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Research Article

KATABEL Flashcards for Fable-Based Dance Learning in Primary School

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Abstract

Dance instruction in primary school requires learning media that make movement concepts concrete, engaging, and usable for young learners. This study developed KATABEL, a fable-based dance flashcard medium, and examined its feasibility and preliminary effectiveness in Grade 4 dance learning. The study employed research and development using the ADDIE framework and involved 29 students at a public primary school in Pati Regency, Indonesia. KATABEL combines animal-fable narratives, illustrations, QR-code-linked movement videos, and prompts for imitating, adapting, sequencing, and presenting movement. Feasibility was assessed by content and media experts; implementation evidence was obtained through sequential small-group (n = 6) and large-group (n = 23) pretest-posttest trials. Content and media validation yielded 93% and 96%, respectively, placing the product in the highly feasible category. Shapiro-Wilk results supported normality, and paired-sample tests indicated significant gains in both trials (small group: $t = -8.174$, $p < .001$; large group: $t = -18.325$, $p < .001$). Mean normalized gains were 0.6879 and 0.7366. KATABEL offers a low-cost, human-centered physical-digital learning resource that supports movement exploration, participation, and equitable access to primary arts learning.

Keywords: ADDIE; Dance Education; Fable-Based Movement; Flashcards; Primary School; QR-Code Learning; Learning Outcomes.

INTRODUCTION

Primary education should provide meaningful and enjoyable learning experiences that foster knowledge, skills, creativity, expression, and participation [1], [2]. Within this mandate, dance education is more than the reproduction of prescribed movements. It gives children a bodily language through which they can explore imagination, communicate feelings and ideas, and practise coordinated participation with peers [3], [4], [5]. Learning resources for this subject must therefore translate abstract movement ideas into developmentally appropriate prompts that are concrete, visually intelligible, and safe to use in ordinary classrooms.

Visual instructional media can make complex content more accessible and can sustain learners' attention when they are designed with readable layouts, relevant imagery, and clear task directions [6]. Flashcards are particularly useful because they reduce an idea to a memorable visual and textual cue that can be handled, discussed, revisited, and used collaboratively. In elementary dance education, dance-specific flashcards have been used to connect images with movement ideas and to scaffold students' exploration of basic movement elements [7].

Nevertheless, primary dance instruction often remains dependent on teacher explanation, textbooks, and one-way demonstration. These approaches may restrict opportunities for children to observe, interpret, imitate, modify, and compose movement, particularly where teachers have limited time or confidence to demonstrate several movement variations [8], [9]. Existing evidence suggests that flashcard-supported learning can improve elementary students' outcomes and engagement in other curriculum areas [10], [11], [12]. However, a card set that is only informative does not fully address the embodied and social demands of dance learning.

A hybrid physical-digital design can extend the usefulness of simple cards. QR codes can link a tangible learning prompt to repeatable audiovisual demonstrations [13], while multimedia learning is strengthened when complementary representations reduce unnecessary cognitive demands and help learners connect words, images, and actions [14], [15]. Mobile and augmented visual resources can also improve access to demonstrations, although their value depends on purposeful integration into teaching rather than technology alone [16], [17]. A human-centered and accessible format is especially relevant to inclusive education because it provides multiple points of entry for learners with different levels of confidence, prior movement experience, and learning preferences [18].

Preliminary observation in the Grade 4 classroom at Tambaharjo 01 Public Primary School, Pati Regency, Central Java, Indonesia, indicated that dance learning relied largely on the official textbook and teacher explanation. The teacher reported difficulty in demonstrating diverse movements and in supporting students to translate a fable into bodily expression. Before the intervention, 62.06% of students had not reached the school minimum mastery criterion of 75, while 37.93% had attained it. These conditions pointed to the need for a practical, low-cost medium that would support movement exploration without replacing the teacher's pedagogical role.

This study developed KATABEL, an acronym used by the authors for a fable-based dance flashcard medium. Unlike conventional cards that primarily present vocabulary or factual prompts, KATABEL integrates a short fable, animal illustration, QR-code-linked

movement video, and a sequence of creative movement tasks. The study addressed three objectives: (1) to develop a fable-based dance flashcard medium responsive to Grade 4 learners' needs; (2) to determine its feasibility through expert validation; and (3) to examine preliminary improvement in students' dance learning outcomes during sequential classroom trials. The study contributes a user-oriented physical-digital design for accessible primary arts learning, thereby speaking indirectly to the journal's concern with equitable education, learner participation, and human-centered learning systems.

