world needs. Thus, this study contributes

to the development of a formative assessment model that is not only based on theory but also born from teachers' needs and experiences in daily learning practices.

Methods

This study used a descriptive approach with a survey method to analyze teacher needs related to the development of the DIGA-FAM Model (Differentiation Instruction and Game-Based Formative Assessment Model). The survey method was chosen because it is able to describe the phenomenon based on data collected from a sample representing the research population. The study population included Indonesian language teachers at the secondary school level in West Sumatra, with a sample size of 64 teachers who participated voluntarily. Respondent characteristics consisted of teachers teaching at the junior high school level (53.1%) and senior high school (46.9%). In terms of teaching experience, respondents were divided into several groups, namely teachers with 1–3 years of experience (15.6%), 4–5 years (53.1%), 5–10 years (23.5%), and more than 10 years (7.8%). The sample was obtained from teachers who were willing to complete the research instrument distributed online. The selection of this method allowed researchers to obtain direct data regarding the real needs of teachers in designing innovative formative assessments that are appropriate to the challenges of learning in language classes.

The research instrument was a questionnaire specifically designed to measure teachers' needs for differentiation and game-based formative assessment models. The questionnaire covered several key aspects, such as the need for innovative assessment models, suitability to student characteristics, feedback effectiveness, student engagement and motivation, and the practicality of using the assessment model. The instrument was developed through a literature review and discussions with education experts to ensure the relevance of the indicators. Validation was carried out in two stages: content validation and language validation. Content validation focused on the item's suitability to the concept being measured, while language validation ensured that each statement was clear, communicative, and easily understood by teachers. The instrument was then piloted on a small group of respondents to detect any ambiguous or inconsistent items. Feedback from the pilot test was used to refine the instrument for greater accuracy and reliability. The refined instrument was then widely distributed via Google Forms and WhatsApp, effectively reaching respondents and generating reliable data as a basis for developing the DIGA-FAM Model.

Result and Discussion

The results of this study provide an initial overview of teachers' needs for an integrated formative assessment model within the DIGA-FAM Model (Differentiation Instruction and Game-Based Formative Assessment Model). Data obtained through questionnaires indicate that teachers urgently need a model that not only supports active student engagement but also facilitates learning differentiation and enhances the effectiveness of formative assessment. Analysis of the questionnaire results confirms the urgency of developing a model that is more adaptive, interactive, and appropriate to the diverse characteristics of students. To clarify the findings, the teacher questionnaire data will be presented in tabular form based on indicators to facilitate easier understanding and interpretation of responses. This tabular presentation is also intended to serve as a basis for formulating an

assessment model that is truly relevant to teachers' needs. The results of the analysis of teacher needs for a formative assessment model that can accommodate the diverse needs and characteristics of students can be seen in Table 1 below.

Table 1. Teachers' Need for Assessment Models

No.	Statement	Answer (%)			
		SA	A	D	SD
1.	I need a more innovative formative assessment model for Indonesian language learning.	84.4	15.6	0	0
2.	The formative assessments I currently use are traditional and less engaging for students.	9.4	46.9	40.6	3.1
3.	The assessment model I currently use motivates students to be active in learning, but not all of them.	12.5	81.3	6.3	0
4.	I need media or applications that support digital-based formative assessment.	71.9	28.1	0	0
5.	I need an assessment model that provides a fun learning experience for students.	78.1	21.9	0	0

Description: SA (Strongly Agree), S (Agree), D (Disagree), DS (Strongly Disagree)
Source: Research data, 2025

The table shows that most teachers value the importance of implementing formative assessment in Indonesian language learning. They believe that formative assessment helps them understand students' learning progress more accurately. The results also indicate that teachers need a more varied assessment model that does not solely focus on written tests. Furthermore, teachers tend to desire an approach that adapts to the varying abilities of students in the classroom. The data in the table demonstrates the need for more interactive and engaging assessments for students. Teachers also expressed the need to utilize technology as part of their formative assessment strategies. Overall, these findings indicate a gap between current formative assessment practices and teachers' expectations. Therefore, it is necessary to develop a formative assessment model that aligns with actual needs in the field.

