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EFFECTS OF INTERACTIVE DIGITAL STORYTELLING AND PEER-MEDIATED GAMIFIED INSTRUCTION ON KINDERGARTNERS' LITERACY SKILLS: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Early literacy skills serve as the foundation for children's language development, academic readiness, and subsequent learning success. Despite their importance, the need for engaging, developmentally appropriate, and innovative instructional approaches to strengthen foundational literacy among kindergarten learners remains evident. This study compared the effectiveness of Interactive Digital Storytelling and Peer-Mediated Gamified Instruction in developing learners' Sound Awareness, Alphabet Knowledge, and Sound Blending. Employing a quasi-experimental pretest–posttest design, the study involved 60 kindergarten learners from two intact classes in a public elementary school in Bukidnon. Both interventions were implemented over six weeks, and data were gathered using a researcher-made literacy assessment administered before and after the interventions. Descriptive statistics, paired-samples *t*-tests, and multivariate analysis of covariance were utilized. Findings revealed significant improvements in all three literacy skills from pretest to posttest in both instructional groups. The adjusted overall comparison indicated no statistically significant difference between the two approaches. Although Peer-Mediated Gamified Instruction demonstrated an advantage in Sound Awareness, no significant differences were established in Alphabet Knowledge and Sound Blending. This means that either approach can be used to develop kindergartners' early literacy skills; partner games that give repeated practice in identifying beginning sounds may be especially helpful for Sound Awareness, while Sound Blending needs additional guided practice. These findings suggest that both approaches offered meaningful opportunities for enhancing early literacy development. Future researchers are encouraged to conduct studies involving multiple classes, diverse learning contexts, and more controlled implementation conditions.

Keywords: *early literacy skills, interactive digital storytelling, peer-mediated gamified instruction, kindergarten learners, sound blending*

INTRODUCTION

Literacy is a foundation for academic success and the development of more advanced reading and writing skills. Early literacy develops along a continuum and becomes especially important during the kindergarten years, when children begin to engage in structured learning activities that help them recognize sounds, identify letters, and combine phonemes to form words.

Three foundational skills are central to this present study: Sound Awareness, Alphabet Knowledge, and Sound Blending. These skills supported the development of early reading abilities before learners progressed to more complex tasks such as reading comprehension and critical thinking. The revised K–10 curriculum also placed emphasis on foundational literacy during the early years of schooling (Department of Education, 2023, 2024).

Despite the importance of foundational literacy skills in preparing kindergartners for beginning reading, some learners were observed to experience difficulties in developing sound awareness, alphabet knowledge, and sound blending. These difficulties may be associated with limited opportunities for engaging, interactive, and developmentally appropriate literacy experiences that allow children to actively explore speech sounds, connect letters with their corresponding sounds, and practice blending sounds to form meaningful units. Although interactive and play-based approaches offer promising opportunities to support early literacy development, the effectiveness of integrating Interactive Digital Storytelling and Peer-Mediated Gamified Instruction in addressing these specific skills within the local kindergarten context requires further investigation. The researcher therefore examined both interventions' effectiveness in improving kindergartners' foundational literacy skills.

Interactive Digital Storytelling presented narratives through text, audio, images, animation, and interactive elements. These features provided opportunities for learners to hear speech sounds, attend to letters and their corresponding sounds, and practice combining sounds to form words within story-based activities. Research on e-storybook reading with guided attention to print found gains in kindergarten learners' print knowledge and sound awareness, supporting the use of digital stories for early literacy instruction (van Dijken, 2023).

Meanwhile, Peer-Mediated Gamified Instruction combined collaborative learning with game elements to encourage participation in literacy activities. Through structured interaction, learners worked with classmates on tasks involving Sound Awareness, Alphabet Knowledge, and Sound Blending. Challenges, rewards, and immediate feedback provided opportunities for repeated practice and peer support. Research

involving preschool children also examined the use of collaborative puzzle games to practice blending, providing a relevant basis for including game activities in this study (Ungau et al., 2023).

Previous research had examined structured digital storytelling in early childhood literacy development (Maureen et al., 2020), gamification across learning contexts (Sailer & Homner, 2020), and structured peer-assisted reading activities (Vardy et al., 2022). However, these sources did not directly compare Interactive Digital Storytelling and Peer-Mediated Gamified Instruction in developing the same three early literacy skills among kindergarten learners in a Philippine public school. This specific comparison was the focus of the present study, which examined Sound Awareness, Alphabet Knowledge, and Sound Blending before and after each intervention and compared the groups' adjusted posttest scores.

Addressing this gap, the present quasi-experimental study examined learners' early literacy skills in terms of Sound Awareness, Alphabet Knowledge, and Sound Blending before and after each intervention. It assessed pretest–posttest changes within the Interactive Digital Storytelling and Peer-Mediated Gamified Instruction groups and compared their adjusted posttest scores. In doing so, the study sought to provide local evidence that could inform early literacy instruction in the participating public elementary school.

Research Questions

This study aimed to examine and compare the effects of Interactive Digital Storytelling and Peer-Mediated Gamified Instruction on the early literacy skills of kindergarten learners in a public elementary school in Manolo Fortich, Bukidnon, during School Year 2026–2027. Specifically, the study sought to answer the following questions:

1. What was the level of the kindergarten learners' early literacy skills before and after the interventions in terms of:
    1.1. Sound Awareness;
    1.2. Alphabet Knowledge; and
    1.3. Sound Blending?
2. Was there a significant difference between the pretest and posttest literacy scores of kindergarten learners within each group exposed to:
    2.1. Interactive Digital Storytelling; and
    2.2. Peer-Mediated Gamified Instruction?
3. Which instructional approach is more effective in improving the kindergartners' literacy skills?

Null Hypotheses

Research Question 1 was hypothesis-free. Based on Research Questions 2 and 3, the following null hypotheses were tested at the 0.05 level of significance:

H_{01}: *There is no significant difference between the pretest and posttest scores in Sound Awareness, Alphabet Knowledge, and Sound Blending within each*

intervention group: Interactive Digital Storytelling and Peer-Mediated Gamified Instruction.

