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DIGA-FAM model (Differentiated Instruction and Game-Based Formative Assessment): Fostering mindfulness, meaningfulness, and joyfulness through interactive wordwall

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ABSTRACT

21st-century education demands a learning approach that develops not only academic achievement but also meaningfulness, awareness, and joy toward diverse student needs. However, previous research tends to separate differentiated learning, game-based learning, and formative assessment, leaving few models that simultaneously optimize cognitive and affective dimensions. This study evaluates the DIGA-FAM (Differentiated Instruction and Game-Based Formative Assessment) model to foster mindfulness, meaningfulness, and joyfulness through interactive Wordwall in poetry text learning. Using a descriptive research design, student perceptions and classroom responses were collected from a single sample of 48 students at SMK Negeri 3 Padang through a validated Likert-scale questionnaire and classroom observation, complemented by one teacher's perspective via semi-structured interview, then triangulated for comprehensive interpretation. Findings indicate that students reported generally positive responses toward the DIGA-FAM model across all three deep learning dimensions, particularly in emotional comfort, perceived relevance, and focused participation. Meaningfulness was strongest at the motivational and instrumental level; mindfulness was most evident in cognitive focus and social awareness; and joyfulness was prominently reflected in reduced academic anxiety and high emotional engagement during gameplay. However, emotional self-regulation, independent expression of understanding, and sustained intrinsic motivation remain areas requiring further reinforcement. Teacher observations also noted that competitive dynamics occasionally compromised cognitive depth, a tension inherent in game-based assessment design. Overall, DIGA-FAM shows potential as an adaptive and emotionally responsive formative assessment framework that accommodates diverse learners through the integration of differentiated instruction and interactive digital gameplay.

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1. INTRODUCTION

Formative assessment is an ongoing pedagogical strategy designed to collect and analyze student learning data, enabling timely feedback and continuous instructional adjustments [1]. In modern education, it shifts the focus from merely grading outcomes (summative) to actively improving the learning process, thereby fostering personalized learning and higher student participation [2]. By adapting pedagogical methods to student needs, this approach helps identify learning barriers and strengthens professional teaching competence [3]. To be effective in practice, formative assessment must be seamlessly integrated into the teaching process, actively engage students, and provide clear feedback to enhance learning outcomes [4]. This practice has been significantly expanded by digital technology. Mobile applications, online quizzes, and digital platforms now enable immediate feedback, continuous progress monitoring, and a more flexible, interactive learning experience [5]. This digital shift is highly relevant in online and blended learning environments, where technology facilitates frequent, automated, and data-driven assessments [6]. Empirical evidence shows that consistent formative assessment increases student engagement, supports self-directed learning, and strengthens readiness for future summative evaluations [7]. Consequently, it has become a crucial element in educational transformation, serving as a dynamic strategy that drives the overall quality of learning [8].

Despite these established benefits, integrating formative assessment into actual classroom practice remains highly problematic. Teachers frequently struggle to implement meaningful strategies due to a lack of reliable resources and concrete practical models [9], [10]. This issue is exacerbated by the pressure of high-stakes testing, which often forces educators to align their teaching with exam requirements rather than utilizing reflective, in-depth learning assessments [11]. Furthermore, balancing rigid curriculum demands with ongoing assessment creates a major time constraint for planning, execution, and feedback delivery [12]. In complex classroom environments, the dual demand to provide immediate feedback and facilitate student self-reflection significantly increases teachers' professional workload [13]. This difficulty is compounded when teachers lack sufficient knowledge regarding appropriate formative content and adaptive strategies [14]. Finally, a strong societal paradigm favoring numerical scores often triggers resistance from parents and students toward non-graded, process-oriented activities [15]. This profound gap between the theoretical potential of formative assessment and its practical challenges highlights the urgent need for innovative assessment models.

To address the limitations of conventional formative assessment, Game-Based Learning (GBL) has emerged as an innovative strategy that utilizes digital and non-digital games to achieve specific pedagogical objectives through student-centered interactive experiences [16], [17], [18]. In classroom practice, digital games are highly effective in fostering self-directed learning, shifting instruction away from rigid, teacher-centered formats [19], and addressing the problem of low student engagement found in traditional approaches [20], [21]. GBL offers clear pedagogical advantages by providing rapid feedback, facilitating interactive problem-solving, enhancing student autonomy [22], [23], and fostering 21st-century creativity [24]. This immersive environment allows students to experience “flow,” a state of intense focus that enhances the quality of learning and task

performance [25], thus transforming assessment into a highly engaging activity [26]. Most importantly, integrating GBL with evaluations enables "disguised assessment," where students' abilities are measured naturally within the game [27].]. This integration provides authentic performance-based data, reduces evaluative anxiety, and maintains engagement [28] through highly realistic contextual simulations that build real-world problem-solving and collaboration skills [29], [30]. However, maximizing these benefits requires tight alignment between game mechanics, pedagogical strategies, and curriculum goals [31].