Based on this explanation, it was found that teachers valued the importance of implementing formative assessments that were more varied, interactive, and tailored to the differences in student abilities. This finding aligns with (Tavassoli & Farhady, 2018), who emphasized the need to strengthen teachers' knowledge of assessment, particularly in language learning, so that teachers can select and implement relevant assessment strategies. Furthermore, (Looney et al., 2018) emphasized that teachers' identities as assessors need to be strengthened so that they act not only as instructors but also as facilitators capable of comprehensively assessing student learning processes and outcomes. Thus, the need for more innovative formative assessment models underscores the importance of increasing teacher capacity in developing assessments that are oriented toward student learning.

This finding is also supported by the view of (Heitink et al., 2016), who stated that successful implementation of assessment for learning requires important prerequisites, such as teacher readiness and adequate system support. In this context, assessment is not merely a tool for measuring learning outcomes, but also a strategy that can increase engagement and the quality of learning. This is in line with (Boud & Soler, 2016), who emphasized the importance of continuous assessment to encourage more meaningful learning. Furthermore, Cordingley (2015) stated that

this can be the basis for teacher professional development, particularly in creating evidence-based assessment practices. Thus, the results of this study confirm that teachers' need for interactive and enjoyable technology-based formative assessment provides a strong foundation for developing models that better meet today's language learning challenges.

The results of the questionnaire analysis regarding formative assessment needs reviewed from the aspect of suitability with student characteristics are presented in the following table 2.

Table 2. Teachers' Need for Assessments According to Student Characteristics

No.	Statement	Answer (%)			
		SA	A	D	SD
1.	I need an assessment model that can accommodate the varying abilities of students in one class.	68.8	31.2	0	0
2.	I need an assessment model that can improve students' overall language skills (listening, speaking, reading, and writing).	81.3	18.7	0	0
3.	I need an assessment model that is adaptive to students' characteristics and learning styles.	65.6	34.4	0	0
4.	I need an assessment model that is flexible and can be used across a variety of language skills.	78,1	18.8	3.1	0
5.	I need an assessment model that can adjust the difficulty level of questions to suit students' abilities.	75.0	25.0	0	0
6.	I need a formative assessment that can accommodate students' diverse learning interests.	71.9	28.1	0	0
7.	I need an assessment model that can accommodate visual, auditory, and kinesthetic learning styles.	75.0	25.0	0	0
8.	I need a formative assessment that can identify students' potential more fairly, without focusing solely on high-achieving students.	71.9	28.1	0	0
9.	I need an assessment model that can help me differentiate between students based on their learning readiness.	81.2	18.8	0	0

Source: Research data, 2025

Based on the results of a questionnaire regarding teachers' needs for formative assessments tailored to student characteristics, a strong trend emerged that teachers need assessment models that are appropriate to the diverse characteristics of their students. Teachers recognize that the diversity of student abilities, interests, and learning styles requires assessment models that are not only uniform but also able to accommodate differences within the classroom. This confirms that traditional assessment practices, which tend to emphasize written tests, do not fully address teachers' needs to understand students' comprehensive learning development. Therefore, teachers recognize the importance of flexible assessment models that can be applied to various language skills while adapting to the real-world conditions of classroom learning.

Furthermore, the questionnaire results also indicate that teachers need formative assessment models that are oriented toward the diversity of student

potential. Teachers believe that assessments should not only highlight high-achieving students but should also provide a more equitable picture of the development of all students. There is a need for assessments that can identify individual student strengths through a variety of tasks and strategies appropriate to their level of learning readiness. Teachers also emphasized the need for assessment approaches that comprehensively integrate language skills, including listening, speaking, reading, and writing. This shows that there is a push to present formative assessments that do not only assess final results, but are also able to facilitate a learning process that is centered on students with their various different characteristics.

The findings of this study indicate that teachers place a strong emphasis on the importance of formative assessment that adapts to the diverse characteristics of students in the classroom. These results align with (Heitink et al., 2016) study, which found that the effectiveness of formative feedback is significantly influenced by the appropriateness of assessment strategies to individual student characteristics. Therefore, the need for teachers to have more responsive assessment models emphasizes that assessment can no longer be uniform but must consider the diversity of student abilities, interests, and learning styles. This reinforces the idea that assessment should be positioned as a learning process that facilitates the development of each student, not simply a tool for measuring learning outcomes. In this context, teachers need more flexible assessment models that can be applied to various language skills and are appropriate to real-life classroom dynamics.