H_{02}: *None of the instructional approaches is more effective in improving the kindergartners' Sound Awareness.*

H_{03}: *None of the instructional approaches is more effective in improving the kindergartners' Alphabet Knowledge.*

H_{04}: *None of the instructional approaches is more effective in improving the kindergartners' Sound Blending.*

METHODOLOGY

Research Design

This study used a quasi-experimental, non-equivalent groups pretest–posttest design to examine and compare the effects of Interactive Digital Storytelling and Peer-Mediated Gamified Instruction on kindergarten learners' literacy skills. The design was appropriate because the learners belonged to established classes, and individual random assignment was not feasible within the school's regular classroom arrangement. Two intact kindergarten classes participated: the morning class received Peer-Mediated Gamified Instruction, while the afternoon class received Interactive Digital Storytelling. Because both classes received an intervention, they served as comparison groups for the two approaches rather than as an intervention group and an untreated control group. Denny et al. (2023) noted that pretest–posttest measurements in non-equivalent group designs require attention to threats to validity when participants are not randomly assigned.

Both groups completed a pretest in Sound Awareness, Alphabet Knowledge, and Sound Blending. Each class then received its assigned intervention for six weeks, with three sessions per week lasting approximately 45 minutes each: the morning class through structured peer activities and literacy games, and the afternoon class through guided multimedia stories and related literacy tasks. To improve comparability, both groups addressed the same three skills, followed the same order of target letters, and underwent the same assessment procedures. After the intervention period, both groups completed a posttest using the same instrument.

The pretest and posttest scores were compared within each group to examine changes in the three skills, and the groups' posttest scores were compared while accounting for their pretest scores to determine the relative effectiveness of the two approaches. Because the learners were not randomly assigned and each intervention was given to a different intact class at a different time of day, the results were interpreted with these limitations in mind.

Locale of the Study

The participants of the study were 60 kindergarten learners, aged five to six, officially enrolled in a public elementary school in Manolo Fortich, Bukidnon, during the first

trimester of School Year 2026–2027. They belonged to two intact kindergarten classes, with 30 learners in each class. The morning class was assigned to Peer-Mediated Gamified Instruction, while the afternoon class was assigned to Interactive Digital Storytelling. The two existing classes were used as intact groups because assigning individual learners at random to the interventions was not feasible within the school's regular classroom arrangement, and keeping the learners in their established classes preserved the usual classroom organization and minimized disruption to their school routines. Thus, the study used a non-random sampling procedure involving two intact classes, consistent with the quasi-experimental, non-equivalent groups pretest–posttest design.

Participants and Sampling Method

The inclusion and exclusion criteria were established before data collection and applied consistently to both classes. A learner was eligible if the learner was officially enrolled in one of the two selected kindergarten classes, was within the specified age range, had written informed consent from a parent or legal guardian, and provided developmentally appropriate assent. A learner was excluded if a parent or legal guardian did not provide written informed consent, if the learner did not assent or declined to participate, or if parental or guardian consent was withdrawn. Learners were not selected or excluded because of their gender, socioeconomic background, academic ability, prior literacy performance, or expected assessment results.

Participation remained voluntary throughout the study. A learner could stop participating after expressing a desire to withdraw, upon the request of a parent or legal guardian, or following the withdrawal of parental or guardian consent. Participation could also be discontinued if continuing the research activities raised a significant concern for the learner's safety or well-being, and a learner who showed distress, discomfort, or fatigue could be excused from that activity. Withdrawal did not affect the learner's grades, classroom standing, access to regular instruction, or relationship with the teacher or school.

Both interventions were conducted during regular class hours over six weeks, with three sessions per week lasting approximately 45 minutes each. Both groups addressed the same target skills (Sound Awareness, Alphabet Knowledge, and Sound Blending), followed the same sequence of target letters, and completed the same assessment procedures. The researcher monitored participation and implementation throughout the intervention period, including concerns related to learner safety, discomfort, attendance, and opportunities to participate. These measures supported comparability, although they could not fully remove possible differences associated with the learners' class membership, the morning and afternoon schedules, or the researcher's dual role as class adviser and implementer. These conditions were acknowledged as limitations of the study.

Research Instruments

The study used a researcher-made early literacy assessment designed to measure Sound Awareness, Alphabet Knowledge, and Sound Blending. The items were

constructed from the operational definitions of these three skills and the ten target letters used in the study: M, A, S, T, I, N, B, E, G, and U. The Table of Specifications allocated 10 items to each skill. For Sound Awareness, the researcher selected familiar pictured words and asked learners to identify their beginning sounds. For Alphabet Knowledge, the items required learners to name the ten presented uppercase letters. For Sound Blending, the researcher prepared oral sound sequences that learners combined into complete spoken words. The items were subsequently reviewed by three experts for clarity, developmental appropriateness, relevance, and alignment with the Department of Education's Kindergarten Curriculum Guide.

The instrument contained 30 items, with 10 items for each skill. It was used for both the pretest and posttest and was administered individually by the teacher-researcher. During administration, the researcher gave the instructions, presented the pictures or letters, or said the sounds required by each item. Each correct answer received one point, while each incorrect answer received zero points. The researcher recorded the learners' responses without giving clues or coaching them during the assessment.

Sound Awareness was assessed through 10 items that measured the learners' ability to identify the beginning sound of a pictured or spoken word. The researcher presented the item and asked the learner to say its first sound. For example, when presented with "mangga", the expected response was /m/. The section used the words "mangga", "aso", "saging", "tasa", "nars", "elepante", "bola", "isda", "gatas", and "ulan". The score for Sound Awareness ranged from 0 to 10.

Alphabet Knowledge was assessed through 10 items that measured the learners' ability to identify the names of presented uppercase letters. The researcher showed one letter at a time and asked the learner to say its name. The letters included in the instrument were M, A, S, T, I, N, E, B, G, and U. A correct letter name received one point, giving a possible Alphabet Knowledge score of 0 to 10. This section assessed letter-name identification; it did not separately score lowercase-letter recognition or the production of letter sounds.

Sound Blending was assessed through 10 oral items. For each item, the researcher said the sounds separately and asked the learner to combine them into a complete spoken word. The items included sound sequences corresponding to mat, sat, bat, man, ban, tan, tag, bag, men, and ten. A correct spoken word received one point, giving a possible Sound Blending score of 0 to 10. The instrument did not include a separate score for sound segmenting.