Although GBL creates an interactive environment, its pedagogical value is maximized when integrated with Differentiated Learning (DI), an approach that proactively adapts learning objectives, processes, content, and assessments to suit students' diverse readiness, interests, and learning profiles [32], [33], [34]. Recognizing that uniform instruction fails to accommodate heterogeneous classes [35], DI relies on continuous assessment to track individual trajectories and dynamically adjust instructional strategies [36]. Tailoring instruction to these levels of academic readiness significantly improves student achievement, engagement, and confidence [37], while offering choices that value student voice and identity [38], creating highly inclusive and accessible classrooms [39]. However, widespread implementation of DI remains low due to intense planning complexity, severe time constraints, inadequate teacher training, and difficulties in conducting continuous manual diagnostics [40], [41], [42]. To bridge this practical gap, combining DI with Game-Based Formative Assessment presents a vital innovation. Digital game mechanics can automate personalization, provide real-time feedback, and efficiently segment learning paths based on performance [27]. By using digital games as a formative medium, teachers can easily map individual needs and differentiate experiences without being overwhelmed by manual tracking [43]. Consequently, synthesizing these two approaches forms a distinct pedagogical framework designed to address classroom heterogeneity and assessment limitations through the development of the DIGA-FAM (Differentiated Instruction and Game-Based Formative Assessment) model.

Despite rapid innovations in assessment, current practices remain narrowly oriented toward measuring cognitive outcomes and end-of-life performance, failing to optimally shape students' internal psychological dimensions such as self-awareness, meaningfulness, and enjoyment. This paradigm highlights the urgent need to reconstruct assessment from a mere evaluation tool into a transformative pedagogical instrument that measures how students consciously learn. Contemporary formative assessment should encourage metacognitive reflection, stress management, and sustained attention so that students move beyond the pursuit of grades to develop the capacity for self-awareness as the foundation for healthy learning [44]. In this context, integrative models such as DIGA-FAM become highly relevant by providing real-time feedback and reflective spaces that stimulate self-awareness throughout the process. Furthermore, prioritizing self-awareness strengthens students' psychological capital, including resilience, self-regulation, and intrinsic motivation, which are crucial in 21st-century education to address high academic pressure and digital distractions through a more humanistic evaluation system [45], [46], [47], [48], [49], [50].

In line with mindfulness, the quality of learning should be directed towards the development of meaning as a cognitive-affective dimension, ensuring that the process is perceived by students as valuable and strongly connected to their experiences, prior knowledge, and personal goals [51]. Meaning refers to students' ability to build strong conceptual connections between new information and existing cognitive structures so that learning becomes useful in real contexts [52], [53]. From this perspective, meaningful learning develops when students actively engage in knowledge construction through activities that are important for their personal development, placing intention and contextual relevance as the primary foundation [54], [55], [56]. This dimension is also closely related to the learning environment, where teacher support and reflective social interactions reinforce the perception that learning is a valuable process of self-transformation rather than simply the transfer of information [57]. In contemporary education, students who experience meaning tend to demonstrate sustained motivation, higher cognitive engagement, and better metacognitive capacity [58], [59]. Therefore, optimizing learning should ensure that every activity builds meaningfulness to strengthen students' understanding, learning identity, and ongoing personal relevance [60].

Furthermore, the core essence of this approach lies in fostering joyfulness as a fundamental affective-psychological dimension reflecting students' happiness, enthusiasm, emotional engagement, and intrinsic satisfaction throughout the learning process [61]. Joyfulness is not merely an incidental byproduct of enjoyable methods, but a vital psychopedagogical indicator showing the extent to which students experience learning as a secure space that fosters positive energy and personal connection to the material [62], [63], [64]. When joyfulness is consistently present, students demonstrate higher engagement, stronger academic resilience, and sustained focus even during challenging tasks [65], [66]. In this context, joyfulness serves as a catalyst connecting intrinsic motivation with the experience of "flow," reducing academic stress, increasing self-confidence, and supporting long-term success [67], [68]. Moreover, happy students tend to be more open to collaboration, communication, and empathy, creating a supportive classroom ecosystem [69]. Therefore, contemporary education needs to position joyfulness as a strategic outcome that is systematically measured, ensuring that evaluations assess not only academic achievement but also the quality of students' emotional experiences.

Based on this description, a key challenge in education is developing an ecosystem that integrates meaningfulness, mindfulness, and joy to support balanced student development. Although previous studies have examined game-based learning, differentiated learning, and formative assessment separately, there remains a practical gap in connecting these elements into a single integrative framework that addresses classroom heterogeneity while also shaping these affective dimensions. To address this gap, this study proposes an integrative framework through the development of the DIGA-FAM model using an interactive Wordwall. This model is implemented in the specific context of Indonesian language learning, specifically in poetry text learning, where students often struggle to connect with abstract emotional meanings. While this model serves as an innovative approach to balancing diversity with emotional well-being, its long-term

effectiveness still requires further validation through experimental design. To guide this investigation, this study addresses the following research questions:

1. How is the DIGA-FAM model designed and implemented in poetry text learning?
2. How do students respond to the DIGA-FAM model in terms of mindfulness, meaningfulness, and joy?
3. What is the teacher's perspective on the implementation of the DIGA-FAM model?

2. METHOD

2.1. Research Design

This study employs a design-based descriptive research framework. It explicitly aims to evaluate and describe student perceptions and classroom responses toward the implementation of the DIGA-FAM (Differentiated Instruction and Game-Based Formative Assessment) model using interactive Wordwall. This study is purely descriptive and process-oriented; it does not aim to measure academic skills, learning outcomes, or establish causal effects through a comparative group.

