



Developing an AI-Supported Joyful Learning Guide for Grade 4 English Instruction Using Addie

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ABSTRACT

Limited preparation time remains a practical challenge for elementary English teachers in designing engaging instructional media and joyful learning activities. This study developed and evaluated an AI-supported Joyful Learning Activity Guide for Grade 4 English instruction using the ADDIE framework. The guide was developed from a needs analysis with Grade 4 English teachers and integrates three complementary components: Ice Breaking, Total Physical Response (TPR), and Classroom Management. Its distinctive contribution lies in translating teachers' identified needs into a ready-to-use instructional resource that integrates joyful learning activities, classroom-management support, and directly accessible materials through QR codes within a single teacher-oriented guide. AI was utilized during product development to support content elaboration and visual resource preparation rather than requiring direct student interaction with AI. Expert validation and a limited trial with target users indicated that the guide was highly feasible, clear, relevant, and practical for classroom use. Teachers particularly valued the accessible supporting materials, structured activity procedures, and their potential to reduce preparation demands. The study provides a practical and context-responsive instructional resource that enables Grade 4 English teachers to implement joyful learning activities by following ready-to-use guidance and accessing supporting materials through QR codes, thereby reducing preparation demands while maintaining teacher control over classroom implementation.

Keywords: joyful learning, instructional guidebook, grade 4 english instruction, artificial intelligence, ADDIE

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INTRODUCTION

Elementary English instruction requires teachers to integrate linguistic objectives with developmentally appropriate learning experiences. For Grade 4 learners, movement, visual support, interaction, and simple competition can help sustain attention and reduce the monotony that may occur in predominantly teacher-centered lessons. Ice-breaking activities have been associated with improved motivation, concentration, and participation (Wahyuni et al., 2025), while Total Physical Response (TPR) connects verbal input with comprehension through physical action (Amalia et al., 2024; Wibowo & Astiyandha, 2025). At the same time, active and movement-based learning requires clear procedures, appropriate timing, safety guidance, transitions, and attention management so that learner enthusiasm remains purposeful and manageable (Aliyyah & Febriani, 2025).

Despite the pedagogical potential of such activities, their classroom implementation creates a practical challenge for teachers. Engaging activities require not only pedagogical ideas but also preparation of supporting materials, clear implementation procedures, and appropriate classroom-management arrangements. Teachers may therefore understand the value of joyful and active learning but still experience difficulty implementing it consistently when preparation time is limited. This concern was reinforced by the preliminary needs analysis in the present study, which identified four recurring issues among Grade 4 English teachers: time and workload constraints, variation in students' vocabulary mastery and motivation, the need for practical and ready-to-adapt instructional media and activity ideas, and the need for feasible guidance in using AI and

related technologies under varying conditions of device availability and internet access. These findings indicate that the problem is not simply a lack of teaching strategies or technological tools; rather, teachers require instructional support that can translate pedagogical ideas into activities that are practical, accessible, and manageable within actual classroom conditions.

Previous research has provided important evidence regarding the individual elements relevant to this problem. Studies on Ice Breaking have emphasized its role in supporting learners' motivation, concentration, and participation (Wahyuni et al., 2025), while research on TPR has highlighted the pedagogical value of connecting language input with physical response in elementary English learning (Amalia et al., 2024; Wibowo & Astiyandha, 2025). Classroom-management research has similarly demonstrated the importance of structured procedures for maintaining effective elementary learning environments (Aliyyah & Febriani, 2025). In parallel, recent studies have explored the growing role of artificial intelligence in education. AI has been investigated for elementary English lesson design (Han & Lee, 2024), literacy learning in elementary classrooms (Kosmas et al., 2025), and teacher lesson planning and content development (Luo & Tahir, 2025). Interactive digital resources have also been associated with learner motivation when technology is meaningfully integrated into pedagogy rather than introduced as an isolated feature (Barokah et al., 2025).

Taken together, these studies demonstrate the educational value of ice-breaking, movement-based language learning, classroom management, and AI-supported educational practices. However, these areas have largely been addressed as distinct pedagogical or technological strands. Limited attention has been given to translating them into a single teacher-oriented, ready-to-use instructional resource specifically designed for Grade 4 English instruction. More specifically, teachers need more than evidence that individual strategies are beneficial; they also need clear procedures, accessible supporting media, and classroom-management guidance that allow those strategies to be implemented without requiring extensive independent preparation. A further distinction concerns the role of AI. Rather than requiring elementary students to interact directly with AI, there is value in positioning AI behind the instructional process as a teacher-supporting tool for developing and preparing classroom resources.

The present study addresses this gap by developing an AI-supported Joyful Learning Activity Guide that integrates three complementary components: Ice Breaking, Total Physical Response (TPR), and Classroom Management within one coherent resource for Grade 4 English teachers. The guide translates the needs identified during the Analysis stage into ready-to-use activity procedures and supporting materials that can be accessed through QR codes, while Classroom Screen provides additional support for classroom organization and implementation. AI is positioned as a development aid for content elaboration and visual-resource preparation rather than as an adaptive tutoring system requiring direct student interaction. The rationale for developing the product, therefore, lies not in presenting Ice Breaking, TPR, classroom management, or AI as individually concepts, but in integrating them into a needs-based, teacher-oriented resource designed to reduce preparation demands and support practical classroom implementation.

This study, therefore, aimed to develop and evaluate an AI-supported joyful learning activity guide for Grade 4 English instruction through an ADDIE-based research and development process. The study addressed three questions: (1) How can a joyful learning guidebook be developed from teachers' identified needs through an ADDIE-based R&D process? (2) To what extent is the guidebook considered feasible, acceptable, practical, and relevant by expert validators and target users? Moreover, (3) What improvements are required before the product is finalized for broader use?