METHODS

Research Design

The study employed research and development using the ADDIE framework: analysis, design, development, implementation, and evaluation [19]. ADDIE was selected because it provides an iterative sequence for moving from identified learning needs to a designed instructional product, expert-informed refinement, and classroom evaluation. The study also adopted design-based inquiry principles by using evidence from actual classroom implementation to inform product quality and usability [20]. The effectiveness component used a one-group pretest-posttest approach in sequential small-group and large-group trials. Accordingly, the analyses indicate learning improvement after use of KATABEL but do not establish a controlled causal comparison.

Setting and Participants

The study took place in the Grade 4 class of Tambaharjo 01 Public Primary School, Pati Regency, Central Java, Indonesia. Twenty-nine students participated. Product implementation was undertaken in two sequential trials: a purposively selected small group of six students representing varied learning characteristics, followed by a large group of 23 students. The fourth-grade teacher, one content expert, and one media expert also participated in the product-evaluation process. The school name is translated here for international readability; it refers to the public primary school identified in the original study record.

KATABEL Product and Instruments

KATABEL consists of two-sided fable-based flashcards. The front side displays an animal illustration, a short moving story, and a QR code linked to an animal-movement video. The reverse side provides four scaffolded prompts: imitate a basic movement, adapt it creatively, combine it into a sequence, and present the sequence through a brief group role-play. This progression was designed to move learners from observation to guided enactment and collective creation. Expert validation sheets examined content relevance, conceptual accuracy, presentation clarity, visual quality, usability, and instructional usefulness. Content-validity procedures were informed by established recommendations for systematic expert review [21], [22].

Data Collection Procedure

Analysis-stage data were obtained through classroom observation, teacher interview, needs-analysis questionnaires, and documentation. During implementation, students completed an

achievement pretest before using KATABEL and a posttest after the learning activity. The activity involved viewing and discussing a card, accessing the QR-linked video, identifying possible animal movements, rehearsing movements in groups, modifying or sequencing movements, and presenting a short movement role-play. Teacher and student response questionnaires, validation sheets, and classroom documentation were used to describe usability and implementation. The available research record reports aggregate results only; it does not provide individual demographic data, raw score files, test-item reliability coefficients, or a formal ethics reference number.

Data Analysis

Qualitative information from observation, interview, and expert comments was summarized descriptively and used to revise the product. Expert validation was converted into percentages and interpreted using the study's feasibility categories. The normality of pretest and posttest distributions was examined with the Shapiro-Wilk procedure [23]. Because the same learners completed both assessments within each trial, learning differences were analysed using paired-sample t-tests. Normalized gain (N-Gain) was calculated to describe the proportional learning improvement [24]. To enhance interpretability, this revised manuscript additionally reports paired-sample standardized effect estimates (Cohen's $d_z = |t|/\sqrt{n}$) and mean-difference estimates derived from the reported t statistics and standard deviations; these are explicitly identified as derived values [25].

Ethical Considerations

The study involved a routine, curriculum-related learning intervention in a primary school. Results are reported only at the group level, and no student names, identifiable images, or personal data are presented. The available source record does not state a formal institutional ethics-review number; therefore, none is invented in this manuscript. Before submission, the authors should verify that school authorization and parent/guardian communication records meet their institution's current requirements for research involving minors.

RESULTS AND DISCUSSION

Results

Needs Analysis and Design Requirements

The needs analysis identified an instructional mismatch between the embodied nature of dance learning and the predominantly text- and explanation-based learning format used in the classroom. Students had limited opportunities to receive repeated visual movement cues, to explore movements with peers, or to connect a narrative with a body-based response. The teacher's reported difficulty in modelling varied movements further indicated that the medium needed to be independently legible, simple to facilitate, and capable of supporting repeated observation. Table 1 translates these needs into the product requirements used for KATABEL.