The learner's scores in the three sections were added to obtain an overall score ranging from 0 to 30. The same items, administration directions, and scoring rules were specified for the pretest and posttest. Using the same instrument allowed the researcher to compare each learner's performance before and after the intervention in Sound Awareness, Alphabet Knowledge, and Sound Blending.

Validity and Reliability

The researcher-made early literacy assessment underwent expert review and pilot testing before it was administered to the kindergarten participants. These procedures provided

evidence concerning the relevance of the assessment items, the clarity of the administration procedures, and the internal consistency of the scores for Sound Awareness, Alphabet Knowledge, and Sound Blending.

To obtain evidence of content validity, the instrument was reviewed by three experts in early childhood education and literacy instruction. The validators examined the items for clarity, developmental appropriateness, relevance to the skills being measured, and alignment with the Department of Education's Kindergarten Curriculum Guide. Their review covered the three sections of the instrument: identification of beginning sounds for Sound Awareness, identification of uppercase letter names for Alphabet Knowledge, and oral combination of separately presented sounds into words for Sound Blending.

Following expert review, the instrument was pilot-tested with 30 Grade 1 pupils from the same public elementary school. These pupils were not included among the 60 kindergarten participants in the main study. The pilot test allowed the researcher to examine whether the directions, presentation of items, administration procedures, and scoring criteria could be applied as intended. Because the pilot participants were in Grade 1, their responses also needed to be interpreted with care when considering the instrument's use with kindergarten learners.

The researcher personally administered and scored the pilot assessment. Each pupil was assessed individually using the directions and scoring criteria specified in the instrument. A correct response received one point, while an incorrect response received zero points. The researcher recorded the responses without coaching the pupils or providing clues. These procedures were intended to promote consistency in administration and scoring. However, because only the researcher scored the responses, the pilot test did not provide a separate estimate of agreement between different scorers.

Internal consistency was examined separately for each of the three skills because the instrument reported a distinct score for each one. With the assistance of a statistician, Cronbach's alpha was calculated using the pilot-test responses. The resulting coefficients were 0.782 for Sound Awareness, 0.717 for Alphabet Knowledge, and 0.769 for Sound Blending. These coefficients provided evidence of internal consistency for the three 10-item sections in the Grade 1 pilot sample. Cronbach's alpha can be applied to items scored as correct or incorrect; in this setting, it addresses the consistency of responses within a section, rather than agreement between scorers or stability of scores over time.

Scoring Procedure

The researcher used a scoring procedure to tabulate and organize the participants' scores in Sound Awareness, Alphabet Knowledge, and Sound Blending. Each correct response was assigned one (1) point, while each incorrect or unanswered response was assigned zero (0) points. Each skill consisted of 10 items, with a maximum score of 10 points per skill and a total maximum score of 30 points for the three skills. The participants' scores were summed to determine their performance in each literacy skill and their overall score. Each skill score ranged from 0 to 10 points and was interpreted using the performance categories reported in the Results section.

The combined literacy score, obtained by adding the scores in the three skills (0 to 30 points), was interpreted using the performance categories reported in the Results section.

Data Gathering Procedure

Before data collection, the researcher obtained ethical clearance from the Research Ethics Committee (REC) and the required permissions from the Schools Division Office and the school principal. Eligible learners from the two intact kindergarten classes were then identified using the predetermined inclusion criteria. Written parental or guardian consent and developmentally appropriate learner assent were secured before participation.

The researcher individually administered the pretest to both groups using the researcher-made assessment in Sound Awareness, Alphabet Knowledge, and Sound Blending. Each skill contained 10 items. The researcher followed the prescribed instructions and scoring criteria and recorded responses without coaching or providing clues.

Following the pretest, the groups underwent their assigned interventions over six weeks. The instructional activities, weekly sequence, and implementation procedures are described in the Implementation of Intervention section.

At the end of the intervention period, the researcher individually administered the posttest using the same instrument, instructions, and scoring criteria as the pretest. Comparable assessment procedures were followed at both assessment points. The possible testing or practice effect from using the same items was acknowledged when interpreting the findings.

The pretest and posttest responses were scored and organized by participant code, intervention group, assessment period, and literacy skill. The coded scores were prepared for statistical analysis to examine changes within each group and compare outcomes between the groups.

Implementation of the Interventions

The study involved two intact kindergarten classes in a public elementary school in Manolo Fortich, Bukidnon. The morning class received Peer-Mediated Gamified Instruction, while the afternoon class received Interactive Digital Storytelling. The existing class schedules were maintained to avoid disrupting regular school routines. The researcher implemented and monitored both interventions using prepared lesson plans.

Both groups followed the same six-week schedule, with three scheduled sessions per week lasting approximately 45 minutes each. They addressed Sound Awareness, Alphabet Knowledge, and Sound Blending and followed the same sequence of target letters: Mm and Aa in Week 1, Ss and Tt in Week 2, Ii and Nn in Week 3, Bb and Ee in Week 4, and Gg and Uu in Week 5. Week 6 focused on review and assessment, with the final scheduled session used for the individual posttest. The groups differed in how the instructional activities were delivered.

The kindergarten learners exposed to Interactive Digital Storytelling participated in guided literacy activities built around digital stories presented on a television. The stories

provided visual and spoken contexts for introducing the target letters and words. At selected points, the researcher paused the story, repeated a word clearly, and guided learners in listening for its beginning sound. Picture cards, letter cards, worksheets, and oral prompts were used after the stories to provide further practice.

Each instructional session followed a planned sequence of preparation or review, motivation, story presentation, discussion, guided practice, application, generalization, and evaluation. The researcher demonstrated new tasks, invited learners to respond, and gave feedback during practice. Responses recorded during lesson activities helped the researcher identify learners who needed additional support. These lesson checks were kept separate from the study's pretest and posttest scores.

During Weeks 1–6, the first session focused on the first letter of the weekly pair, and the second session focused on the second letter. Both letter sessions used the same main activity for that week. The third session reviewed the two letters through Sound Sorting. For this activity, the researcher named the pictures aloud, and learners grouped them according to their beginning sounds. Previously introduced letters and sounds were briefly reviewed in later sessions to give learners repeated practice.