LITERATURE REVIEW

Joyful and Movement-Based Learning in Elementary English

For young learners, joyful learning should not be understood merely as entertainment or the creation of a pleasant classroom atmosphere. Its pedagogical value lies in combining enjoyment with purposeful language-learning experiences that encourage participation, attention, interaction, and meaningful engagement. Interactive activities can contribute to learner motivation when they are embedded within clear instructional purposes rather than used as isolated classroom diversions (Barokah et al., 2025). Within this perspective, Ice Breaking and Total Physical Response (TPR) serve different but complementary pedagogical functions.

Ice Breaking primarily supports learners' readiness to participate by restoring attention, increasing motivation, and encouraging classroom involvement (Wahyuni et al., 2025). TPR, in contrast, links verbal input with bodily action, allowing young learners to process language through physical response and concrete experience (Amalia et al., 2024; Wibowo & Astiyandha, 2025). Thus, while Ice Breaking primarily addresses the affective and attentional conditions for learning, TPR contributes more directly to the connection between language input, comprehension, and physical action.

These functions should not be viewed as competing or interchangeable strategies. Rather, they can operate sequentially and complementarily within elementary English instruction. Ice Breaking can create readiness and re-establish learners' attention, while TPR can capitalize on that readiness by engaging learners in language-focused physical interaction. From this perspective, joyful learning emerges not from the presence of a single entertaining activity but from the coordination of motivational, cognitive-linguistic, and physical dimensions of learning. The relationship between Ice Breaking and TPR therefore provides a pedagogical basis for combining both components within the developed guide: one helps establish conditions for engagement, while the other channels engagement toward language comprehension and meaningful response.

Classroom Management as an Enabling Condition for Joyful Learning

Movement-based and collaborative activities create opportunities for active participation, but they simultaneously introduce greater demands on classroom organization. Activities involving movement, rapid responses, grouping, interaction, and transitions require clear instructions, timing, attention signals, safety expectations, and procedures. Classroom management should therefore be understood as part of instructional design rather than merely as a response to student misbehavior. Structured classroom-management practices are particularly important in elementary education, where teachers must balance learner participation with instructional direction (Aliyyah & Febriani, 2025).

This relationship reveals an important pedagogical tension. The same characteristics that can make Ice Breaking and TPR engaging movement, interaction, spontaneity, and active participation—can also make classroom activities more difficult to manage if procedures are unclear. Consequently, greater engagement does not automatically result in more effective learning. Joyful learning requires a structure that allows enthusiasm to remain connected to instructional purposes. Classroom management, therefore, functions as an enabling condition for Ice Breaking and TPR: it provides the procedural structure through which active and enjoyable activities can be implemented safely, efficiently, and purposefully.

This connection also explains why classroom management is treated as a principal component of the present product rather than as an additional or supplementary topic. Ice Breaking, TPR, and Classroom Management address different but interdependent dimensions of classroom practice: Ice Breaking supports readiness and attention, TPR provides movement-based language processing, and classroom management regulates how participation, movement, timing, and transitions occur. Their integration consequently reflects the practical reality that teachers must simultaneously consider what activity to conduct, how students engage with the activity, and how the activity is organized and controlled.

AI and Technology as Teacher-Supporting Resources

Digital technologies can support language learning when their features are meaningfully connected to pedagogical purposes. Previous research has shown, for example, that technology-mediated access to subtitled audiovisual content can provide contextual and engaging opportunities for vocabulary learning (Agustiani, Rery, & Putri, 2025). This suggests that the educational value of technology lies not simply in the presence of digital tools, but in the way those tools provide learners and teachers with relevant language-learning resources.

AI can support teachers behind the instructional process through lesson design, content development, resource preparation, and visual creation. Research has documented broader educational applications of generative AI (Khan et al., 2024), AI-supported elementary English lesson design (Han & Lee, 2024), co-designed literacy learning in elementary classrooms (Kosmas et al., 2025), and teacher lesson planning and content development (Luo & Tahir, 2025). However, AI-generated resources still require teacher judgment, curricular alignment, and contextual adaptation. More broadly, the use of digital technology in language learning also requires careful instructional management. Agustiani, Ramdha, et al. (2025) found that notifications, messaging, entertainment applications, and multitasking could become sources of distraction during smartphone-supported vocabulary learning. Although the study involved university students rather than elementary learners, its findings highlight a broader pedagogical principle: digital technology needs to be used purposefully and accompanied by appropriate structures for maintaining attention and instructional focus. The same principle applies to QR codes and classroom-management technologies: their value lies in making resources and procedures easier to access and implement, rather than in technological novelty itself (Barokah et al., 2025).

Ice Breaking, TPR, and Classroom Management determine what pedagogical functions need to be supported, whereas AI, QR codes, and Classroom Screen assist teachers in preparing, accessing, and implementing those functions. This distinction is important because technology alone does not create joyful learning. Its contribution depends on whether it reduces unnecessary preparation demands and improves access to pedagogically relevant resources.

This relationship also differentiates AI support from direct AI-based instruction. In the present product, AI does not replace the teacher, determine student learning pathways, or require elementary learners to interact directly with an AI system. Instead, AI operates behind the instructional process by assisting in content elaboration and visual-resource preparation, while the teacher retains responsibility for selecting, adapting, and implementing the activities. Thus, the relationship between AI and pedagogy is supportive rather than substitutive: technology assists the preparation and delivery of instruction, while pedagogical decisions remain under teacher control.

Synthesis and Theoretical Positioning of the Present Study

The reviewed literature suggests that the major concepts underlying the present study are functionally interconnected rather than independent. Joyful learning provides the broader pedagogical orientation; Ice Breaking contributes motivational readiness and attention; TPR translates active participation into movement-based language comprehension; Classroom Management provides the procedural structure necessary to regulate that participation; and AI-supported resources, QR codes, and Classroom Screen facilitate preparation, access, and implementation. These relationships can be represented conceptually as follows:

Teacher needs and classroom constraints → joyful learning orientation → learner readiness and engagement through Ice Breaking → language processing through TPR → structured implementation through Classroom Management → practical access and preparation support through AI and supporting technologies.