Table 1. Learning Needs and Corresponding KATABEL Design Requirements

Observed learning need	KATABEL design response	Intended learner action
Movement concepts were difficult to grasp through explanation alone	Animal illustrations and short moving stories	Identify movement ideas from visual and narrative cues
Teacher demonstration could not easily provide repeated movement models	QR code linked to a short animal-movement video	Observe and revisit a movement model as needed
Students had limited opportunities to create and sequence movements	Four-step creative movement prompt on the reverse side	Imitate, adapt, combine, and present movement
Classroom participation required manageable group interaction	Small-group role-play and shared card tasks	Discuss, rehearse, and perform collaboratively
Learning media needed to be practical in a public-school setting	Portable two-sided printed cards with optional phone access	Use the resource with low preparation demand

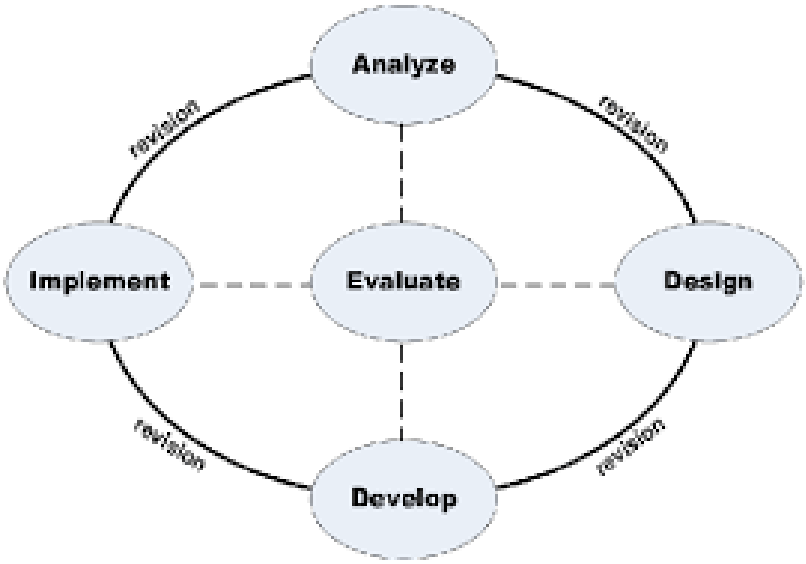

Figure 1. ADDIE development stages used in the KATABEL development process

Product Architecture and Iterative Revision

The product was designed as a compact learning sequence rather than as a collection of isolated pictures. Each card begins with a fable character and setting, offers an action cue through the story, provides a video model through the QR code, and ends with a structured invitation to create. The narrative component therefore functions as a meaning-making prompt, while the movement component functions as an embodied response. Table 2 summarizes the resulting instructional architecture.

Table 2. KATABEL Instructional Architecture

Product component	Design specification	Learning function
Fable character and natural setting	Animals such as squirrel, wolf, civet, kangaroo, and elephant in familiar settings such as forests, rivers, grasslands, and seas	Provides a recognisable narrative anchor and stimulates imagination
Moving story	Brief story describing actions such as walking, jumping, running, sneaking, swimming, or playing	Converts abstract movement ideas into a concrete action narrative
Illustration	Large, child-oriented animal and setting images	Offers immediate visual cues for attention and interpretation
QR code	Direct access to a short animal-movement video	Provides an optional repeatable audiovisual model
Creative movement prompt	Imitate, adapt, combine, and present	Scaffolds movement from reproduction to collaborative composition

Figure 2. Initial KATABEL card design specification showing front-side and reverse-side information hierarchy

Expert feedback during development focused on visual clarity and colour selection. The revisions were directed toward making the cards easier for children to read at classroom distance and ensuring that visual elements did not compete with the task directions. Table 3 records the available revision trail. The source material does not report a numerical score for each individual revision item; therefore, the table preserves the qualitative evidence without introducing unobserved data.

