

# Development of Interactive Storybook for Improved Comprehension in Science

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## ABSTRACT

The Philippines continues to be one of the nations with the lowest reading comprehension and science literacy scores, underscoring the critical need for innovative teaching strategies that simultaneously improve students' literacy abilities and scientific understanding. The goal of this study was to develop and evaluate an interactive storybook for the Grade 6 science lesson on mixture separation at Doña Juana Actub Lluch Memorial Central School, North II District, Division of Iligan City. The study was anchored on the Technological Pedagogical Content Knowledge (TPACK) framework, Constructivist Learning Theory, Cognitive Theory of Multimedia Learning, and Story-Based Learning. The study used a mixed-method approach that combined qualitative and quasi-experimental design. Seventy two sixth-grade students and science instructors participated in the study's preparation and assessment. A validated 30-item pretest and posttest to gauge learning progress and Learning Resources Management and Development System (LRMDS) evaluation sheets to assess the quality of materials were all used in the data collection process. The interactive storybook was developed methodically using the Successive Approximation Model (SAM), which ensured iterative design, feedback integration, and ongoing improvement. In order to improve learner engagement, comprehension, and retention, the developed material included narrative-driven information, multimedia features, interactive tasks, simulations, and audio-visual components. The results showed a statistically significant improvement between the pretest and posttest scores, indicating that the interactive storybook was successful in raising students' reading comprehension abilities, conceptual grasp of separating mixtures, and general level of learning engagement. Additionally, teachers acknowledged the material's efficacy in fostering inquiry-based learning, motivation, teamwork, and meaningful classroom engagement, while students found it interesting, relatable, and simple to comprehend. The findings imply that including interactive storybooks into scientific lessons can be an effective strategy for filling in primary students' literacy and science learning gaps.

**Keywords:** Interactive Storybook, Science Education, Separating Mixtures, Story-Based Learning, SAM Model, Instructional Material Development, Grade 6 learners

## INTRODUCTION

Academic success has traditionally been accessed through reading comprehension. Reading comprehension has always been employed and given a lot of weight across the board. The Philippines continues to rank lowest in reading comprehension and science literacy (OECD, 2022), and the majority of students have critical deficiency of knowledge of science and comprehension of scientific concepts (TIMSS, 2021; Palines and Ortega-Dela Cruz, 2021). According to DepEd, 2019 on PISA 2018 results, Filipino students obtained an average score of 340 points in Overall Reading Literacy, which was significantly lower than the OECD average of 487 points, students achieved an average score of 353 points in Mathematical Literacy, which was significantly lower than the OECD average of 489 points and an average score of 357 points in Scientific Literacy, which was significantly lower than the OECD average of 489 points. Many students enter higher education with poor reading skills, which frequently causes problems learning new material and functioning academically (Urbano et al., 2021; Anwar et al., 2022; Ganaden, 2022).

Reading is a crucial ability that has to be fostered, taught, and improved. The ability to read and comprehend scientific texts is essential for a large portion of scientific literature. Several studies found that reading comprehension has a contribution to science achievement (Esleta et al., 2024; Abao, 2025; Galimpin, 2024). Promoting improved academic performance in important scientific disciplines needs addressing reading comprehension issues in science education. According to Dr. Monera Hadji-Salic Hairulla, the dean of the College of Education in MSU-IIT and has a Major in Chemistry, one of the challenging lessons in Chemistry is the separating of mixtures due to its abstract nature, involving processes at the molecular level that are not easily visualized. Another Science Teacher from Iligan Medical Center College (Basic Education Department), Ms. Maria Gillin Padua said that separating mixtures is a difficult lesson to teach because it involves invisible processes so particles and processes that they can't observe directly are hard to grasp.

Notwithstanding the Department of Education's efforts to enhance pupils' scientific and reading comprehension abilities (ECARP and NRP), there are still issues (Cultura et al, 2025; Acita, 2022). Given the kind of new students who are currently enrolled, educators are urged to adopt innovative teaching strategies that are more inclusive, dynamic, participatory, and developmental (Burak & Gultekin, 2021; Ozaydin Ozkara & Ibili, 2021; Basister et al, 2025; Zillmer & Mussmann, 2023)

With vast technology, numerous studies support the use of digital resources in the classroom to improve students' performance (Edulan et al, 2025; Duterte, 2024; Ridha and Fithriani, 2025). To achieve optimal use of multimedia in the educational process, it is necessary to employ the multisensory approach and the interactive approach together (Consentio et al, 2025; Saborio- Taylor, 2025). One of these digital resources are electronic books, e-journals and interactive storybooks. Interactive storytelling has become a potent technique for educating and engaging people with difficult subjects in recent years (Sulastri, Nasution & Rakhmawati, 2024; Tee & Samah, 2025; Azores & Velasco, 2025)

Digital storytelling helps elementary school children learn with visual design of media communication through digital animation. These media also help children develop their senses and motor skills at a young age (Adil et al, 2025; Faizah et al, 2024). It develops a student's ability to synthesize, analyze, evaluate, and present information in an organized way as well as the development of knowledge and academic skills (Rosyid et al, 2025; Nasir et al, 2024). Digital storytelling enhances motivation, creativity, problem-solving, and critical thinking among students (Halimova, 2025; Nasir et al, 2024)

This study aims to develop and evaluate an interactive storybook focusing on teaching and learning about separating mixtures for Grade 6 students of the selected public school in South I District of Division of Iligan City. Specifically, this study seeks to answer the following objectives:

1. Assess the needs of the teachers in developing interactive storybooks on a Science lesson on separating mixtures.
2. Determine the pretest and posttest scores of the Grade 6 students.