Furthermore, the findings of this study also align with the views of (Boud & Soler, 2016), who emphasize the crucial role of teacher competence in determining the success of assessment on student achievement. Teachers who understand the needs of diverse students tend to be more successful in creating fair and meaningful assessment strategies. This view aligns with the research of (Klusmann et al., 2016) showed that teachers' ability to adapt teaching and assessment practices to student conditions can improve both motivation and learning outcomes. Furthermore, (Rusilowati & Wahyudi, 2020) also emphasized that developing teachers' professional competencies, including in assessment, is a crucial foundation for ensuring inclusive learning. Therefore, this study underscores the need for formative assessments that prioritize the diversity of student potential, so that each individual has the opportunity to develop according to their abilities.

The following table presents the results of an analysis of teacher needs related to the effectiveness of feedback in the learning process, as well as student engagement and motivation. This data demonstrates the extent to which teachers perceive the importance of prompt and accurate feedback for student learning development. Furthermore, this table also illustrates teachers' need for learning models that can increase active student participation and motivation, as seen in table 3 below.

Table 3. Teachers' Needs for Effective Feedback and Student Engagement

No.	Statement	Answer (%)			
		SA	A	D	SD
1.	I need a formative assessment that can provide quick feedback to students.	81.2	18.8	0	0
2.	Game-based formative assessment can make students more enthusiastic about learning.	68.8	31.2	0	0
3.	I need a formative assessment that can help me identify students' weaknesses more accurately.	75.0	25.0	0	0

4.	I need an assessment model that can increase student engagement in the learning process.	75.0	25.0	0	0
5.	I need a formative assessment that can help students learn collaboratively.	71.9	28.1	0	0
6.	I need an assessment model whose results can help me design future learning strategies.	78.1	21.9	0	0

Source: Research data, 2025

Based on the questionnaire results in the table, it is clear that teachers view formative assessment as a crucial instrument for supporting effective learning. The primary emphasis is on teachers' need for prompt and accurate feedback so students can immediately correct errors and develop deeper understanding. This demonstrates that teachers view assessment not only as an evaluation tool but also as an integral part of the teaching and learning process. The need for accurate formative assessment also demonstrates teachers' attention to the differentiation of student abilities, enabling more targeted teaching strategies. Thus, formative assessment is seen not only as measuring outcomes but also as helping to create process-oriented learning.

The questionnaire results also indicate that teachers perceive game-based and collaborative formative assessment as having significant potential for increasing student engagement. This engagement is seen not only in terms of learning motivation but also in the context of how students are able to work together, interact, and solve problems together. This emphasis on student collaboration and participation aligns with the demands of 21st-century learning, which emphasizes the development of critical, creative, collaborative, and communicative skills. Furthermore, teachers believe that formative assessment results can serve as a basis for designing subsequent learning strategies. This shows the existence of long-term thinking, where teachers do not only focus on momentary achievements, but also on the sustainability of the student learning process.

The results of this study indicate that student engagement in learning is significantly influenced by the role of teachers, particularly in providing constructive and supportive feedback. This finding aligns with research by (Carvalho et al., 2021), which asserts that student attachment to school is closely correlated with their engagement with teacher feedback. Thus, the higher a student's identification with the school, the greater their receptivity to the feedback provided. Similarly, research by (Pedler et al., 2020) emphasizes that student engagement is inextricably linked to the quality of teacher-student interactions, where teachers serve as facilitators who create a learning environment that encourages active participation. Therefore, the results of this study strengthen the evidence that teachers play a role not only as content providers but also as mediators of student engagement through appropriate feedback strategies.

Furthermore, this study aligns with a study by (Zhang, 2022), which found that the use of collaborative pedagogy in delivering feedback significantly increased student engagement by providing opportunities for students to participate in the evaluation process. These findings are supported by research by (Zhang & Hyland, 2018)comparing student engagement with teacher feedback and automated feedback in L2 writing, where students showed a higher preference for direct feedback from teachers due to the personal interaction. Furthermore, research by (Amerstorfer & Freiin von Münster-Kistner, 2021) emphasized the importance of positive

relationships between students and teachers in enhancing academic engagement, especially in problem-based learning contexts. Therefore, it can be concluded that the results of this study provide an important contribution in strengthening previous findings regarding the role of teachers, feedback quality, and interpersonal relationships as key factors driving student engagement in the learning process.