Table 3. Expert-Informed Revision Trail for the KATABEL Product

Review focus	Revision implemented	Rationale for final version
Colour selection	Adjusted colour choices to improve contrast and visual appeal	Supports visual distinction between narrative and task areas
Visual clarity	Refined the prominence and readability of card elements	Helps learners identify story cues, QR access, and creative task steps
Instructional presentation	Retained concise, sequential movement prompts on the reverse side	Supports teacher facilitation and student independence during group work

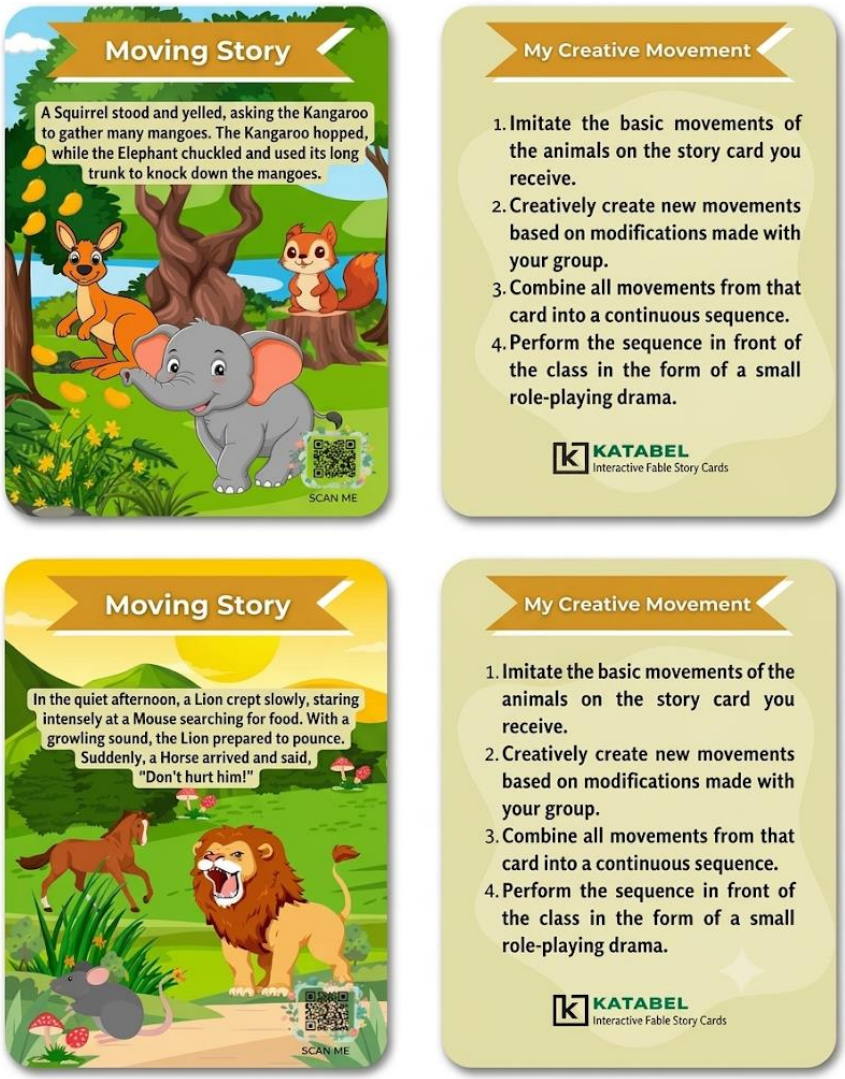

Figure 3. Developed KATABEL flashcard media showing fable-based movement prompts and creative movement tasks

Expert Feasibility Assessment

The final product was evaluated by a content expert and a media expert. Both assessments placed KATABEL in the highly feasible category. The media-expert score was 96%, indicating strong perceived quality in visual presentation, usability, and technical design. The content-

expert score was 93%, indicating that the fable content, movement prompts, and learning relevance were judged suitable for Grade 4 dance learning (Table 4).