2.2. Research Location, Time, and Implementation

The research was conducted at SMK Negeri 3 Padang during the odd semester of the 2025/2026 academic year, specifically in May 2026. The pedagogical intervention lasted for two distinct sessions, with each meeting consisting of 3 instructional periods (3 × 45 minutes). The intervention targeted Indonesian language learning, specifically focusing on poetry text learning, where Wordwall game mechanics were seamlessly integrated into each lesson plan to deliver differentiated paths.

2.3. Participants and Sampling Technique

A purposive sampling technique was utilized to select the subjects of this study. The sample consisted of a single classroom containing 48 students. The inclusion criteria for this sample were: (1) high student heterogeneity representing diverse learning styles (visual, auditory, and kinesthetic), (2) highly varied initial cognitive capabilities, and (3) a high level of familiarity with digital smartphones. Additionally, data sources were enriched by involving exactly one Indonesian language teacher. The teacher was purposively selected due to their high digital literacy, proficiency in utilizing the Wordwall application, and thorough pedagogical understanding of the DIGA-FAM framework.

2.4. Data Sources and Collection Techniques

Primary data were gathered directly from the field using three triangulated data collection techniques: a student survey questionnaire, structured classroom observations, and a semi-structured teacher interview.

2.5. Research Instruments

Data collection was facilitated through three primary instruments: a survey questionnaire, structured observation sheets, and semi-structured interview guidelines. The primary instrument was a 5-point Likert scale questionnaire, ranging from Strongly Agree

(SA) to Strongly Disagree (SD), which comprised a total of 37 items distributed across three core dimensions: 10 items for mindfulness, 15 items for meaningfulness, and 12 items for joyfulness. To complement this, structured observation sheets were utilized to monitor student engagement, the general classroom atmosphere, and digital gameplay dynamics based on predefined behavioral indicators of the three dimensions. Finally, the teacher interview was guided by a semi-structured framework consisting of 6 open-ended questions designed to extract professional insights regarding the model's implementation, technical challenges, and real-time student responses.

2.6. Validity, Reliability, and Minimizing Bias

Prior to field administration, all research instruments underwent rigorous content validation through expert judgment. The questionnaire's internal consistency was statistically measured, yielding a Cronbach's Alpha value of 0.84, thereby confirming high reliability. To minimize observation bias and ensure confirmability, classroom observations were conducted concurrently by the primary researcher and one peer observer (a fellow language teacher) acting as an external observer. The teacher interview lasted for approximately 30 minutes and was fully audio-recorded with explicit prior consent before being transcribed verbatim.

2.7. Data Analysis Technique

Quantitative data from the questionnaires were analyzed using descriptive statistics to calculate the percentage distribution of student choices for each statement item and affective dimension. No inferential statistical tests or hypothesis evaluations were executed. Qualitative data from the observations and the teacher interview were analyzed using thematic analysis. The observation notes were reduced and categorized into primary operational themes. For the interview, a systematic coding strategy was applied to code the transcripts, group recurring responses, and synthesize meaningful patterns. Finally, data triangulation was performed by cross-examining the questionnaire distributions, peer-validated field observations, and the teacher's qualitative account to produce a rigorous, multi-perspectival descriptive narrative.

2.8. Ethical Considerations

This study adhered strictly to institutional ethical standards regarding human subjects. Written informed consent was obtained from the participating teacher, while verbal and written informed consent was secured from all participating students prior to the intervention. To protect the participants, strict anonymity and confidentiality protocols were enforced across all data sheets, ensuring no personal identifiers were exposed. Furthermore, participants were explicitly informed that their involvement was entirely voluntary, with the right to withdraw at any stage of the session without any pedagogical or academic repercussions.

3. RESULTS AND DISCUSSION

3.1. DIGA-FAM Model Design in Poetry Text Learning

The DIGA-FAM model is a game-based formative assessment design developed to address the challenges of Indonesian language learning, which students often perceive as complex and uninteresting. This model is built on the principle of differentiated instruction, which recognizes that each student has different learning readiness, interests, learning styles, and learning profiles, so that uniform assessment strategies are no longer adequate to accommodate this diversity. Through the integration of the Wordwall platform as an interactive assessment medium, DIGA-FAM is designed to provide a learning experience that not only measures understanding but also simultaneously stimulates students' cognitive and emotional engagement. This model design includes nine game formats selectively chosen based on their suitability to the characteristics of the poetry text material: Open the Box, Match Up, Unjumble, Group Sort, Gameshow Quiz, Hangman, Whack-a-Mole, Speaking Cards, and Watch and Memorize. Each game format is developed in three difficulty levels: easy, medium, and hard, so that students with various levels of readiness can participate optimally according to their respective zones of proximal development. The differentiation applied not only addresses content aspects but also the learning process and product, ensuring that the resulting formative assessment is authentic. Thus, DIGA-FAM can encourage students to develop meaningful understandings of the poetry texts they study.

Before being implemented in the classroom, the DIGA-FAM model underwent a validation process involving experts in the field of Indonesian language assessment and learning to ensure that each designed instrument met the appropriateness standards in terms of content, language, and presentation. This validation is a crucial stage that serves as a quality filter, so that weaknesses in the instrument in terms of question wording, indicator accuracy, and appropriateness of difficulty level can be identified and corrected before the product is tested on students. The validation results showed that all developed Wordwall assessment formats were declared suitable for use with a number of revisions that were then followed up. The revision process was carried out based on validator input, specifically regarding the clarity of game instructions, the appropriateness of the choice of diction in the questions, and the consistency of cognitive levels at each difficulty level. After the validation and revision stages were completed, the assessment instruments were then tested on research subjects. To visually operationalize this framework, the DIGA-FAM syntax is structured into five core progressive stages as illustrated in Figure 1.