This conceptual relationship provides the foundation for the developed guidebook. The product does not simply place several unrelated teaching techniques in one book. Instead, its three principal components were selected because they address complementary requirements of joyful elementary English instruction. Ice Breaking addresses readiness and engagement; TPR connects engagement with language learning through

action; and Classroom Management ensures that active learning remains organized and sustainable. AI-assisted development, QR-code-linked materials, and Classroom Screen then function as supporting mechanisms intended to reduce preparation demands and make these pedagogical components easier for teachers to implement.

Previous studies have generally investigated ice-breaking, TPR, classroom management, and AI-supported educational resources as separate areas of pedagogical or technological inquiry. Their findings collectively support the individual value of these components, but classroom practice requires teachers to coordinate them simultaneously. The theoretical contribution of the present study, therefore, lies in bringing these strands together within a needs-based instructional-development framework. Through ADDIE, identified teacher needs are translated into an integrated, teacher-facing resource in which pedagogical strategies, classroom-management support, and accessible media are designed as mutually supporting elements rather than isolated features. This synthesis provides the theoretical justification for developing and evaluating the AI-supported Joyful Learning Activity Guide as a coherent instructional product for Grade 4 English.

METHODS

Research Design

This study employed educational Research and Development (R&D) using the ADDIE framework, consisting of Analysis, Design, Development, Implementation, and Evaluation. ADDIE has roots in systematic instructional-development procedures of the 1970s (Branson, 1975; Molenda, 2003). R&D was selected because the study aimed not merely to examine an existing instructional practice but to transform identified teacher needs into an instructional product that could be systematically designed, developed, validated, implemented with its intended users, evaluated, and refined. ADDIE was employed as an iterative instructional-development framework in which information obtained at one stage informed decisions at the subsequent stage and evaluation findings guided product revision (Afriani et al., 2025; Zulkarnaen et al., 2025; Fitriyah et al., 2026).

The five ADDIE stages were treated as an interconnected development process. The Analysis stage identified the needs, constraints, and instructional conditions experienced by Grade 4 English teachers. The Design stage translated those findings into specifications for the content, structure, supporting media, and implementation procedures of the guidebook. The Development stage transformed the design into an initial prototype, integrated supporting technologies and media, and subjected the product to expert validation. The Implementation stage involved a limited trial with the intended teacher users. Finally, the Evaluation stage integrated expert feedback and quantitative and qualitative evidence from the limited trial to determine specific revisions required before product finalization.

Research Setting and Participants

The study was conducted within the context of elementary English instruction in Sukajadi and Senapelan Districts, Pekanbaru, Riau, Indonesia. Different participants were involved at different stages because each stage of the R&D process required a specific type of evidence. Grade 4 students were the intended beneficiaries of the developed guidebook, but they were not direct respondents in the present study.

At the Analysis stage, 15 Grade 4 English teachers from Sukajadi and Senapelan Districts were purposively selected. The selection criteria were directly related to the intended users and implementation context of the product: the participants were elementary-school English teachers who were directly involved in Grade 4 English instruction and taught within the two districts targeted by the study. Their experience with the target grade and instructional context enabled them to provide relevant information concerning teacher preparation demands, learner characteristics, instructional-media needs, classroom activities, and feasible technology use.

The 15 teachers were selected for an exploratory and formative needs analysis. The purpose of this stage was to identify recurring needs and contextual constraints that could be translated into product-design

requirements. Therefore, the sample was defined by its relevance to the intended users and context of the guidebook rather than by an intention to statistically generalize the findings to all elementary English teachers.

At the Development stage, the prototype was reviewed by two expert validators with complementary areas of expertise, namely instructional media and educational technology. These areas were considered directly relevant to the evaluation of a product combining pedagogical content, instructional media, QR-code-linked resources, and supporting technology. At the Implementation stage, a separate group of 30 English teachers affiliated with the Sukajadi and Senapelan Teacher Working Groups (KKG) participated in the limited trial. The limited trial was conducted on 22 August 2026 at SDN 6 Pekanbaru. These participants represented the direct target-user group of the guidebook and evaluated its clarity, practicality, relevance, supporting media and technology, classroom-management guidance, and potential for continued classroom use.

The 30 participants in the Implementation stage constituted a limited target-user trial. The purpose of this stage was to obtain sufficient descriptive and qualitative user feedback regarding product usability, relevance, practicality, and areas requiring refinement. The sample was therefore appropriate to the developmental and formative purpose of the trial and was not intended to support broad statistical generalization or causal claims regarding student learning outcomes.

Participant characteristics are reported based on information directly relevant to the research purpose, including teaching role, grade level, instructional context, and teacher working group affiliation. More detailed demographic characteristics, such as age, gender, educational background, and years of teaching experience, were not included in the analysis because these demographic fields were not completed consistently by all respondents. Accordingly, no incomplete demographic profile was used to characterize the sample.

Research Product, Materials, and Supporting Media

The product developed in this study was an AI-supported Joyful Learning Activity Guide for Grade 4 English instruction. The guidebook was organized around three interconnected pedagogical components: Ice Breaking, Total Physical Response (TPR), and Classroom Management. The final structure included 10 ice-breaking activities, 12 TPR activities, and classroom-management guidance. Each activity provided objectives, required materials, procedures, and implementation guidance.

QR codes were incorporated to provide direct access to printable and digital supporting materials. Classroom Screen was integrated as a supporting classroom-management application for instructions, timing, transitions, participation, and attention management. AI was used during product development to assist content elaboration and visual-resource preparation; it did not function as an adaptive tutoring system and did not require direct student interaction with AI.