Table 4. Expert Feasibility Assessment of KATABEL

Validator	Validation score	Feasibility category
Content expert	93%	Highly feasible
Media expert	96%	Highly feasible

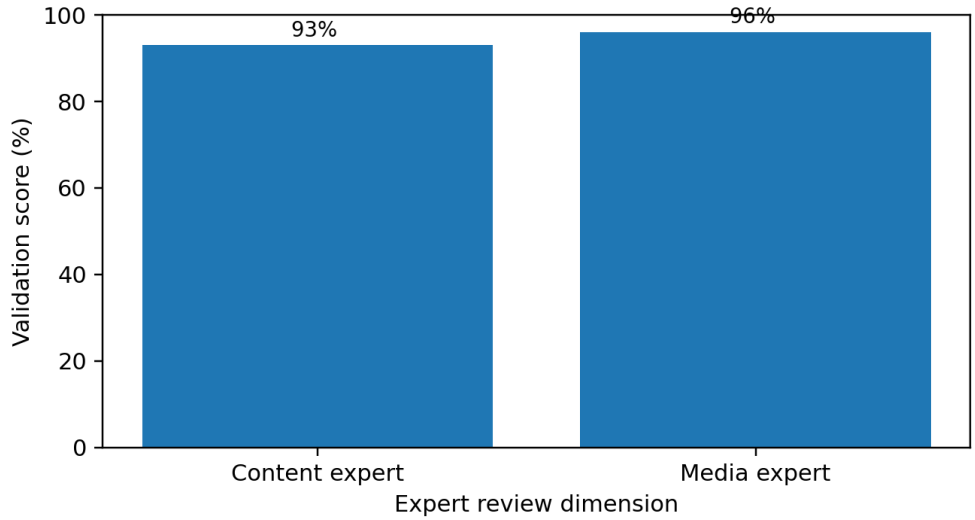

Figure 4. Comparative expert feasibility scores for the developed KATABEL medium

Classroom Implementation Process

Implementation was organized as a participatory sequence. Students first encountered the fable-based prompt, identified the animal action in the story, accessed the video when needed, and practised the suggested movement in groups. They then adapted the movement, combined it with peers' ideas, and presented a short role-play. The activity sequence positioned the card as a shared learning object that facilitated dialogue and movement rather than as a passive display. Table 5 specifies the implementation flow.

Table 5. Classroom Implementation Sequence

Learning phase	Student activity	Instructional purpose
Narrative orientation	Observe the illustration and listen to or read the moving story	Activate imagination and identify a movement possibility
Model observation	Scan the QR code and view the short movement video when required	Clarify movement direction through a repeatable example
Guided enactment	Imitate the basic animal movement	Build initial confidence and body awareness
Creative transformation	Modify the movement and combine it with group members	Develop agency, creativity, and negotiation of movement ideas

Learning phase	Student activity	Instructional purpose
Group presentation	Perform a brief role-play or movement sequence	Communicate meaning through collaborative embodied expression

Distributional Assumptions and Learning Improvement

Shapiro-Wilk statistics indicated no departure from normality for the pretest and posttest distributions in either implementation trial. All significance values exceeded .05, allowing the use of paired-sample t-tests for the reported learning comparisons (Table 6).

Table 6. Shapiro-Wilk Normality Test Results

Trial group	Assessment	W	df	p-value
Small group	Pretest	0.982	6	0.960
Small group	Posttest	0.853	6	0.167
Large group	Pretest	0.926	23	0.089
Large group	Posttest	0.946	23	0.236

Paired-sample t-tests showed statistically significant pretest-posttest differences in the small-group and large-group trials. The negative t statistics reflect the calculation order used in the source analysis (pretest minus posttest); the magnitude and N-Gain results indicate higher posttest performance. For greater transparency, Table 7 includes standardized paired effect estimates and approximate mean differences derived from the reported t statistics and standard deviations. These derived values should be interpreted as supplementary estimates because individual score data were not available in the source record.

Table 7. Pretest-Posttest Effectiveness Results

Trial group	n	SD of paired difference	t	p-value	Derived mean increase	Derived Cohen's d_z
Small group	6	10.488	-8.174	< .001	35.00 points	3.34
Large group	23	9.330	-18.325	< .001	35.67 points	3.82

Normalized-gain analysis similarly indicated meaningful improvement. The small-group trial produced a mean N-Gain of 0.6879, categorised as moderate improvement, whereas the large-group trial produced a mean of 0.7366, categorised as high improvement. The large-group result also showed a narrower pattern of variability relative to the wide range of individual gains, suggesting that the improvement was observed across a broad range of participating learners (Table 8).