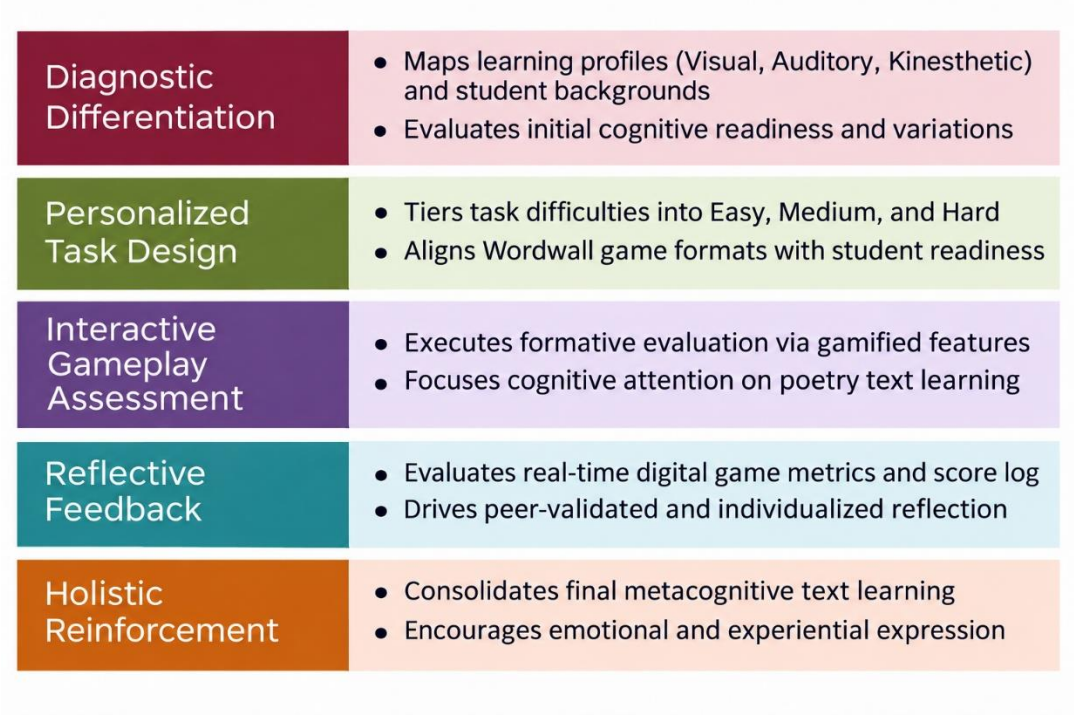


Figure 1. Conceptual Flowchart of the DIGA-FAM Framework Syntax

The learning process carried out during the trial use of the DIGA-FAM model is outlined in the following table 1.

Table 1. Learning Design Using the DIGA-FAM Model

No.	Syntax	Teacher Activity	Students Activity	Format	Targeted Dimention
1.	Diagnostic Differentiation	Administers visual, auditory, and kinesthetic profiling tools.	Reflects on individual learning readiness and initial profiles.	Diagnostic Form/Questionnaire	Mindfulness Meaningfulness
2.	Personalized Task Design	Adjusts task difficulty tiers based on diagnostic results.	Selects or engages with tailored learning instructions.	Adapting games to teaching materials	Meaningfulness Joyfulness
3.	Interactive Gameplay Assessment	Facilitates gamified formative assessment tracking.	Conducts interactive processing of poetry components.	Open the Box, Match Up, Unjumble, Group Sort, Gameshow Quiz, Hangman, Whack-a-Mole, Watch & Memorize, Speaking Cards	Mindfulness Meaningfulness Joyfulness
4.	Reflective Feedback	Evaluates real-time game metrics to provide personalized feedback.	Reviews performance and targets cognitive areas of growth.	Score Analytics Dashboard	Mindfulness Meaningfulness
5.	Holistic Reinforcement	Orchestrates final metacognitive consolidation.	Articulates connections between textual themes and personal experiences.	Oral Reflection and Digital Journals	Meaningfulness Joyfulness

The research findings reveal that the DIGA-FAM model is capable of creating a learning ecosystem that organically brings together three dimensions of deep learning in a mutually reinforcing flow. The integration of the principle of differentiation from the earliest stage, namely diagnostic mapping, proved to be a significant differentiating factor, because students were not merely treated as recipients of material, but as learning subjects whose needs were recognized and responded to individually. This recognition built a strong psychological foundation, so that student engagement in subsequent activities was not merely procedural compliance, but participation stemming from authentic internal motivation. Furthermore, the use of Wordwall as a formative assessment vehicle apparently went beyond its function as a mere evaluation tool; the competitive yet non-threatening game format was proven to reduce students' academic anxiety while sharpening their cognitive focus during the learning process. These findings suggest that when assessment is packaged as a fun experience, students tend to invest deeper attention and construct a more meaningful understanding of the poetic text material. The syntax of Reflective Feedback and Holistic Reinforcement that concluded the learning cycle further strengthened the indication that this model successfully shifted students' orientation from merely chasing scores to an awareness of the learning process itself, reflecting the achievement of mindfulness in a truly academic dimension.