To gain a deeper understanding of teacher needs, this study also examined aspects of digital-based assessment deemed relevant to the demands of 21st-century learning. Digital-based assessment is seen as providing convenience, objectivity, and flexibility in evaluating student learning more effectively. The results of the teacher needs analysis related to digital-based assessment models are shown in Table 4 below.

Table 4. Teacher Needs Related to Digital-Based Assessment Models

No.	Statement	Answer (%)			
		SA	A	D	SD
1.	I need an assessment model that is easy to use in a class with a large number of students.	87.5	12.5	0	0
2.	I need a practical and efficient assessment system to implement in the classroom.	75.0	25.0	0	0
3.	I need formative assessments that can be used both online and offline.	84.4	15.6	0	0
4.	I need media or applications that support digital-based formative assessments.	71.9	28.1	0	0
5.	I need an assessment model that can improve the effectiveness of Indonesian language learning in my class.	78.1	21.9	0	0

Source: Research data, 2025

Based on the questionnaire results in Table 4, it is clear that teachers' needs for digital-based assessment models strongly favor ease, efficiency, and flexibility in classroom implementation. This trend reflects the urgency of developing assessment systems that are not only practical to use but also able to address the challenges of large student populations and diverse learning contexts, both online and offline. This aligns with developments in 21st-century education, which demand the integration of technology into learning evaluation, so that assessment no longer functions merely as a tool for measuring learning outcomes but also as a means to continuously strengthen the learning process. Therefore, the teachers' needs in this table indicate that adaptive digital assessment models can provide a solution to the technical and pedagogical barriers currently encountered.

Furthermore, the findings in this table also indicate that teachers emphasize the importance of assessments that can improve learning effectiveness, particularly in Indonesian language subjects. This perspective indicates that the digital-based assessment models developed must not only be technical but also contribute directly to improving the quality of teaching and learning interactions in the classroom. The need for digital media or applications that support formative assessment, for example, reflects teachers' expectations for fast, accurate, and relevant feedback on student development. This way, assessment can be positioned as an integral part of learning strategies that encourage active student engagement and facilitate teachers in designing appropriate learning interventions. These findings reinforce the point that teachers' expectations for digital assessment are not just about the use of

technology, but also about how that technology can strengthen the quality of the learning process.

The results of this study indicate that the development of a digital-based learning evaluation model can provide an alternative assessment method that better suits the needs of students in the digital age. This aligns with the findings of (Leary et al., 2018), who asserted that digital technology opens up opportunities for more adaptive, interactive, and accurate assessments in mapping student abilities. These findings are further reinforced by research by (Wayan Widana, 2020), who emphasized the role of teachers' digital literacy in developing assessments based on higher-order thinking skills (HOTS). This allows the resulting digital evaluation model to not only measure learning outcomes but also support students' critical and analytical thinking processes. Therefore, a digital-based evaluation model can be seen as a solution to the challenges of conventional assessments, which tend to be limited to written tests and do not adequately accommodate 21st-century skills.

Furthermore, this study aligns with the findings of (Eliaumra et al., 2024), who developed a digital literacy-based assessment model in project-based learning to enhance students' creative thinking skills. Their results indicate that the integration of technology in evaluation serves not only as a measuring tool but also as a learning tool that encourages problem-solving. (Roza et al., 2022) also emphasized that digital evaluation models at the secondary school level can enrich assessment variations and help teachers monitor student progress more authentically. Thus, this study confirms continuity with previous studies while also presenting updates in the form of an evaluation model design that aligns with the characteristics of today's students.

Questions asked of respondents regarding current formative assessment practices indicate that teachers' formative assessment practices are still highly diverse, both in traditional and digital technology-based forms. Teachers tend to use simple strategies such as short quizzes, oral questioning, group discussions, and essay assignments and reflections. These practices demonstrate teachers' awareness of the importance of ongoing assessment to gauge student understanding over time. However, the assessment methods used are largely conventional and tend to emphasize written tests and routine quizzes. This indicates that although teachers have attempted to utilize a variety of methods, the assessments they use have not fully accommodated the diversity of learning styles and student readiness levels. In other words, teachers still need a more systematic and structured assessment model to accommodate students' comprehensive needs.