3. Evaluate the significant difference between the pretest and posttest of the students after using the interactive storybook.
4. Develop an interactive storybook on a Science lesson on Separating Mixtures

Through the development and evaluation of an interactive storybook that combines science concepts with literacy instruction for elementary students, this study primarily supports United Nations Sustainable Development Goal 4: Quality Education by fostering inclusive, equitable, and high-quality learning. The solution supports creative, learner-centered teaching strategies and technology integration that are in line with 21st-century competences while improving reading comprehension, scientific understanding, and learner engagement. By introducing technology-enhanced instructional materials that promote digital innovation in classroom instruction and SDG 10: Reduced Inequalities by offering accessible and contextualized learning resources targeted at addressing disparities in literacy and science achievement among public school learners, the study further supports SDG 9: Industry, Innovation, and Infrastructure.

## METHODOLOGY

### Research Design

In this study, the researcher used Mixed-Method - qualitative and quasi-experimental. In the present study, the SAM model was utilized to create the Interactive Storybook, making sure that the interactive storybook is improved by testing and feedback. The instructional design methodology known as the Successive Approximation Model (SAM) emphasizes ongoing input, edits, and incremental enhancements. Using the SAM model in the quali-quasi-experimental design allows for more responsive and improved educational content by emphasizing ongoing input and adjustments throughout the development process.

### Research Setting

The study was conducted at one public elementary school in South I District of Iligan City, Lanao del Norte, during the school year 2025-2026 namely Doña Juana Actub Lluch Memorial Elementary School. Due to its potential alignment with the study focus on separating mixtures, the study selects this school to be significant. In fact, this study aspires to determine the present academic atmosphere of the selected school by looking into the facets involving educational techniques, student engagement, and the entire educational environment.

### Respondents of the Study

The respondents of this study are 72 Grade 6 students (2 sections) that are chosen using purposive sampling. Selecting participants is made simpler with this enhanced approach, which yields a well-rounded sample of children from a specific grade level and enables a closer examination of how they interact with and react to their interactive storybook.

### Research Instrument

The Department of Education Learning Resources Management and Development System Evaluating (LRDMS) Sheet for Interactive Storybook, the Needs Assessment Questionnaire for Science Teachers, which was adapted and modified from Jumawan (2022), and thirty multiple-choice items from the pretest and posttest were the research instruments used in this study. To gather qualitative insights, the items included open-ended questions with a four-point Likert scale (1 being strongly disagree and 4 being strongly agree). Before being administered, the questionnaire was expertly validated by scientific educators and ICT specialists to guarantee content accuracy and relevance.

### Data Gathering Procedure

The iterative design and assessment of the interactive storybook will be led by the Successive Approximation Model (SAM), which served as the framework for the process. The study sought to guarantee that the content

satisfied the needs of the students and enhanced their understanding of separating mixtures by continuously upgrading it in response to comments and evaluations.

### Preparation Phase

This stage focuses on creating focused educational interventions based on the previously determined least mastered competencies in separating mixtures. Then, aligning it to the study objectives and give focused to the PISA 2018 results and knowing the challenges of the teachers based on the Needs Assessment results.

### Iterative Design Phase

This stage focuses on developing of storybook. Brainstorming and Storyboard detailing was done first followed by selecting the multimedia components like pictures and animations. After making the storybook, I asked Science & English Teacher and ICT Experts to evaluate the storybook.

### Iterative Development Phase

This stage focuses on revisions and adjustments made based from the evaluators. As a result, it moves from development to real-world use in the implementation phase, when the created interactive storybook is integrated into the classroom via pilot testing.

### Data Analysis

In this study, the researches used Content Analysis to investigate qualitative data in the Needs Assessment of the Science Teachers. Descriptive Statistics was used to analyze the data collected from the LRDMS evaluation rating sheet which was completed by Science & English In-Service Teachers and ICT Experts.