3.2. Student Responses to Learning Poetry Texts Using the DIGA-FAM Model

Questionnaire data obtained from 48 students of SMK Negeri 3 Padang were analyzed descriptively to reveal the pattern of student responses to the process of learning poetry texts using the DIGA-FAM model in three main dimensions, namely mindfulness, meaningfulness, and joyfulness. Each dimension was described in a number of statement items that students responded to using a five-level Likert scale, so that the tendency of student perceptions could be described measurably. The percentage of responses to each statement item became the basis for interpretation to assess the extent to which the DIGA-FAM model was perceived by students as a learning strategy that was able to build focus, relevance, and joy in learning simultaneously. The results of the descriptive analysis are presented as follows.

Table 2. Distribution of Student Responses to the Meaningfulness Dimension in the Implementation of the DIGA-FAM Model

No.	Statement	Percentage (%)					
		SA	A	N	D	SD	Total
1	Material relevance to daily life.	29.2	47.9	22.9	0	0	81.26
2	Understanding instrumental value for future goals.	41.7	52.1	6.3	0	0	87.96
3	Connecting concepts with prior knowledge.	27.1	43.7	29.2	0	0	79.58
4	Supporting in-depth conceptual understanding.	35.4	47.9	16.7	0	0	83,74
5	Motivation to find real-world connections.	18.8	50.0	29.2	2.1	0	77.16
6	Independent re-explanation of material.	12.5	39.6	47.9	0	0	72.92
7	Active engagement in problem-solving tasks.	18.8	41.7	35.4	4.2	0	75.08
8	Self-reflection on personal understanding changes.	12.5	47.9	39.6	0	0	74,58
9	Application of knowledge to novel problems.	16.7	60.4	22.9	0	0	78,76
10	Readiness for challenges outside the classroom.	22.9	41.7	33.3	2.1	0	77.78
	Average						**78.88**

Overall, student response data on the meaningfulness dimension suggests that the DIGA-FAM model may support students' awareness of the relevance and personal value of learning poetry, although the distribution of responses varies across indicators. The most dominant positive trend is observed in the second indicator regarding the understanding of learning benefits for future needs, where 41.7% of students strongly agreed and 52.1% agreed, resulting in a high calculated total score of 87.96. This pattern indicates that the differentiated approach within DIGA-FAM has the potential to shift student perceptions from simply completing academic assignments to realizing that the material studied holds instrumental value for their future. This aligns with previous research stating that differentiation is essentially an effort to align learning content with students' characteristics, including their background knowledge and personal interests, so that connections between the material and students' real lives can be formed more organically [70]. Previous research also shows that learning using a differentiated approach is positively perceived by students, with increased motivation, accurate access to materials, and learning autonomy [71].

Similarly, the indicator regarding the ability to apply knowledge to solve new problems (Item 9) showed a strong positive response with 60.4% agreement and a total score of 78.76, suggesting that the game-based assessment format may encourage a deeper transfer of understanding rather than merely stimulating superficial engagement. This finding is consistent with the results of studies stating that students who learn with a deep approach demonstrate better abilities in retaining, integrating, and transferring knowledge than those who use a surface approach [72]. Interestingly, the indicator of the material's connection to everyday life and previous experiences (Item 3) shows a relatively higher proportion of neutral responses (29.2%) compared to several other items, which results in a total score of 79.58. This suggests that certain students might still require more explicit pedagogical scaffolding to build a functional bridge between the poetic text as a literary work and their real-life context. This is relevant to the finding that the implementation of feedback strategies that consider individual differences contributes to greater equity and effectiveness in creating autonomous and meaningful learning [73], implying that feedback differentiation needs to be consistently strengthened to fortify this connection.

The indicator for the ability to re-explain material with one's own understanding (Item 6) found the highest proportion of neutral responses (47.9%) among all measured statements in this dimension, yielding the lowest total score of 72.92. This finding is notable and suggests that although students perceive the relevance and benefits of the model, full internalization of understanding to the stage of independent verbal articulation may not be immediately achieved. This points to a cognitive gap between a self-reported feeling of understanding and actual expressive articulation that needs to be bridged through more structured metacognitive activities [74]. Research also shows that students who are taught using materials and approaches that are appropriate to their abilities will feel more comfortable and confident in learning [75], but this perceived confidence does not automatically result in an equal capacity for independent constructive expression. Indicators of active involvement in problem-solving (Item 7) and the drive to find real-world connections (Item 5) also display a more heterogeneous distribution, including a

small number of disagreeing responses (4.2% and 2.1%), resulting in total scores of 75.08 and 77.16 respectively. This variation aligns with research suggesting that recognizing and responding to individual differences, particularly in terms of interests, can positively impact student engagement [76], indicating a need to refine interest-based differentiation within the DIGA-FAM syntax. Furthermore, to maintain the impact of gamification, the design of meaningful gamification experiences needs to be aligned with instructional objectives and learners' psychological needs, including autonomy, mastery, relatedness, and purpose, to foster long-term engagement and ensure meaningful learning [77]. Overall, the response distribution across this dimension, which reaches an overall calculated average score of 78.88, suggests that DIGA-FAM may be more immediately successful at building meaningfulness at the motivational and instrumental levels than at the constructive and expressive levels.