Research Instruments and Data Sources

Four principal data sources were used in the study: (1) a needs-analysis questionnaire administered to 15 Grade 4 English teachers; (2) expert-validation instruments completed by the instructional-media and educational-technology validators; (3) an 18-item limited-trial questionnaire completed by 30 target users; and (4) three open-ended questions administered after the limited trial.

The needs-analysis instrument was used to identify instructional needs and contextual constraints that could inform the initial product design. Expert-validation instruments were used to evaluate the appropriateness and feasibility of the prototype before implementation.

The limited-trial questionnaire consisted of six indicators, with three items for each indicator: Clarity and Readability; Practicality of Use; Alignment with Grade 4 English Instruction; Student Response and Engagement; Media, QR Codes, and Supporting Technology; and Classroom Management and Sustainability of Use. Responses were recorded using a four-point scale ranging from 1 (*strongly inappropriate*) to 4 (*strongly appropriate*).

Table 1. Instrument Grid for the Limited-Trial Questionnaire

No.	Indicator	Evaluation Focus	Items
1	Clarity and Readability	Clarity of language, instructions, procedures, and presentation	3
2	Practicality of Use	Ease of preparation, implementation, and adaptation	3
3	Alignment with Grade 4 English Instruction	Relevance of topics, activities, and materials	3
4	Student Response and Engagement	Participation, concentration, responses, and engagement as observed by teachers	3
5	Media, QR Codes, and Supporting Technology	Accessibility and usefulness of supporting media and technology	3
6	Classroom Management and Sustainability of Use	Classroom management, safety, teacher confidence, and continued use	3
Total			18

The three open-ended questions complemented the numerical questionnaire data by asking participants to identify the most helpful features of the guidebook, implementation obstacles, and suggestions for improvement. Thus, the two forms of data served different but complementary purposes: the quantitative questionnaire indicated the strength of users' evaluations across predetermined indicators, while the qualitative responses provided explanations and concrete suggestions that could inform product revision.

Research and Development Procedure

1. Analysis

The Analysis stage was conducted before any product specifications were finalized. A needs analysis was administered to 15 purposively selected Grade 4 English teachers from Sukajadi and Senapelan Districts to identify instructional needs and constraints experienced in their teaching context.

The responses were examined and organized into recurring need clusters. Four principal concerns were identified: (1) limited preparation time and teacher workload, (2) variation in students' vocabulary mastery and motivation, (3) the need for practical instructional media and activity ideas, and (4) the need for feasible AI and technology integration under varying conditions of device availability and internet connectivity.

The needs-analysis findings were subsequently translated into specific design requirements. Limited preparation time indicated that teachers required activities and supporting media that were ready to use or readily adaptable. Variation in learners' ability and motivation indicated the need for flexible, active, and enjoyable classroom activities. The need for practical instructional media supported the inclusion of prepared games, printable resources, and activity examples. Finally, differences in technological access indicated that technology should be integrated selectively and remain usable under varying school conditions.

2. Design

The Design stage translated the findings from the needs analysis into a structured blueprint for the guidebook. The principal design requirement was to create a teacher-oriented and ready-to-use resource that could reduce the amount of time teachers needed to independently search for activities, develop media, and prepare classroom procedures.

The guidebook was designed around three complementary components: Ice breaking, TPR Activities, and Classroom Management. Ice breaking was incorporated to support learner readiness, attention, motivation, and participation. TPR was selected to provide movement-based opportunities through which learners could connect English input with comprehension and physical response. Classroom Management was included because active and movement-based activities require procedures for organizing participation, timing, transitions, attention, and safety.

The structure of individual activities was also determined during this stage. Each activity was planned to include clear objectives, materials, procedures, and implementation guidance. QR codes were incorporated as access points to prepared supporting resources so that teachers would not need to independently produce all media before teaching. Classroom Screen was selected as a supporting tool for classroom instructions, timing, transitions, and attention management. Thus, the Design stage established a direct relationship between identified teacher needs and concrete product features.

3. Development

During the Development stage, the design blueprint was transformed into the initial prototype of the AI-supported Joyful Learning Activity Guide. The three planned components were developed into practical teacher-oriented sections. The prototype contained 10 Ice breaking activities, 12 TPR activities, and a Classroom Management section.

Supporting materials required for the activities were prepared and linked to relevant sections through QR codes. Classroom Screen was incorporated into the Classroom Management component to assist with classroom instructions, timing, transitions, participation, and attention management.

AI was used as a development-support tool to assist with content elaboration and visual-resource preparation. The researcher first developed the initial activity concepts based on the Grade 4 English curriculum content and the general characteristics of Grade 4 learners. AI was then used to elaborate on these concepts. The researcher reviewed the resulting outputs and, when necessary, revised them through additional prompting before being incorporated into the prototype. This process was intended to ensure that the materials remained applicable and suitable for the intended Grade 4 English classroom context.

Before implementation, the prototype underwent expert validation. Two validators with complementary expertise (one in instructional media and one in educational technology) reviewed the product. Their feedback functioned as formative quality control rather than merely as a source of numerical feasibility scores. Recommendations were used to refine the prototype before the limited trial, including improvements in page layout and margins and greater consistency in QR-code placement.

4. Implementation

The Implementation stage involved a limited target-user trial with 30 elementary English teachers from the Sukajadi and Senapelan Teacher Working Groups (Kelompok Kerja Guru). The purpose of this stage was to obtain user-based evidence regarding the clarity, relevance, practicality, accessibility of supporting media, classroom-management support, and potential sustainability of the guidebook.

The research team first introduced the organization and intended use of the guidebook. Representative Ice breaking and TPR activities were demonstrated or simulated, while participants were shown how to access supporting materials through QR codes and how the Classroom Screen could be used to support classroom procedures.

After this guided introduction and simulation, all participants completed the 18-item questionnaire and responded to the three open-ended questions. The implementation procedure, therefore, generated both quantitative evaluations and qualitative explanations that could subsequently be used in the evaluation stage. The limited trial evaluated teachers' perceptions and observations of product usability and classroom applicability. It was not designed as a controlled experiment to establish the causal effects of the guidebook on Grade 4 students' learning outcomes.