Sound Blending was introduced gradually. In Week 1, the researcher modeled how two separately spoken sounds could be joined as introductory practice. As learners became familiar with more letters and sounds, they practiced combining three orally presented sounds into English consonant–vowel–consonant (CVC) words. The researcher modeled the sounds and used counters or supplementary CVC slides when needed. Printed words were hidden during oral blending checks so that learners responded to the sounds they heard. English CVC practice was conducted as a guided activity following a story excerpt; the Filipino stories were not presented as sources of the English CVC words.

The kindergarten learners exposed to Peer-Mediated Gamified Instruction practiced Sound Awareness, Alphabet Knowledge, and Sound Blending through partner activities and simple games. The researcher explained and demonstrated each activity before organizing learners into pairs. During practice, she monitored the pairs, encouraged both partners to take turns, and provided feedback when needed.

During Weeks 1–6, the first session focused on the first letter of the weekly pair, and the second session focused on the second letter. Both sessions used the same main game for that week. The third session reviewed the two letters through Partner Sound Sorting. Brief, teacher-guided oral Sound Blending practice was introduced as learners became familiar with more letters and sounds.

In Week 6, the first two sessions reviewed all ten target letters. During the first session, each learner drew a letter card and looked at it before putting on a blindfold. Learners made the sound of their assigned letter and listened for the classmate holding its other form, such as M and m. Once paired, they removed their blindfolds, held up their cards, and said the letter name and sound. The researcher supervised them as they moved. In the second session, learners played Jumping with Letters. The researcher placed large letter cards on the floor and called out a letter name or sound. Partners found the correct card, took turns jumping beside it, and then held it up while saying its name and sound. The final scheduled session was used for the individual posttest in Sound Awareness,

Alphabet Knowledge, and Sound Blending. The researcher followed the same instructions and scoring criteria used in the pretest.

Using the same target skills, weekly sequence, session schedule, and assessment procedures supported comparability between groups. However, these measures could not eliminate differences associated with the two intact classes, the researcher's dual role, or the morning and afternoon schedules. Attention, fatigue, hunger, attendance, and classroom conditions could have differed between schedules. These conditions were considered when interpreting the findings.

Data Analysis

The pretest and posttest scores were analyzed using descriptive and inferential statistical procedures aligned with the three research questions and the four null hypotheses. Each of the three early literacy skills—Sound Awareness, Alphabet Knowledge, and Sound Blending—was scored from 0 to 10, and the combined literacy score ranged from 0 to 30. The level of significance for the reported individual inferential tests was 0.05.

For Research Question 1, frequencies and percentages described the distribution of learners across the specified performance categories. Means and standard deviations summarized pretest and posttest scores in each skill and the combined literacy score for each intervention group. These descriptive results addressed the learners' observed levels of performance before and after the interventions. Research Question 1 was hypothesis-free.

For Research Question 2, pretest–posttest comparisons were conducted separately within the Interactive Digital Storytelling group and the Peer-Mediated Gamified Instruction group. Repeated-measures multivariate analysis of variance (RM-MANOVA) examined the overall effect of measurement occasion, pretest versus posttest, across the three literacy skills within each group. Wilks' lambda, the associated F statistic, the p-value, and partial eta squared were reported for this overall analysis in Tables 2 and 3.

Paired-samples t-tests supplemented the overall repeated-measures analysis by examining the pretest–posttest difference in each literacy skill within each intervention group. Each test examined whether the mean paired difference was zero. The t statistic, degrees of freedom, and p-value were considered alongside the pretest and posttest means. Cohen's d described the magnitude of the paired differences. H_{01} was evaluated through the separate analyses for the two groups, rather than by pooling the learners into one intervention group. These within-group comparisons described changes following instruction; they did not, by themselves, establish that the interventions alone caused those changes.

For Research Question 3, multivariate analysis of covariance (MANCOVA) compared the two groups' posttest scores while accounting for their pretest performance. Intervention group was the between-subjects factor. The posttest scores in Sound Awareness, Alphabet Knowledge, and Sound Blending were the dependent variables, and the three corresponding pretest scores were entered as covariates. The overall multivariate group comparison was summarized using Wilks' lambda, the F statistic, the p-value, and partial

eta squared. This overall result addressed the combined outcomes and was distinguished from the separate skill comparisons.

The adjusted univariate group comparisons addressed H_{02} for Sound Awareness, H_{03} for Alphabet Knowledge, and H_{04} for Sound Blending, that is, whether either instructional approach was more effective in improving each skill. These comparisons were obtained from the model containing the pretest covariates. Adjusted posttest means and standard errors summarized group performance after adjustment, while the F statistics and p-values described the evidence for a group difference in each skill. Partial eta squared described the magnitude of each adjusted group effect. Here, adjusted scores referred to adjustment for pretest covariates; this term did not itself indicate an adjustment of p-values for multiple testing.

Partial eta squared (ηp^2) was the effect-size measure reported for the overall repeated-measures analyses and the adjusted group comparisons. It expressed the effect sum of squares relative to the sum of the effect and its associated error, rather than the total variability in all scores (Lakens, 2013). It was reported as a proportion from 0 to 1 and interpreted in relation to the analysis and research design. It did not represent the percentage of learners who improved or the percentage increase in their scores.

For each reported individual test, a p-value below 0.05 indicated statistical significance at the stated level, while a p-value of 0.05 or greater did not provide sufficient evidence to reject the corresponding null hypothesis. Because several literacy outcomes were examined, the skill-specific results were interpreted alongside the overall multivariate result and the effect sizes. In particular, an individual skill result below 0.05 was interpreted cautiously when the overall MANCOVA result was not significant; it did not establish an overall advantage for an intervention. Nonsignificant results were not treated as proof that the approaches were equivalent.

The adjusted comparisons were also interpreted within the limits of the quasi-experimental design. Each instructional approach was implemented in only one intact class, and the two classes attended at different times of day. Adjustment for pretest scores could account for the measured baseline scores but could not separate the instructional approach from all other class or schedule differences. The findings therefore concerned the two participating classes, with these limitations considered when drawing conclusions about the interventions.