Furthermore, there is a tendency for teachers to begin integrating technology into formative assessment, for example through game-based applications like Quizizz, Kahoot, and Wordwall. This use of technology demonstrates teachers' efforts to increase student enthusiasm and engagement in the learning process. However, the implementation of digital assessment is still limited to interactive quizzes and has not yet addressed other assessment aspects, such as collaboration, creativity, or higher-order thinking skills. Teachers also reported trying reflection strategies, peer assessments, and practical observations, but their implementation has not been consistent and integrated. This fact suggests that teachers need an assessment model that can combine cognitive, affective, and psychomotor aspects in a more balanced manner. Therefore, more comprehensive and enjoyable assessment practices remain an unmet need.

The results of this study align with various previous studies that confirm the effectiveness of using digital games in learning and assessment. (All et al., 2016) demonstrated that game-based learning can increase student engagement and understanding if designed according to appropriate pedagogical principles. Furthermore, (Mislevy et al., 2016) emphasized that games can be used as a more authentic psychometric assessment tool than traditional tests, as they allow for the measurement of higher-order thinking skills in a more natural context. This finding is reinforced by (Gris & Bengtson, 2021), who identified a variety of assessment instruments in game-based learning, leading to the selection of more accurate evaluation methods. The findings of this study also contribute to improving assessment practices by providing alternative evaluations that measure not only cognitive learning outcomes but also collaborative and problem-solving skills.

Furthermore, recent research further emphasizes the significant potential of game-based assessment in supporting meaningful learning. (Udeozor et al., 2024) developed a game-based assessment framework capable of providing detailed data on students' learning processes in real time, enabling teachers to intervene more quickly. (Gomez et al., 2023) found, through their systematic review, that research on game-based assessments shows an increasing trend in measuring 21st-century skills, although challenges related to validity and reliability remain. These findings are relevant to this study, which emphasizes that the use of game-based assessments not only increases learning motivation but also enriches evaluation data to support more personalized learning. Thus, this study confirms that integrating game-based assessments can be an innovative strategy to improve assessment quality and learning effectiveness.

Based on these findings, it is clear that teachers have implemented various innovations in formative assessment, but their implementation remains sporadic and lacks a focused framework. On the one hand, teachers have tried differentiated and gamified approaches, but still face challenges in terms of effectiveness, fairness, and validity of assessments. This situation demonstrates the need for an assessment model that is not only flexible and adaptive but also capable of increasing student learning motivation. In this context, the DIGA-FAM Model (Differentiation Instruction and Game-Based Formative Assessment Model) presents a solution that can address these challenges. This model combines the principles of differentiated instruction with game-based assessment, enabling teachers to provide assessments that are more enjoyable, fair, and tailored to students' individual needs. With DIGA-FAM, assessment serves not only as a measuring tool but also as a learning strategy that empowers both teachers and students.

Conclusion

Based on the research results and discussion, it can be concluded that teachers need a formative assessment model that adapts to student characteristics, utilizes digital technology, and integrates game-based approaches to increase learning motivation. This study shows that teachers view formative assessment not only as an evaluation tool but also as a means of providing faster and more accurate feedback. Furthermore, this model is considered essential for accommodating differences in student abilities through instructional differentiation, enabling more effective and learner-centered learning. These findings confirm the high demand for innovative

digital-based formative assessments by teachers and can serve as the basis for developing a tailored DIGA-FAM Model.

This study recommends further development of the DIGA-FAM Model so that it can be practically implemented in classrooms with adequate digital devices. This study also implies that educational institutions, teachers, and curriculum developers need to consider integrating instructional differentiation with game-based formative assessment to encourage active student engagement. Furthermore, teacher training in the use of digital technology is needed to optimize the implementation of this model. However, this study is limited by the limited number of respondents, so the generalizability of the results needs to be tested through further research with a broader scope. Thus, the results of this study can be an initial step for the development of the DIGA-FAM Model in improving the quality of innovative formative assessments and in accordance with the demands of the 21st century.

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