5. Evaluation

The Evaluation stage integrated evidence obtained from expert validation and the limited trial. The purpose of the evaluation was not merely to determine whether the guidebook received a favorable overall score, but to identify which components should be retained, revised, clarified, or strengthened before finalization.

Quantitative questionnaire results were examined at the item, indicator, and overall levels. The open-ended responses were analyzed thematically to identify helpful product features, implementation obstacles, and suggestions for improvement. Quantitative and qualitative evidence were then compared to determine whether user comments confirmed, explained, or contextualized the numerical results.

The integrated evaluation resulted in several concrete product revisions. First, the placement and use of QR codes were standardized across relevant sections to improve consistency and accessibility. Second, the illustrations and visual presentation were made more consistent throughout the guidebook. Third, participants indicated that the guidance for using Classroom Screen within the Classroom Management component was insufficiently detailed for independent use. The Classroom Management section was therefore expanded by providing clearer and more detailed step-by-step guidance for operating Classroom Screen and applying it to classroom procedures.

These revisions were intended to improve the guidebook's independent usability so that teachers could follow the procedures and access the prepared resources after the guided trial without requiring extensive additional preparation.

Data Analysis

Needs-analysis responses were summarized descriptively and organized into thematic need clusters that served as context-specific inputs for product design. Expert-validation and limited-trial quantitative data were analyzed descriptively at the item, indicator, and overall levels. The four-point scale was interpreted as Poor (1.00–1.75), Fair (>1.75–2.50), Good (>2.50–3.25), and Very Good (>3.25–4.00). All 30 limited-trial participants completed the 18 questionnaire items, generating 540 quantitative responses. The three open-ended questions were analyzed thematically into helpful features, implementation obstacles, and suggestions for improvement. Because one response could contain more than one relevant idea, theme percentages were allowed to overlap. Finally, quantitative and qualitative results were interpreted side by side. The numerical data indicated the relative strengths and weaknesses of different product components, while qualitative responses were used to explain those patterns and identify specific revision priorities. This integrated interpretation provided the evidence used during the Evaluation stage to finalize the product.

RESULTS AND DISCUSSION

Teachers' Needs and Their Translation into Product Design

The Analysis stage involved 15 distinct elementary English teachers who had teaching responsibility for or access to Grade 4 English instruction in the intended study context. Rather than relying solely on thematic summaries, the needs-analysis questionnaire provided quantitative evidence regarding the practical conditions that informed product development. Twelve of the 15 teachers (80.0%) agreed that administrative and additional school responsibilities reduced the time available for preparing English instruction. Furthermore, 14 teachers (93.3%) agreed that searching for instructional ideas, adapting materials, and preparing teaching media required considerable time. Most importantly, all 15 teachers (100%) agreed or strongly agreed that they needed practical support, such as AI-assisted resources or a guidebook, to prepare materials and classroom activities more efficiently.

The needs analysis also identified challenges related to learner and classroom conditions. Differences in class size and students' abilities emerged as the most prominent barrier, with 10 of the 15 teachers (66.7%) rating this issue as a moderate or major obstacle, producing a mean score of 2.80 on the four-point barrier scale. Limitations related to preparation time and the lack of practical examples, guidance, or training obtained a mean score of 2.47, while limitations involving materials, devices, internet access, classroom space, or other facilities obtained a mean score of 2.40.

The open-ended responses reinforced these quantitative patterns. Teachers referred to limited preparation time, difficulties generating instructional ideas, differences in students' ability and interest, challenges in maintaining classroom focus, limitations in devices and internet access, and the need for

attractive but practical instructional media. Their responses also indicated expectations for ready-to-use activity examples, adaptable instructional ideas, accessible supporting materials, and practical assistance in using AI for instructional preparation.

Table 2. Needs-Analysis Evidence and Product-Design Implications

Identified Need	Empirical Evidence	Product-Design Implication
Preparation time and teacher workload	12/15 teachers (80.0%) reported reduced preparation time; 14/15 (93.3%) reported that searching for ideas, adapting materials, and preparing media required considerable time	Provide ready-to-use or readily adaptable activities and supporting media
Variation in class size and student ability	10/15 teachers (66.7%) rated this as a moderate or major barrier; mean = 2.80/4	Provide flexible and adaptable activities for different classroom conditions
Need for practical instructional support	15/15 teachers (100%) agreed or strongly agreed that practical support, such as AI-assisted resources or a guidebook, was needed; preparation/guidance barrier mean = 2.47/4	Include clear activity procedures, ready-to-access materials, practical examples, and teacher-oriented guidance
Technology and infrastructure limitations	Facilities-related barrier mean = 2.40/4; open-ended responses also referred to limitations in devices and internet access	Integrate technology selectively while maintaining usability across different school conditions.

In synthesis, the quantitative and qualitative evidence indicate that teachers did not simply require additional technology or more teaching materials. Rather, they needed instructional support that could reduce preparation demands, accommodate learner diversity, provide practical and adaptable activities, and remain feasible under varying technological conditions. These four recurring areas are consistent with the broader needs identified during the analysis stage: workload and preparation time, differences in student ability and motivation, the need for practical media and activity ideas, and feasible AI and technology integration.

These findings were directly translated into product-design decisions. Limited preparation time supported the inclusion of ready-to-use or readily adaptable activities and prepared supporting media. Differences in learner ability and classroom conditions supported the development of flexible activities that could be adjusted according to students' needs. The demand for practical instructional resources informed the inclusion of games, printable materials, visual resources, and clearly structured activity procedures. Finally, differences in technological access informed the decision to use technology selectively rather than making the guidebook dependent on sophisticated digital infrastructure.