Scope and Limitations

This study examined and compared the effects of Interactive Digital Storytelling and Peer-Mediated Gamified Instruction on the early literacy skills of kindergarten learners in a public elementary school located in Manolo Fortich, Bukidnon, during School Year 2026–2027. The early literacy skills covered in this study included Sound Awareness, Alphabet Knowledge, and Sound Blending.

This study did not investigate other factors that predict the early literacy skills of kindergarten learners, such as the home literacy environment, parental involvement, teacher-related factors, and learners' socio-emotional readiness. Furthermore, the study was conducted over six weeks during School Year 2026–2027. Moreover, the researcher

served as the class adviser, implementer, and assessor of both interventions, which may have introduced researcher bias. To reduce this, the same instructions, scoring criteria, and assessment procedures were applied to both groups, and responses were recorded without coaching or clues.

RESULTS

Results are organized according to the three research questions. Descriptive findings are followed by within-group and adjusted between-group comparisons.

Pretest and Posttest Performance

Table 1. Descriptive statistics for kindergarten literacy skills by intervention (n = 30 per group)

Intervention	Literacy skill	Pretest M	Pretest SD	Posttest M	Posttest SD
Interactive Digital Storytelling	Sound Awareness	2.87	1.61	7.90	1.99
Interactive Digital Storytelling	Alphabet Knowledge	3.27	2.56	7.37	2.01
Interactive Digital Storytelling	Sound Blending	1.50	1.61	5.40	2.34
Interactive Digital Storytelling	Overall literacy (out of 30)	7.63	5.11	20.67	5.18
Peer-Mediated Gamified Instruction	Sound Awareness	2.73	1.31	8.73	1.28
Peer-Mediated Gamified Instruction	Alphabet Knowledge	3.93	2.78	7.97	1.88
Peer-Mediated Gamified Instruction	Sound Blending	2.07	1.96	5.43	2.19
Peer-Mediated Gamified Instruction	Overall literacy (out of 30)	8.73	5.42	22.13	4.13

Alphabet Knowledge increased in both groups following the six-week interventions.

For Interactive Digital Storytelling, the pretest mean was 3.27 (SD = 2.56), interpreted as Fair, and the posttest mean was 7.37 (SD = 2.01), interpreted as Very Good. The observed increase was 4.10 points. The percentage of learners classified as Needs Improvement declined from 30.00% to 0%, while the Very Good category increased from 3.33% to 30.00%. These findings showed a descriptive improvement in the group's letter-name identification following instruction.

For Peer-Mediated Gamified Instruction, the mean increased from 3.93 (SD = 2.78), interpreted as Fair, to 7.97 (SD = 1.88), interpreted as Very Good. This represented an observed increase of 4.04 points. The percentage classified as Needs Improvement declined from 23.33% to 0%, while the Outstanding category increased from 10.00% to 46.67%. These results indicated a shift toward higher Alphabet Knowledge performance within this group.

Both groups progressed from Fair to Very Good in mean Alphabet Knowledge performance. Their numerical gains were similar: 4.10 points for Interactive Digital Storytelling and 4.04 points for Peer-Mediated Gamified Instruction. Although the latter group obtained the higher posttest mean, these descriptive results alone did not determine which intervention was more effective.

The results show that Sound Blending followed a different pattern from the other two skills. At pretest, it was the weakest skill in both groups, with 76.67% of the Interactive Digital Storytelling group and 66.67% of the Peer-Mediated Gamified Instruction group in Needs Improvement. At posttest, most learners moved to the middle categories rather than to the top: 76.67% and 66.67%, respectively, were classified as Good or Fair, while only 20.00% and 30.00% reached Very Good or Outstanding.

For Interactive Digital Storytelling, the pretest mean was 1.50 (SD = 1.61), interpreted as Needs Improvement, and the posttest mean was 5.40 (SD = 2.34), interpreted as Good. The standard deviation increased from 1.61 to 2.34, indicating that the learners' Sound Blending scores became more spread out after the intervention; some learners progressed quickly, while others still needed support. The proportion of learners classified as Needs Improvement declined from 76.67% to 3.33%. At posttest, 46.67% were classified as Good. These findings showed an improvement in the group's observed ability to combine separately presented sounds into complete spoken words.

For Peer-Mediated Gamified Instruction, the pretest mean was 2.07 (SD = 1.96), interpreted as Needs Improvement, while the posttest mean was 5.43 (SD = 2.19), interpreted as Good. The percentage of learners classified as Needs Improvement declined from 66.67% to 3.33%. At posttest, 33.33% were classified as Good and another 33.33% as Fair. The mean score therefore improved, although learners continued to show varied levels of Sound Blending performance.

Both groups progressed from Needs Improvement to Good in mean Sound Blending performance. Their posttest means were close, although Interactive Digital Storytelling showed the larger numerical pretest–posttest increase. Sound Blending posttest means remained lower than the corresponding means for Sound Awareness and Alphabet Knowledge in both groups. The descriptive pattern therefore indicated progress alongside a continuing need for blending practice.

The results show that the combined scores followed the pattern of the individual skills. At pretest, 83.33% of the Interactive Digital Storytelling group and 80.00% of the Peer-Mediated Gamified Instruction group were in the Fair or Needs Improvement categories. At posttest, 66.67% and 73.33%, respectively, were classified as Very Good or Outstanding, and no learner in either group remained in Needs Improvement.

For Interactive Digital Storytelling, the overall pretest mean was 7.63 (SD = 5.11), interpreted as Fair, while the overall posttest mean was 20.67 (SD = 5.18), interpreted as Very Good. No learner remained in the Needs Improvement category at posttest, and 66.67% were classified as Very Good or Outstanding. These results summarized the group's upward movement across the three assessed literacy skills.

For Peer-Mediated Gamified Instruction, the overall mean increased from 8.73 (SD = 5.42), interpreted as Fair, to 22.13 (SD = 4.13), interpreted as Very Good. At posttest, no learner was classified as Needs Improvement or Fair. A total of 73.33% were classified as Very Good or Outstanding, and all learners were classified as Good, Very Good, or Outstanding. These results showed an overall shift toward higher literacy performance within the group.