Table 3. Distribution of Student Responses to the Mindfulness Dimension in the Implementation of the DIGA-FAM Model

No.	Statement	Percentage (%)					
		SA	A	N	D	SD	Total
1	Maintaining task focus without distractions.	14.6	47.9	35.4	2.1	0	74.96
2	Introspective awareness of internal thoughts/feelings.	20.8	47.9	31.3	0	0	77.90
3	Maximizing cognitive attention toward textual mastery.	14.6	58.3	27.1	0	0	77.50
4	Sustaining calm under academic evaluation.	22.9	50.0	22.9	4.2	0	78.38
5	Reducing anxiety when facing academic challenges.	14.6	37.5	43.8	4.2	0	72.56
6	Controlling panic under pedagogical pressure.	14.6	48.8	35.4	4.2	0	76.56
7	Regulating acute negative emotions during tasks.	22.9	37.5	33.3	6.3	0	75.42
8	Sustaining mental and emotional equilibrium.	20.8	37.5	39.6	2.1	0	75.40
9	Perceived internal confidence and comfort.	14.6	39.6	45.8	0	0	73.76
10	Reflecting on experiences for self-improvement.	27.1	43.7	27.1	2.1	0	78.32
11	Identifying individual learning strengths/weaknesses.	16.7	47.9	31.3	4.2	0	75.60
12	Transforming errors into positive self-development.	29.2	37.5	31.1	2.1	0	78.70
13	Empathetic understanding of peers' feelings.	25.0	47.9	27.1	0	0	79.58
14	Communicating and respecting peer viewpoints.	27.1	52.1	20.8	0	0	81.26
15	Building supportive social classroom networks.	25.0	56.3	16.7	0	2.1	80.52
	Average						**76.80**

Student response data on the mindfulness dimension showed an interesting pattern, namely that cognitive engagement and focus during learning were relatively easier to develop using the DIGA-FAM model compared to emotional regulation and academic anxiety reduction, which typically require a longer internalization process. Indicators related to focus on understanding the material (Item 3) and awareness of thought processes (Item 2) showed high calculated total scores of 77.50 and 77.90, respectively, suggesting that the game-based Wordwall assessment format can engage students in a more focused learning experience. This is consistent with findings that mindfulness contributes to increased concentration and individual self-confidence, as well as encouraging emotional regulation through strengthening metacognitive awareness and attention skills [78]. However, the indicator for the ability to reduce anxiety when facing academic challenges (Item 5) produced the lowest calculated score of 72.56 and showed the highest proportion

of neutral responses (43.8%) accompanied by 4.2% of disagree responses. This distribution suggests that one learning cycle using the DIGA-FAM model may not be enough to completely change long-standing patterns of academic anxiety in students.

Several studies have shown that mindfulness can reduce anxiety levels and improve focus on academic tasks. However, researchers have concluded that mindfulness techniques not only help students temporarily relieve anxiety but also provide long-term skills to deal with academic pressure in a more controlled manner [79]. This implies that the impact of DIGA-FAM on anxiety regulation might only be optimal if it is implemented consistently and continuously over an extended period. Similarly, indicators for managing negative emotions (Item 7) and maintaining mental balance (Item 8) also display a more heterogeneous distribution of responses with total scores of 75.42 and 75.40, even though research shows that the majority of mindfulness studies (95%) demonstrate significant improvements in student attention and reduced impulsivity, which applies across research designs and types of control groups [80], [81]. This empirical gap indicates a potential need for a more explicit and structured integration of mindfulness practices into DIGA-FAM, rather than simply letting it remain implicitly present through the game atmosphere. This finding is also in line with research results that confirm the close relationship between mindfulness, self-regulated learning, and attentional control in language learners, where systematically integrated mindfulness has been shown to suppress procrastination and increase sustained learning engagement [82].

In dimensions related to self-awareness, error acceptance, and social relationships during learning, the DIGA-FAM model showed a more consistent and equitable contribution than the anxiety regulation indicator. Indicators of reflection on learning experiences (Item 10) and acceptance of mistakes (Item 12) showed strong trends with scores of 78.32 and 78.70, while indicators of positive social relationships reached high total scores, particularly for respecting friends' opinions (Item 14, score: 81.26) and building supportive networks (Item 15, score: 80.52), indicating that the game-based learning format may indirectly encourage the development of a growth mindset orientation in students. The growth mindset perspective asserts that by creating a classroom culture that welcomes and promotes mistakes as opportunities for growth, students will develop resilience, determination, and perseverance, ultimately eliminating fixed mindsets and improving academic achievement [83]. Indicators of the ability to understand others' feelings and communicate better in learning interactions even showed no negative responses at all, a finding that aligns with research proving that mindfulness promotes better self-awareness and emotional regulation, thereby helping individuals manage their emotional reactions in social interactions, making them more empathetic and less reactive, ultimately improving the quality of interpersonal relationships [84]. Furthermore, research shows that mindfulness training is a key feature of mindfulness practices that intersect with core competencies within the Social Emotional Learning framework, where self-awareness is the most fundamental skill that forms the foundation for other skills such as self-management, awareness of others, and relationship building [85]. Overall, the distribution pattern of responses across these parameters, which yields a total calculated average score of 76.80, suggests that DIGA-FAM may be more effective in supporting mindfulness at the

cognitive and social levels than at the level of managing acute emotional anxiety. This is relevant to the finding that academic mindfulness, self-regulated learning, and school engagement are collectively significant predictors of students' academic resilience [86]. Therefore, strengthening the emotional dimension of mindfulness through more structured reflection activities remains an agenda for model development that cannot be ignored.