The identified needs were subsequently translated into a guidebook comprising three interconnected components: Ice breaking, Total Physical Response (TPR), and Classroom Management. The developed product contained 10 Ice breaking activities and 12 TPR activities, complemented by Classroom Screen as a classroom-management aid and QR codes linking teachers to printable or digital supporting materials.



Figure 1. Developed Guide Book

Ice breaking was incorporated to support readiness, attention, motivation, and participation, whereas TPR provided opportunities for learners to connect verbal input with comprehension and physical response. Previous studies have similarly associated Ice breaking with motivation, concentration, and classroom participation (Wahyuni et al., 2025) and TPR with meaningful movement-based language learning (Amalia et al., 2024; Wibowo & Astiyandha, 2025). The contribution of the present product, therefore, lies not in presenting these strategies as entirely new techniques, but in integrating them with classroom-management guidance and accessible supporting media within a teacher-ready resource

AI Utilization and Quality Control

Artificial intelligence was used during the Development stage as a supporting tool for product development rather than as an instructional agent directly interacting with students. ChatGPT was used to support the elaboration of selected activity ideas and instructional content, while generative AI was also used in the preparation of visual illustrations for the guidebook. AI, therefore, contributed to content and visual-resource development, whereas the instructional structure, activity selection, and classroom implementation remained researcher- and teacher-directed. When AI-generated content or illustrations did not match the intended activity or classroom context, the researcher revised the prompt and generated a new output. This iterative process continued until the material was considered suitable for the intended design. For visual materials, particular attention was given to whether the clothing and representation of students were appropriate to the intended Indonesian elementary-school context.

AI did not independently determine learning objectives, assign learning pathways, evaluate students, or make classroom decisions. Grade 4 learners were not required to interact directly with an AI system. Thus, the developed product should be understood as an AI-supported teacher resource, not as an adaptive AI tutoring system. The validation instrument itself reflects this positioning: the product incorporated AI-generated illustrations, QR-code-linked resources, and Classroom Screen as distinct supporting elements rather than treating technology as the pedagogical core.

Following this researcher-led review and refinement, selected AI-assisted materials were incorporated into the prototype and subsequently evaluated through expert validation together with the other product components. The instructional-media validation instrument explicitly assessed whether AI-generated illustrations were relevant to the activities, supported teachers' understanding, remained clear when viewed or printed, were natural and appropriate for elementary-school learners, and did not create ambiguous meanings.

The educational-technology validation instrument further examined whether AI-supported illustrations contributed to understanding, whether digital media supported rather than dominated the learning

process, whether QR codes facilitated access to materials, and whether Classroom Screen and other technologies could be used flexibly according to school facilities. Thus, AI functioned as a development aid, while quality control remained human-led through researcher review, expert validation, and subsequent target-user evaluation.

Expert Validation and Product Feasibility

Before the limited trial, the prototype was evaluated by two validators whose areas of expertise corresponded to the two principal dimensions of the developed product. The first validator, Herizal, M.Ed., from UIN Raden Fatah Palembang, had expertise in instructional media. His evaluation addressed the guidebook as an instructional medium, including its visual presentation, readability, media organization, illustrations, supporting resources, QR codes, and usability.

The second validator, Triana Ramdha, M.Pd., from Sekolah Tinggi Teknologi Pekanbaru, had expertise in educational technology. Her evaluation focused on the relationship between instructional design and technology use, particularly the integration and consistency of technological support within the guidebook. The two experts were therefore selected to provide complementary perspectives rather than duplicate judgments. This was particularly relevant because the developed product combined instructional activities, print and digital media, AI-supported illustrations, QR-code resources, and Classroom Screen.

The instructional-media validator used a 26-item four-point validation instrument covering five domains: (1) visual appearance and design; (2) readability and organization of information; (3) illustrations and visual media; (4) supporting media and QR codes; and (5) practicality and accessibility of media. The instrument also provided space for qualitative comments and final recommendations. The educational-technology validator used a separate 30-item four-point instrument covering five domains: (1) alignment of objectives, content, and activities; (2) instructional design and systematic organization; (3) interactivity and learner engagement; (4) integration of technology and digital media; and (5) practicality, flexibility, and sustainability. The instructional-media expert provided a mean score of 3.50, whereas the educational-technology expert provided a mean score of 3.78. When treated with equal weighting, the two scores produced a combined descriptive mean of 3.64, indicating that the product was considered highly feasible/valid for proceeding to limited implementation after minor revision.

Table 3. Expert-Validation Results

Validator Expertise	Mean	Interpretation	Main Recommendation
Instructional Media	3.50	Highly feasible	Improve margins and page layout
Educational Technology	3.78	Highly valid	Standardize QR-code placement
Combined	3.64	Highly feasible/valid	Proceed to a limited trial after minor revision

The instructional-media validator considered the substantive activities and media appropriate for Grade 4 English instruction but recommended improvements in margins and page layout. The educational-technology validator recommended more consistent QR-code placement across units or subtopics requiring supporting resources.

The use of only two validators nevertheless represents a limitation of the expert-validation stage. Their selection was based on the direct relevance and complementarity of their expertise to the characteristics of the product. However, their feedback should be seen as specific expert input, not as a broad consensus. The expert validation in this developmental study was primarily formative: to identify weaknesses requiring revision before the product was presented to target users. Accordingly, the validation scores were not treated as evidence of instructional effectiveness. Their principal contribution was to provide professional quality-control input that could be translated into concrete product improvements.

Integrated Evaluation of the Limited Trial

All 30 teachers completed the 18 Likert-scale statements, producing 540 complete quantitative responses. The guidebook obtained an overall mean of 3.54 out of 4, equivalent to 88.38%, and was categorized as *Very Good*. Five of the six indicators were categorized as *Very Good*, while Classroom Management and Sustainability of Use were categorized as *Good*.