Overall, both groups progressed from Fair to Very Good on the 30-point literacy scale. Peer-Mediated Gamified Instruction had the higher numerical posttest mean, while both groups showed upward shifts in their score distributions. The combined descriptive findings summarized observed performance and did not establish a statistically significant difference between the approaches. The inferential results for within-group change and the adjusted between-group comparison are presented under Research Questions 2 and 3, respectively.

Within-Group Pretest–Posttest Comparisons

Table 2. Paired-samples t-test results for Interactive Digital Storytelling (n = 30)

Literacy skill	Pretest M	Posttest M	t(29)	p	Cohen's d
Sound Awareness	2.87	7.90	16.71	< .001	3.05
Alphabet Knowledge	3.27	7.37	8.07	< .001	1.47
Sound Blending	1.50	5.40	8.86	< .001	1.62

Overall RM-MANOVA: Wilks' Λ = .113, $F(1, 29) = 227.024$, $p < .001$, partial $\eta^2 = .887$.

Table 3. Paired-samples t-test results for Peer-Mediated Gamified Instruction (n = 30)

Literacy skill	Pretest M	Posttest M	t(29)	p	Cohen's d
Sound Awareness	2.73	8.73	20.04	< .001	3.66

Alphabet Knowledge	3.93	7.97	6.83	< .001	1.25
Sound Blending	2.07	5.43	8.08	< .001	1.48

Overall RM-MANOVA: Wilks' Λ = .141, F(1, 29) = 177.278, p < .001, partial η² = .859.

The results show that the Interactive Digital Storytelling group demonstrated statistically significant pretest–posttest differences in all three literacy skills: Sound Awareness, t(29) = 16.71, p < .001; Alphabet Knowledge, t(29) = 8.07, p < .001; and Sound Blending, t(29) = 8.86, p < .001. All three p-values were below .05; therefore, H_{01} is rejected for the within-group comparison involving Interactive Digital Storytelling. The higher posttest means indicated improvement in the three assessed skills following the intervention. This decision concerned change within the group and did not, by itself, establish an advantage over Peer-Mediated Gamified Instruction. The improvement was consistent across all three literacy skills.

The overall repeated-measures result was statistically significant, Wilks' Λ = .113, F(1, 29) = 227.024, p < .001. The partial eta squared (ηp²) of .887 indicated a large association between measurement occasion and performance relative to the effect and its associated error in this analysis. It did not mean that 88.7% of the learners improved or that instruction explained 88.7% of all differences in literacy scores. Partial eta squared depends on the statistical design and should be interpreted with that context in mind (Lakens, 2013). Together with the higher posttest means, this result supported substantial pretest–posttest change within the Interactive Digital Storytelling group.

The results showed that the Peer-Mediated Gamified Instruction group demonstrated statistically significant pretest–posttest differences in Sound Awareness, t(29) = 20.04, p < .001; Alphabet Knowledge, t(29) = 6.83, p < .001; and Sound Blending, t(29) = 8.08, p < .001. All three posttest means were higher than their corresponding pretest means. Similar to the decision of the Interactive Digital Storytelling group, H_{01} is therefore rejected for group exposed to Peer-Mediated Gamified Instruction. Both groups showed a significant difference between the pretest and posttest scores in Sound Awareness, Alphabet Knowledge, and Sound Blending.

The overall repeated-measures analysis was also statistically significant, Wilks' Λ = .141, F(1, 29) = 177.278, p < .001, with partial eta squared (ηp²) = .859. This indicated a large effect of measurement occasion relative to its associated error within the fitted analysis. The value did not represent the percentage of learners who improved or the percentage gain in their scores. The Cohen's d values also showed substantial paired differences: 3.66 for Sound Awareness, 1.25 for Alphabet Knowledge, and 1.48 for Sound Blending. These effect sizes described the observed changes within the peer-mediated group; they were not direct tests of an advantage over the storytelling group.

Sound Awareness showed the largest observed mean gain, increasing by 6.00 points, from 2.73 to 8.73 out of 10. The interpretation changed from Needs Improvement to Very Good. One possible explanation was the close match between the assessed beginning-sound skill and the repeated picture naming, sound matching, and Partner Sound Sorting activities. These tasks gave learners opportunities to listen to a word, identify its first

sound, and check their response with a partner and the teacher. The activities may have supported the improvement, although the study did not test which particular game or form of feedback accounted for the gain.

Alphabet Knowledge increased by 4.04 points, from 3.93 to 7.97, moving from Fair to Very Good. The posttest standard deviation of 1.88 was lower than the pretest standard deviation of 2.78, indicating less spread in scores at the second assessment. Matching uppercase and lowercase cards, finding a partner with the corresponding letter, and identifying letters during games provided repeated practice with letter forms. These activities offered a plausible instructional explanation for the higher scores. However, the group mean did not show that every learner had mastered every assessed letter; individual responses remained necessary for identifying learners who needed further practice.

Sound Blending increased by 3.36 points, from 2.07 to 5.43, moving from Needs Improvement to Good. Despite the statistically significant difference and the large Cohen's d of 1.48, its posttest mean remained lower than those for Sound Awareness and Alphabet Knowledge. This suggested that blending required continued instructional attention. Whereas the beginning-sound task required identification of the first sound, the blending task required learners to combine a sequence of separately presented sounds into a complete word. This difference in task demands offered a possible explanation for the lower blending performance, but it was not tested separately in the study. The result supported continued guided practice followed by individual oral responses.

Adjusted Between-Group Comparisons

Table 4. MANCOVA-adjusted posttest comparisons controlling for pretest scores

Literacy skill	IDS adjusted M (SE)	PMGI adjusted M (SE)	F(1,55)	p	Partial η^2
Sound Awareness	**7.91 (0.27)**	**8.72 (0.27)**	**4.548**	**.037**	**.076**
Alphabet Knowledge	**7.36 (0.35)**	**7.97 (0.35)**	**1.459**	**.232**	**.026**
Sound Blending	**5.45 (0.38)**	**5.38 (0.38)**	**0.014**	**.905**	**.000**

Overall MANCOVA: Wilks' Λ = .902, F(3, 53) = 1.914, p = .138. The overall group effect was not statistically significant.