Table 4. Distribution of Student Responses to the Joyfulness Dimension in the Implementation of the DIGA-FAM Model

No.	Statement	Percentage (%)					
		SA	A	N	D	SD	Total
1	Sustaining enthusiasm throughout the entire lesson.	18.8	50.0	29.2	2.1	0	77.12
2	Active behavioral involvement over passive listening.	25.0	39.6	35.4	0	0	77.92
3	Perceived enjoyment of gamified structures.	27.1	41.7	29.2	2.1	0	78.74
4	Internal happiness and comfort during activities.	35.4	37.5	27.1	0	0	81.66
5	Freedom from error anxiety via teacher support.	27.1	41.7	32.3	0	0	78.94
6	Elevated confidence facing complex tasks.	20.8	43.8	33.3	2.1	0	76.66
7	Exercise of interest-based selection autonomy.	22.9	50.0	25.0	2.1	0	78.74
8	Perceived ownership over individual progress.	27.1	39.6	33.3	0	0	78.76
9	Uncoerced motivation for deeper exploration.	20.8	47.9	27.1	2.1	2.1	76.24
10	Experiencing contextual, real-world instruction.	22.9	45.8	31.3	0	0	78.32
11	Technology integration increasing task interest.	27.1	43.7	29.2	0	0	79.58
12	Fun execution of trial-and-error behaviors.	35.4	37.5	27.1	0	0	81.66
	Average						**78.55**

Student response data on the joyfulness dimension suggests that the DIGA-FAM model may support the creation of a pleasant learning atmosphere and encourage active engagement, although the intensity of the resulting intrinsic motivation varies across indicators. Indicators related to happiness and comfort during the learning process (Item 4) alongside the opportunity to learn from mistakes in a fun way (Item 12) showed the highest identical positive response trend, both achieving peak calculated total scores of 81.66. This pattern suggests that a psychologically safe learning environment is a key prerequisite for fostering genuine joy in learning. This is consistent with findings showing that clear and actionable feedback builds student confidence, while trust in the teacher-student relationship and an emotionally safe environment increase student openness to feedback [73]. Indicators for the utilization of learning technology (Item 11) also show a consistently positive response with a score of 79.58, indicating that Wordwall, as a game-based assessment platform, delivers a more engaging learning experience than conventional paper-and-pencil evaluations. These findings align with the argument that gamification significantly increases student motivation and enthusiasm for academic tasks, as game mechanics not only engage students but also strengthen intrinsic motivation through immediate feedback and recognition of achievement [87]. Furthermore, indicators of the opportunity to choose learning methods that align with interests (Item 7) show a strong positive trend with a score of 78.74, which is relevant to the principle of Self-Determination Theory (SDT) that students demonstrate greater autonomy and intrinsic motivation when engaged in self-selected activities [88]. However, the motivation indicator for deeper learning without coercion (Item 9) yielded the lowest total calculated

score of 76.24 and showed the most heterogeneous distribution of responses, including the emergence of both disagree (2.1%) and strongly disagree (2.1%) responses. This contraction confirms previous review findings that although gamification has a positive influence on student motivation, this drive can decline in the long term, with the influence of novelty effects and extrinsic rewards tending to produce higher motivation initially but decreasing with repeated exposure [89].

For indicators related to responsibility for one's own learning process (Item 8, score: 78.76) and active engagement in learning activities (Item 2, score: 77.92), the more heterogeneous response patterns compared to the absolute indicators of enjoyment and comfort suggest that joyfulness in the DIGA-FAM context might be more easily developed at the affective-hedonic level than at the deeper motivational-autonomous level. This condition aligns with the SDT perspective, which asserts that intrinsic motivation stemming from pure enjoyment and satisfaction with learning is the ideal condition. However, it is unrealistic to assume that all students will always be intrinsically motivated, or that every student possesses the same intrinsic motivation for all learning content [90]. Learning indicators that encourage students to learn from mistakes in a fun way (Item 12) actually show one of the highest distributions of positive responses, confirming the results of a meta-analysis concluding that gamification significantly increases students' perceptions of autonomy and relatedness, although its impact on the competence dimension is relatively minimal [91]. This reinforces the assumption that DIGA-FAM's primary strength lies in fostering a learning climate that is permissive of errors, rather than solely in enhancing technical competence. This finding is further supported by a review showing that granting autonomy to students can enhance their engagement with teachers, and that scaffolding tasks tailored to students' unique needs can simultaneously meet the basic psychological needs of relatedness and competence [92]. Overall, the distribution pattern of responses on the joyfulness dimension, which reaches an overall calculated average score of 78.55, confirms that DIGA-FAM appears most effective in fostering joyfulness at the level of emotional comfort and courage to experiment. However, it still requires strengthening mechanisms that consistently convert extrinsic pleasure into deep and sustainable learning motivation, as emphasized in the study that digital technology-based formative feedback not only accelerates the process of delivering feedback but also allows for greater personalization and monitoring, which in turn promotes more effective learning progress [93].