Table 8. Normalized-Gain Results

Trial group	n	Minimum	Maximum	Mean N-Gain	SD	Interpretation
Small group	6	0.50	0.83	0.6879	0.12550	Moderate
Large group	23	0.44	0.90	0.7366	0.11684	High

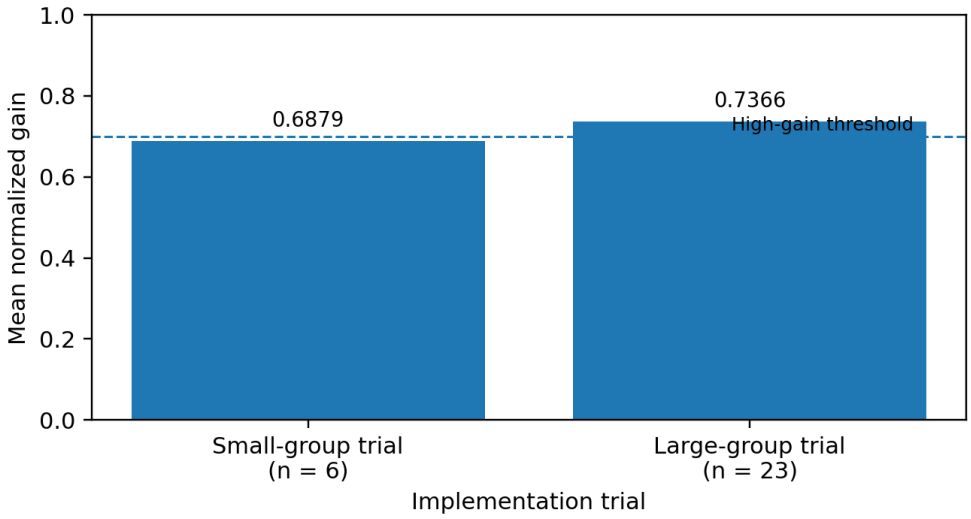

Figure 5. Mean normalized gains in the sequential KATABEL implementation trials

Discussion

The findings indicate that KATABEL functioned as more than an attractive flashcard set. Its performance appears to arise from a deliberate conversion of movement learning into a sequence of comprehensible actions: students interpret a fable, observe a model, enact the movement, modify it, and share a group performance. This sequence is aligned with children's need for concrete and activity-based representations when they are learning concepts that cannot be fully understood through verbal explanation alone [26]. It also reflects constructivist accounts of learning in which learners actively build understanding through experience, social interaction, and reflective adaptation rather than merely receive information [27].

The high feasibility scores provide initial evidence that the medium was simultaneously acceptable in content and usable in classroom form. This is important because dance media can fail when either the artistic content is insufficiently meaningful or the resource is too complicated for ordinary teachers to facilitate. The present result is consistent with studies showing that structured flashcard-based activities can increase elementary students' engagement and achievement when cards function as prompts for active problem solving rather than simple recall [10], [11], [12], [28]. The contribution of KATABEL is to extend this principle to the embodied domain of primary dance learning.

The statistically significant gains in both trials, together with moderate-to-high normalized gains, suggest that students were able to connect fable content with dance-related learning outcomes after using the medium. The approximate paired effect sizes are exceptionally large; however, they must be interpreted carefully because the study involved a single school, sequential trials, and no comparison group. The results do not show that KATABEL outperforms conventional instruction. Rather, they provide strong preliminary evidence that the learning sequence was associated with substantial within-group improvement in the implemented setting. This cautious interpretation is consistent with evidence that creative arts activities can support motor, social, and expressive development when participation is carefully scaffolded [29], [30].

KATABEL's physical-digital combination is a central feature of its novelty. The printed card maintains the tactile, low-cost, shared affordances of a conventional learning object, whereas the QR code supplies an optional repeatable video demonstration. This dual representation can reduce barriers for children who require a visual model before initiating movement, while still keeping peer discussion and teacher facilitation at the center of the lesson. Such a design is consistent with embodied-cognition perspectives, which emphasize that thinking and learning are closely tied to bodily action and environmental cues [31], as well as research indicating that educational dance can strengthen self-management, relationship skills, and socio-emotional development [32], [33], [34].