The overall multivariate result was Wilks' Λ = 0.902, F(3, 53) = 1.914, p = 0.138, with a partial eta squared of 0.098. Because p exceeded .05, the analysis did not establish a statistically significant overall difference between the groups across the three combined outcomes. This result was retained as the overall comparison for Research Question 3. The separate adjusted skill comparisons addressed H_{02}, H_{03}, and H_{04}. Levene's test

indicated equal error variances across the two groups for all three posttest scores (p = .213 to .996; Appendix C), supporting the use of the covariance analysis.

For Sound Awareness, PMGI obtained a higher adjusted posttest mean (Adj. M = 8.72, SE = 0.27) than IDS (Adj. M = 7.91, SE = 0.27). The separate group comparison yielded F(1, 55) = 4.548, p = 0.037, and partial η² = 0.076. At the .05 level specified for the reported individual tests, H_{02} is rejected. This result indicated that PMGI showed a higher adjusted Sound Awareness score in improving Sound Awareness among the participating classes. The reported effect size fell within the study's medium-effect range. This individual-test decision required caution because three skills were examined and the overall MANCOVA was not significant; it did not establish an overall advantage for PMGI.

For Alphabet Knowledge, PMGI had a higher adjusted posttest mean (Adj. M = 7.97, SE = 0.35) than IDS (Adj. M = 7.36, SE = 0.35). However, the adjusted group difference was not statistically significant, F(1, 55) = 1.459, p = 0.232, with partial η² = 0.026. Since p exceeded .05, H_{03} is not rejected. The analysis did not provide sufficient evidence that either approach was more effective in improving Alphabet Knowledge.

For Sound Blending, IDS had a slightly higher adjusted posttest mean (Adj. M = 5.45, SE = 0.38) than PMGI (Adj. M = 5.38, SE = 0.38). The adjusted group difference was not statistically significant, F(1, 55) = 0.014, p = 0.905, with partial η² = 0.000 as reported. Because p exceeded .05, H_{04} is not rejected.

The analysis did not provide sufficient evidence that either approach was more effective in improving Sound Blending.

Taken together, the adjusted results did not provide sufficient evidence to select one approach as superior across all three literacy skills. The separate Sound Awareness result suggested a possible skill-specific advantage for Peer-Mediated Gamified Instruction, but it required cautious interpretation because the overall multivariate test was not significant and several skill comparisons were examined. A nonsignificant overall result also did not demonstrate that the approaches were equivalent. In practice, either approach could be considered alongside learner needs and classroom resources, with continued support for Sound Blending. The use of one intact class per intervention and different class schedules further limited attribution of the observed differences solely to the instructional approach.

DISCUSSION

The similar Alphabet Knowledge gains suggested that repeated opportunities to identify letters could be useful across different lesson formats (Roberts et al., 2020). Teachers could use story-linked letter tasks or partner matching activities while monitoring which letters each learner could identify independently. Because the assessment measured uppercase letter-name identification, the improvement should not be taken as evidence of mastery of lowercase letters, letter sounds, or word reading. These related abilities would require their own instructional checks before teachers moved learners to more demanding tasks.

A closer look at the scores of the two interventions in Table 1 shows that the groups reached almost the same posttest mean (5.40 and 5.43) by different routes. The Peer-Mediated Gamified Instruction group began with the higher pretest mean (2.07 compared with 1.50) and gained 3.36 points, while the Interactive Digital Storytelling group began lower but gained 3.90 points, the larger increase of the two. Their posttest distributions also differed. The storytelling group had more learners at the highest level (five learners, or 16.67%, classified as Outstanding, compared with three, or 10.00%), whereas the peer-mediated group had more learners classified as Very Good (six, or 20.00%, compared with one, or 3.33%). In both groups, the standard deviation increased from pretest to posttest (from 1.61 to 2.34 and from 1.96 to 2.19), showing that blending scores became more spread out after instruction: some learners progressed quickly, while others still needed support. These descriptive differences were tested under Research Question 3, where the adjusted Sound Blending scores of the two groups did not differ significantly.

The findings on Sound Blending highlighted the importance of distinguishing between improvement in performance and mastery of the skill. Although the mean scores of both groups fell within the Good category, some learners continued to perform at the Fair and Needs Improvement levels, indicating that the skill had not yet been fully mastered by all participants. Moreover, Sound Blending yielded lower mean scores than the other two literacy skills, suggesting that it remained a relative area of difficulty. These findings underscore the need for continued, targeted instructional support and repeated blending exercises to help learners strengthen their phonological processing skills and achieve greater proficiency in sound blending. This pattern supported providing short, guided oral blending practice alongside either intervention, with additional support based on individual responses. Teachers could model how separately spoken sounds joined into a word and gradually reduce assistance, while keeping independent assessment responses separate from supported practice.

The overall literacy scores showed why a combined score should be interpreted alongside the separate skill results. A learner could improve in letter identification and beginning sounds while still needing help with blending, so an overall Very Good mean did not imply equally strong performance in all three skills. For classroom planning, the findings supported maintaining instruction across the three domains while directing additional practice toward the skills and learners with continuing difficulty. Selection of a lesson format could also consider available materials and classroom arrangements, rather than overall means alone.

For classroom practice, the Interactive Digital Storytelling results suggested that story presentation could be accompanied by purposeful literacy tasks rather than treated as a viewing activity alone. In this study, guided questions, letter activities, and oral blending practice were part of the instructional package. The observed gains did not identify which component contributed most, nor did they establish that television presentation by itself produced improvement.

The peer component could be understood in relation to Vardy et al. (2022), who discussed the implementation and adaptation of structured Peer-Assisted Learning Strategies across educational settings. Their work provided a relevant basis for organizing partner

practice, while the present intervention remained a separate classroom program. For the gamified component, Jogo et al. (2022) reported improvements in engagement and syllable-structure awareness in a single-subject study of gamified literacy activities. That finding offered a possible explanation for the value of purposeful game practice, but it did not establish that motivation or engagement improved in the present study, where these were not measured as separate outcomes.

For classroom practice, these results suggested that partner games were most useful when they provided a clear literacy task, opportunities for both learners to respond, and teacher guidance. A partner's correct answer could not substitute for the learner's own response. Stars served as game feedback, while independent answers remained the basis for assessing Sound Awareness, Alphabet Knowledge, and Sound Blending. The lower blending mean pointed to the need for additional modeling and short oral blending practice, with the teacher checking whether each learner could produce the complete word without partner assistance.