Table 4. Integrated Quantitative and Qualitative Evaluation

Indicator	Mean Percentage		Category	Supporting Qualitative Interpretation
Clarity and Readability	3.74	93.61%	Very Good	Instructions and activity procedures were considered easy to follow.
Alignment with Grade 4 English Instruction	3.72	93.06%	Very Good	Activities were perceived as relevant to Grade 4 English.
Media, QR Codes, and Supporting Technology	3.61	90.28%	Very Good	QR codes were highly valued, although technological constraints remained.
Practicality of Use	3.48	86.94%	Very Good	Ready-to-use resources were perceived as reducing preparation demands.
Student Response and Engagement	3.46	86.39%	Very Good	Teachers perceived the activities as supportive of student participation and engagement, although focus remained a concern.
Classroom Management and Sustainability of Use	3.20	80.00%	Good	Classroom management was the most frequently reported implementation obstacle.

The strongest indicator was Clarity and Readability (93.61%), followed by Alignment with Grade 4 English Instruction (93.06%). At the item level, alignment between the activities and Grade 4 English needs reached 95.00%, while illustrations, supplementary media, and printable materials also obtained 95.00%. The item related to reducing preparation time obtained 94.17%. In contrast, safety and classroom-management guidance obtained the lowest item-level score at 72.50%. The high clarity rating is particularly relevant for a teacher-oriented product because a resource has limited practical value if users require substantial additional interpretation before implementing it. The strong evaluation of preparation efficiency also directly corresponds with the needs-analysis finding that preparation time and media development represented major practical concerns.

These results must nevertheless be interpreted according to the scope of the instrument and the limited trial. The scores provide evidence concerning teacher-perceived clarity, relevance, practicality, usability, and perceived or observed engagement, rather than direct evidence of instructional effectiveness in improving student learning outcomes. The present study did not directly measure changes in students' vocabulary knowledge, comprehension, speaking ability, or other English-learning outcomes through a controlled pre-test/post-test design. Consequently, the limited-trial results support claims regarding the product's feasibility, acceptability, and practical usability, but they should not be interpreted as evidence of causal improvement in student achievement.



Figure 2. Limited trial at SDN 6 Pekanbaru, 22 August 2026

Qualitative Evaluation of the Limited Trial

The open-ended responses provided further explanation of the quantitative results. QR-code accessibility and Ice breaking were the two most frequently identified helpful features, each mentioned by 12 teachers (40.0%). Teachers also valued clear activity procedures and TPR activities. At the same time, the qualitative responses revealed concerns that were less visible in the high overall mean score. Classroom management, student focus, and compliance with instructions were the most frequently reported implementation obstacles, while technology, internet connectivity, and Classroom Screen operation were also identified as practical challenges.

Table 5. Key Qualitative Themes from Open-Ended Responses (n = 30)

Focus	Theme	Frequency (%)
Most helpful	QR codes / easy access to supporting media	12 (40.0%)
Most helpful	Ice breaking activities	12 (40.0%)
Most helpful	Clear activity steps/instructions	5 (16.7%)
Most helpful	TPR activities	4 (13.3%)
Obstacle	Classroom management/student focus/instruction compliance	10 (33.3%)
Obstacle	Technology, internet connectivity, or Classroom Screen operation	7 (23.3%)
Obstacle	Time allocation	6 (20.0%)
Suggestion	No specific suggestion/product already considered adequate	14 (46.7%)
Suggestion	More detailed Classroom Screen guidance	8 (26.7%)

Note. Percentages may overlap because a single open-ended response could contain more than one relevant theme

The table strengthens the interpretation of the quantitative results in two ways. First, it confirms that teachers appreciated practical features that reduced preparation demands, especially QR-code accessibility and ready-to-use activities. Second, it demonstrates that positive overall evaluations did not eliminate implementation concerns. In particular, classroom management and Classroom Screen guidance emerged repeatedly as areas requiring further development.

Classroom Management as the Main Area for Improvement

Classroom Management and Sustainability of Use received the lowest indicator score (80.00%), although it remained within the *Good* category. At the item level, safety and classroom-management guidance received 72.50%, the lowest result among the questionnaire items. The qualitative evidence converged with this finding: classroom management, student focus, and compliance with instructions were mentioned as obstacles by 10 participants (33.3%), while eight participants (26.7%) specifically requested more detailed Classroom Screen guidance.

An important contributing factor identified through reflection on the limited-trial implementation was the insufficient procedural detail provided in the initial version of the guidebook concerning the use of Classroom Screen. During the trial, the research team introduced and demonstrated Classroom Screen, enabling participants to understand its general purposes. However, the guidebook itself did not yet provide sufficiently detailed step-by-step guidance that teachers could independently follow after the demonstration.

In particular, the initial version provided a limited explanation of how specific Classroom Screen functions could be applied to organize instructions, regulate activity timing, manage transitions, regain student attention, and support participation during active classroom activities. This limitation appears to have contributed to the comparatively lower evaluation of the Classroom Management component.

The issue should therefore not be interpreted as indicating that teachers rejected Classroom Screen or considered classroom management unimportant. Rather, the result reflects a gap between recognizing the usefulness of a tool during guided implementation and feeling sufficiently prepared to reproduce its use independently. The request from 26.7% of participants for more detailed Classroom Screen guidance provides qualitative support for this interpretation.

A second and complementary explanation concerns the nature of joyful and movement-based learning itself. Ice Breaking and TPR deliberately involve movement, interaction, rapid responses, transitions, competition, and active participation. These characteristics can increase learner engagement, but at the same time, they increase teachers' responsibility for managing noise, movement, grouping, time, attention, safety, and compliance with instructions. Thus, the same features that make activities engaging may also increase their organizational complexity. Joyful learning, therefore, requires more than attractive activities; it requires structured procedures that allow active participation to remain purposeful and manageable. This interpretation is consistent with Aliyyah and Febriani (2025), who emphasize the role of structured classroom-management practices in elementary education.