3.3. Teacher Perspectives on DIGA-FAM Implementation

Classroom observations and in-depth interviews with the teacher revealed learning dynamics that qualitatively reinforced and further elaborated on the findings from the student questionnaire. When asked about overall student engagement during the implementation of the DIGA-FAM model, the teacher stated, “Students were much more active than in traditional learning. They scrambled to answer, even those who are usually quiet became involved because the format was like a game, not an exam.” This statement suggests that DIGA-FAM may help dismantle the psychological barriers that frequently arise in formal assessment contexts, particularly for students who tend to exhibit passive

learning behaviors. This aligns with findings showing that game elements such as points, badges, and competition can positively influence student learning behavior, as game mechanics not only engage but also strengthen intrinsic motivation through immediate feedback and recognition of achievement [87]. Direct classroom observations confirmed this trend: all students appeared actively engaged from the moment the game session began, demonstrating a consistent level of participation, including among individuals who typically choose not to respond in conventional learning settings. These findings are consistent with research findings confirming that gamification significantly increases students' behavioral and cognitive engagement in the learning environment, as the structured competitive element encourages students to process information more actively and purposefully [94]. In terms of formative assessment results, Wordwall score data indicates that the majority of students were able to complete the game's challenges at a level appropriate to their learning profiles, suggesting that the content differentiation implemented in DIGA-FAM can be effective in accommodating the diversity of student learning readiness.

The joyfulness dimension identified in the questionnaire data was strongly supported by observations, particularly regarding students' emotional responses to errors during gameplay. The teacher described this specific qualitative pattern as follows: “What's interesting is that when they answer incorrectly, instead of feeling embarrassed or down, they laugh and try again. It's a completely different atmosphere than a regular exam.” This behavioral coding of a lighthearted response to errors is not simply a spontaneous reaction, but rather an indicator suggesting that students are operating within a psychologically safe state to experiment and fail without immediate consequences that threaten their self-esteem. This condition is highly relevant to the argument that formative assessment is an effective way to create a safe learning space without the pressure of credit or grades, allowing students to try new things, discuss their thoughts, and gradually build confidence [95]. From an observational perspective, this classroom atmosphere characterized by collective laughter and a spirit of retry also indicates the formation of a supportive classroom climate, where mistakes are interpreted not as failures but as an integral part of the learning process. This aligns with research findings showing that constructive and empathetic feedback from teachers promotes students' emotional well-being, while negative or ambiguous feedback risks alienation and disengagement [96]. Wordwall formative assessment score data also supported the view that students who responded to errors with laughter and retries tended to achieve higher scores in subsequent rounds of the game, suggesting that the tolerance for errors in the DIGA-FAM format functionally contributed to increased student response accuracy.

However, classroom observations also identified a critical finding not fully captured in the quantitative questionnaire data: a pattern of compromised concentration among certain students due to competitive pressure and a rush to answer. The teacher highlighted this systemic issue, noting, “There are moments where they are so focused on winning that they just click without really reading the questions. The competition is high, but sometimes it overpowers their thoroughness.” This phenomenon analytically highlights an inherent tension in the DIGA-FAM design, where the competitive element designed to

encourage engagement can potentially compromise the depth of students' cognitive processing. This finding is confirmed by studies noting that while real-time feedback and interactive assessments in gamification can significantly increase engagement, they also have the potential to create stress due to poorly managed competition [97]. From a mindfulness perspective, this condition supports the questionnaire findings where the highest proportion of neutral responses was precisely for indicators of the ability to reduce anxiety and maintain concentration, as intense competitive pressure can activate a fight-or-flight response that disrupts attention regulation. This is relevant to the argument that the effectiveness of gamification in driving motivation depends heavily on a strong pedagogical rationale, so that without a design ensuring a strict alignment between competitive elements and deep instructional goals, the impact of gamification on cognitive engagement can be counterproductive [98]. Wordwall score data further supports this pattern, showing that students playing at easy and medium levels tended to display higher accuracy of answers than those at difficult levels. This implies that competitive pressure is felt more intensely during complex tasks, suggesting a clear need to adjust the game mechanics by adding reflection breaks between inputs to ensure that the joyfulness built does not compromise the cognitive mindfulness that forms the foundation of deep learning within the DIGA-FAM model.

4. CONCLUSION

This study aimed to evaluate students' learning experiences in poetry instruction through the integration of differentiation principles and game-based formative assessment. Findings indicate that the DIGA-FAM model can support positive student responses in learning poetic texts across three dimensions of deep learning: awareness, meaningfulness, and enjoyment. Structurally, this model is most effective in building enjoyment at the emotional comfort level, meaningfulness at the motivational and instrumental levels, and awareness at the cognitive and social levels. However, independent articulation of understanding, emotional regulation, and concentration under competitive pressure remain aspects that require further strengthening. Theoretically, this study contributes to the literature on differentiated instruction by demonstrating how gamified formative feedback can map and accommodate diverse learning readiness in a language arts context. Practically, teachers are advised to use this approach while carefully balancing competitive game mechanics with structured metacognitive reflection breaks to ensure that the resulting enjoyment does not diminish cognitive depth. Key limitations of this study include the small sample size of 48 students in one school, the lack of a comparison group, and its reliance on perceptually based descriptive data, which precludes broad generalization. Therefore, future research should employ a quasi-experimental design with adequate control groups, involve larger and more diverse samples across educational levels, and integrate longitudinal measurements to comprehensively assess the long-term sustainability of the DIGA-FAM model on student learning outcomes.

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