The interpretation remained limited by the quasi-experimental design. The group consisted of one intact morning class, the researcher implemented and assessed the intervention, and the same instrument was used before and after the six-week period. Maturation, other classroom learning, and familiarity with the assessment could also have contributed to the changes. The results therefore showed improvement following the instructional package but did not isolate the effects of peer interaction, rewards, or individual games. The adjusted comparison between the two approaches was addressed separately in Table 4.

Studies that compare instructional formats for blending among kindergartners are still scarce. Göle and Temel (2024) worked with children aged 60 to 72 months who were taught through different phonological awareness programs. The researchers found no significant group difference on a syllable-blending measure, but on a separate sound-merging measure the intervention groups outperformed a group that received no intervention. Since their programs, measures, and comparison group were not the same as in this study, their results indicate only that blending outcomes may differ depending on the program and the measure used. These results do not show that Interactive Digital Storytelling and Peer-Mediated Gamified Instruction are equally effective. In this study, the closeness of the adjusted means (5.45 and 5.38) and the comparatively low blending scores in both groups suggest that learners need more blending practice, whichever approach is used.

One possible explanation for the nonsignificant differences in Alphabet Knowledge and Sound Blending was that both groups received instruction targeting the same skills and letters over the same six-week period. Although the instructional approaches differed, both included teacher guidance, repeated practice, and feedback. These shared features may have supported learning in both groups and reduced the difference associated with the instructional format. In addition, the sample of 30 learners per group and differences in individual performance may have limited the study's ability to detect smaller differences between the approaches. These explanations remained tentative because the study did not separately examine these factors. The nonsignificant results therefore indicated

insufficient evidence of a difference, rather than proof that the two approaches were equally effective.

Conclusions

Both Interactive Digital Storytelling and Peer-Mediated Gamified Instruction were associated with improvements in Sound Awareness, Alphabet Knowledge, and Sound Blending among the participating kindergarten learners. The adjusted overall comparison did not establish a statistically significant advantage for either approach. The findings support using developmentally appropriate digital stories and structured peer games as complementary options for early literacy instruction.

The findings are consistent with the study's theoretical emphasis on multimedia learning, social interaction, and game-based practice. Sound Blending remained an area requiring additional guided practice across both instructional approaches.

Interpretation is limited by the use of intact classes in a single school, the short intervention period, and potential differences in implementation conditions. The results should not be interpreted as establishing causal superiority or broad generalizability.

Recommendations

Based on the findings and limitations of the study, the following recommendations are proposed:

Kindergarten Teachers. Teachers are encouraged to integrate guided digital storytelling and structured peer-assisted games into literacy instruction. Additional guided practice in Sound Blending should be provided, particularly for learners who continue to experience difficulty combining sounds into words. Instructional approaches should be selected according to learners' needs and available classroom resources.

School Administrators. School administrators may support early literacy instruction by providing appropriate digital resources, letter cards, picture cards, and materials for collaborative learning. They should also encourage teachers to share effective strategies and regularly monitor learners' progress in the three literacy skills.

Parents and Guardians. Parents and guardians are encouraged to reinforce classroom learning through simple, age-appropriate activities at home, such as identifying letters, recognizing beginning sounds, and blending sounds into words. Regular communication with teachers may help ensure that these activities match learners' abilities.

Future Researchers. Future studies may involve larger samples, additional schools, and multiple classes per intervention to strengthen the findings. Longer intervention and follow-up periods, comparable class schedules, and independent assessment procedures are also recommended. Future researchers should consider appropriate statistical procedures to address multiple comparisons and minimize potential bias.

Compliance with Ethical Standards

Before data collection, the researcher obtained ethical clearance from the Research Ethics Committee (REC) and the required permissions from the Schools Division Office and the school principal. Eligible learners from the two intact kindergarten classes were then identified using the predetermined inclusion criteria. Written parental or guardian consent and developmentally appropriate learner assent were secured before participation.

The researcher explained the study's purpose, procedures, duration, possible risks and benefits, and voluntary nature to parents or legal guardians and explained participation to learners in age-appropriate language. Participation required written parental or guardian consent and learner assent. Refusal or withdrawal did not affect grades, classroom standing, access to regular instruction, or the learner's relationship with the teacher or school. No financial incentives, compensation, reimbursement, or study-related payments were required or provided.

The researcher served as both class adviser and implementer and data collector. To address the potential influence of this dual role, the voluntary nature of participation was emphasized during recruitment and throughout the study. The Belmont Report's principles of respect for persons, beneficence, and justice (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) guided consent and assent, attention to learner welfare, and the consistent application of participation criteria. Learners could decline or stop an activity without penalty. In practice, respect for persons meant obtaining parental or guardian consent and age-appropriate learner assent without pressure. Beneficence meant minimizing fatigue or distress, allowing breaks or withdrawal, and protecting confidentiality. Justice meant applying the same eligibility criteria to both classes and ensuring that declining research participation did not remove access to regular instruction.

Participant information was protected in accordance with the Data Privacy Act of 2012 and institutional policies. Names and the document linking names to participant codes were stored separately from coded scores. Electronic records were password-protected, and printed records were kept in a secure location. Access was limited to the researcher and authorized persons who required the information for legitimate research, academic, or ethical review. Only the information needed for their roles was provided to the adviser, statistician, or authorized reviewers.

Findings were reported in aggregate form without identifying individual learners. Identifiable records were not included in publicly accessible datasets. Research records would be retained for the period required by Lourdes College and disposed of securely afterward. Any loss, accidental disclosure, or unauthorized access would be reported and managed through the applicable institutional procedures.

No photographs, video recordings, or audio recordings of participants were collected. Any proposed recording for a later research activity would require the applicable REC approval and separate parental or guardian authorization before collection.

The researcher reported findings accurately, including results that did not favor either approach and limitations affecting interpretation. No financial, familial, or proprietary interest in the study's outcome was declared. Any conflict of interest arising during the research was to be disclosed to the REC and managed according to its requirements.

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