The comparatively lower classroom-management score can therefore be understood as reflecting two interconnected factors: the inherent classroom-management demands of active and movement-based learning and the insufficient procedural detail concerning Classroom Screen in the initial version of the guidebook.

This finding has an important practical implication. Classroom management should not be treated as a supplementary section of the guidebook but as an enabling condition for the successful implementation of Ice Breaking and TPR. Teachers need guidance not only on *what activity to conduct*, but also on *how to organize students, manage transitions and time, regain attention, maintain safety, and regulate participation*.

Accordingly, the evaluation stage resulted in an expansion of the Classroom Management section. More detailed step-by-step Classroom Screen guidance was added, with clearer explanations of how its functions could support instructions, timing, transitions, attention management, and participation. The purpose of this revision was to reduce the gap between guided implementation during the limited trial and independent implementation in teachers' own classrooms.

Product Evaluation and Final Revision

The integrated quantitative and qualitative evidence indicated that the guidebook did not require fundamental conceptual redesign. Instead, the evaluation identified several targeted areas in which usability, consistency, and independent implementation could be strengthened.

Table 6. Evidence-Based Final Product Revisions

Evidence Source	Revision Area	Final Action
Instructional-media expert validation	Margins and page layout	Page margins, layout, and formatting were refined
Educational-technology expert validation	QR-code consistency	QR-code placement was standardized across relevant units/subtopics
Limited-trial quantitative and qualitative evidence	Classroom Management and Classroom Screen guidance	More detailed step-by-step operating and implementation guidance was added
Final visual review	Illustration consistency	Illustration style and visual presentation were standardized

The revision process demonstrates why an overall positive score should not be interpreted as indicating that no further product improvement was necessary. If interpretation had relied only on the overall score of 88.38%, the guidebook might simply have been described as highly rated. Indicator-level and qualitative findings revealed more specific implementation issues. For example, teachers valued QR-code accessibility while also reporting technology-related obstacles. Likewise, Ice Breaking and TPR were perceived positively, but the active nature of these activities created additional classroom-management demands. Most importantly, the comparatively lower classroom-management score and participants' request for more detailed Classroom Screen instructions directly informed revision of that component. Quantitative evidence, therefore, indicated the relative strength of user evaluations, whereas qualitative evidence explained why certain components required revision. In this way, the evaluation stage functioned as a formative product-development process rather than merely as a final scoring exercise.

Practical Implications

The principal practical contribution of the developed guidebook lies in translating pedagogical ideas into teacher-ready procedures and supporting resources. For Grade 4 English teachers, the product provides a structured collection of ice-breaking and TPR activities, accessible media, and classroom-management guidance that may reduce the need to independently search for activities and prepare supporting resources from the beginning. The findings also suggest that the value of AI-supported educational products should not be judged primarily according to technological sophistication. Practical value depends on whether the product is understandable, adaptable, manageable, accessible under varying technological conditions, and capable of preserving teacher control over classroom implementation. Within the scope of the present study, these implications concern the product's feasibility, usability, practicality, and perceived value among expert validators and teacher users. They should not be extended to claims that the guidebook has been demonstrated to improve student achievement. Such claims require subsequent research involving direct measurement of student learning outcomes.

CONCLUSION AND RECOMMENDATIONS

This study developed an AI-supported Joyful Learning Activity Guide for Grade 4 English instruction through the ADDIE framework. The final product integrates Ice Breaking, Total Physical Response (TPR), Classroom Management, QR-code-linked supporting resources, and technology-assisted instructional preparation within a teacher-oriented guide. The product was developed from identified teacher needs, particularly the need for practical instructional support that can reduce preparation demands while remaining adaptable to differences in learners, classroom conditions, and technological access.

Expert validation and the limited target-user trial indicated that the guidebook was feasible, relevant, clear, and practical for further classroom use. The evaluation process also identified aspects requiring refinement, particularly the consistency of QR-code use, visual presentation, and the level of procedural

support provided for Classroom Screen and classroom management. These findings demonstrate the value of treating evaluation in R&D as a formative process in which positive feasibility judgments are accompanied by evidence-based product revision.

The main contribution of the study lies in translating teachers' identified needs into an integrated, ready-to-use instructional resource rather than introducing individual teaching strategies or technologies as isolated innovations. Ice Breaking and TPR provide active and movement-based learning opportunities, Classroom Management supports their organized implementation, and QR codes facilitate direct access to prepared resources. AI functions primarily behind the instructional process by supporting content elaboration and visual-resource development, while teachers retain pedagogical control over classroom decisions and implementation. The study, therefore, contributes a practical model for developing teacher-facing instructional resources in which pedagogical needs guide the use of technology, rather than technology determining the instructional design. This positioning is particularly relevant for contexts in which teachers have limited preparation time and uneven access to digital infrastructure.

The findings should nevertheless be interpreted within the developmental scope of the study. The needs analysis involved a purposively selected group of 15 Grade 4 English teachers, while the limited trial involved 30 teachers from two Teacher Working Groups in Pekanbaru. Expert validation was conducted by two specialists, providing focused but not broad expert representation. In addition, the limited trial examined teachers' evaluations and perceived or observed student engagement rather than directly measuring student learning outcomes. No controlled pre-test/post-test design with Grade 4 learners was conducted.

Future research should therefore evaluate the finalized guidebook in broader school contexts, involve additional expert perspectives, examine sustained teacher use, and directly assess student learning outcomes through classroom-based implementation studies. Such research would provide stronger evidence concerning the effectiveness, transferability, and long-term usability of the developed guidebook.

Credit authorship contribution statement

Aulia Agustiani: Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Visualization, Project administration, Funding acquisition. Erni: Methodology, Validation, Supervision, Resources, Writing – review & editing. Adib Alfalah: Investigation, Resources, Validation, Data curation, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Declaration

All participants provided informed consent prior to their involvement in the study. They were informed about the study's purpose, procedures, and their right to withdraw at any time without consequence.

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