The product's pedagogical value also lies in the progression from imitation to adaptation. Initial imitation gives novice learners a secure entry point, but the prompt to modify and combine movements prevents the activity from remaining a reproduction exercise. In this respect, KATABEL can support retrieval, rehearsal, elaboration, and collaborative meaning-making, all of which are associated with stronger learning processes than passive exposure [35], [36]. The fable frame offers a non-threatening narrative reason for movement: a child does not need to begin by inventing an abstract dance but can begin by asking how an animal in a story might move, react, or interact with others.

The study also has implications for equitable primary education. A portable card set with optional QR access can be used with limited infrastructure and does not assume that every learner has the same confidence, prior dance experience, or capacity to infer movement from language alone. By combining image, story, video, demonstration, group practice, and presentation, the medium offers multiple routes into the task. This approach is compatible with universal-design principles that promote flexible engagement and representation in learning environments [18], [37]. The playful format may additionally sustain attention and willingness to participate, as gamified or game-like learning elements can produce small-to-moderate benefits when they are connected to clear pedagogical goals [38].

For teachers, KATABEL offers a manageable planning structure: select a card, orient the fable, model or replay the QR-linked movement, guide group adaptation, and assess the short performance. For curriculum developers, it illustrates how culturally familiar fable narratives can be transformed into a learner-centered arts resource without relying on expensive equipment. For school leaders and education policymakers, the design highlights the value of human-centered media development that treats usability, cognitive accessibility, child participation, and inclusive learning opportunity as connected concerns. The study does not include gender-disaggregated data and therefore does not claim differential outcomes by gender; its relevance to the journal's education and social-welfare orientation is grounded instead in equitable participation, accessible design, and classroom well-being.

Several methodological implications follow. First, future studies should report the full achievement-test blueprint, item validity, and reliability coefficients; such reporting is essential for evaluating the quality of learning-outcome measures [39]. Second, a controlled comparison, broader sample, delayed posttest, and direct assessment of creativity, collaboration, motivation, and retention would strengthen the evidence base. Third, observational research could examine whether group synchronization and shared movement prompts contribute to peer cooperation, an outcome suggested in movement-based studies with young children [40]. These directions

would clarify whether the observed gains are sustained, generalisable, and attributable to particular design features of the medium.

CONCLUSION

KATABEL was developed as a fable-based, physical-digital flashcard medium for Grade 4 dance learning. It integrates animal narratives, illustrations, QR-code-linked movement videos, and a creative sequence that guides students from imitation to adaptation, group composition, and presentation. Content and media experts rated the product highly feasible (93% and 96%), and sequential implementation trials showed significant pretest-posttest improvement with mean normalized gains of 0.6879 and 0.7366. The study's principal contribution is a low-cost, human-centered learning design that uses fable-based movement to make primary dance education more concrete, participatory, and accessible. KATABEL can be used as a practical teaching resource for teachers seeking to organise collaborative movement exploration while maintaining meaningful links between narrative, body, and creative expression.

LIMITATIONS

This study was conducted in one public primary school with a small sequential sample and without a control group; consequently, its effectiveness findings should be interpreted as preliminary within-group evidence rather than as a causal comparison with alternative media or conventional teaching. The source record reports aggregate outcomes but does not provide raw scores, demographic disaggregation, test-item psychometrics, long-term retention data, detailed user-response scores, or a formal ethics-review identifier. The derived effect estimates in this manuscript are mathematically calculated from the reported paired statistics and should not be mistaken for estimates based on newly recovered raw data. Future research should use multi-school controlled designs, report comprehensive instrument quality, include follow-up assessment, and examine creativity, participation, confidence, collaboration, accessibility, and potential differential effects across learner groups.

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AUTHOR CONTRIBUTION

M. N. I. contributed to the conceptualization, product development, data collection, analysis, and initial manuscript drafting. D. d. A. contributed to methodological guidance, product review, interpretation of findings, and critical revision of the manuscript. Both authors approved the final manuscript and accept responsibility for the integrity of the work.

CONFLICT OF INTEREST

"The authors declare no conflict of interest."

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The authors used ChatGPT for language refinement and structural editing during manuscript preparation. After using the tool, the authors reviewed and revised the content and remain fully responsible for the accuracy, integrity, and final published version of the manuscript.

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