### Rating Interpretation for the In-Service Teacher and ICT Experts in terms of Content Quality, Instructional Quality, Technical Quality, and Other Findings

Factors	Mean Ranges	Remarks
Content Quality	30-40	Passed
	1-29.9	Failed
Instructional Quality	30-40	Passed
	1-29.9	Failed
Technical Quality	39-52	Passed
	1-38.9	Failed
Other Factors	16	Passed
	1-15.9	Failed

Note: \*Content Quality: passed= 30-40, failed= 1-29.9; Instructional Quality, passed= 30-40, failed= 1-29.9; Technical Quality, Passed= 39-52, failed= 1-38.9; Other Factors, Passed=16, Failed= 1-15.9

### The Mean Ranges and Corresponding Descriptions Used in Interpreting the Total Points Ratings of In-Service Teachers and ICT Experts

Mean Ranges	Remarks
3.25-4.0	Very Satisfactory
2.5-3.24	Satisfactory
1.75-2.49	Not Satisfactory
1-1.74	Poor

Note: \*Very Satisfactory= 3.25-4; Satisfactory= 2.5-3.24; Not Satisfactory= 1.75-2.49; Poor= 1-1.74

Adapted from Development of Space Jump Adventure Game in Teaching Planets (p 29), by C.L. Colance, L.M. Liscano, S.J. Quiobe, 2023.

The researcher decided to use paired t-tests to evaluate pretest and posttest data in this study's pilot test phase, which comprises a single section (experimental group). The purpose of this inferential statistical analysis will assess the mean differences between two sets of dependent scores, namely the performance of the learners prior to and following the interactive storybook intervention.

### Coding of Data

In-Service Elementary Science Teachers (Needs Assessment)	Evaluators English Teachers	ICT Experts	Content Validator
IESTNA 1	ET 1	ICT 1	CV
IESTNA 2	ET 2	ICT 2	
IESTNA 3	ET 3	ICT 3	

For the needs assessment, the code IESTNA stands for In-Service Elementary Science Teachers Needs Assessment, where IESTNA1 refers to In-Service Elementary Science Teachers Needs Assessment 1. Evaluators responsible for assessing content dependability, identified as English Teachers, are coded ET, with ET1 signifying English Teacher 1. ICT Experts are labeled as ICT, and ICT1 corresponds to ICT Coordinator 1. Finally, CV represents Content Validator.

### Ethical Consideration

In order to respect participant rights, confidentiality, and voluntary involvement, this study adhered to established ethical standards in educational research by following the recommendations made by John W. Creswell and Louis Cohen. Every activity will be in line with educational goals, age-appropriate, and safe. Since participation is completely voluntary, students are free to decline or discontinue at any moment without facing consequences or losing their rights as students. Without express authorization, the gathered data will not be shared with outside parties and will only be utilized for scholarly purposes. Throughout the study, the researcher will keep lines of communication open with participants and their guardians to guarantee that their welfare always comes first.

## RESULTS AND DISCUSSION

### Assess The Needs of The Teachers in Developing Interactive Storybooks on a Science Lesson on Separating Mixtures

1.1.1 Learning Competency	Comments/Remarks	F	%
Demonstrate various techniques in separating mixtures, such as decantation, winnowing, scooping, picking, evaporation, filtering, sieving, and using magnets	IESTNA 1: "Some techniques in separating mixtures are hard to identify and define." IESTNA 2: "It is informative. The techniques are given more emphasis since the students find it difficult to understand." IESTNA 3: "The ways on how to separate mixtures is a difficult topic in Science"	3	100%
Explain the benefits of each mixture separation technique in preparing useful products	None	0	0

The table shows that there are 3 teachers who chose the learning competency "Demonstrating various techniques in separating mixtures such as decantation, winnowing, scooping, picking, evaporation, filtering, sieving and using magnets".

This indicates that the topic Separating Mixtures is fundamental yet still underexplored in Chemistry and Science education. Only a few studies have highlighted this topic (Nabilah, 2024).

1.1.2 What teaching strategies do you currently use when discussing Separating Mixtures?	F	%
Traditional lecture and discussion	1	33%
Visual aids (e.g., charts, diagrams)	1	33%
Interactive activities (e.g., experiments, hands-on demonstration)	3	100%
Digital tools (e.g., videos, apps, or simulations)	3	100%
Others: _____	0	0

This table shows that most teachers use Interactive Activities (e.g., experiments, hands-on demonstration) and Digital Tools (e.g., videos, apps, or simulations) as their primary teaching strategies. Numerous studies have shown that Interactive Activities significantly enhance student learning outcomes particularly in terms of engagement and comprehension (Upula, 2025; Chen et al, 2025).

1.1.3 What challenges do you face when teaching Separating Mixtures?	F	%
Students struggle with reading comprehension	1	33%
Students find it difficult to tell what method they should use in separating the mixtures	3	100%
Lack of engaging materials or resources	1	33%
Limited access to technology in the classroom	1	33%
Others: _____	0	0

The table shows that there are 3 In-Service Science Teachers who reported that the most challenging aspect of teaching Separating Mixtures is when students have difficulty determining which method to use for separation. Many studies focus on identifying misconceptions about what mixtures or compounds are, or on conceptual understanding of mixing, rather than explicitly on the choice of separation method (Suparman et al, 2024; Boateng, 2024).

Open-Ended Questions	Utterances
1.1.4 Are you familiar with Interactive Digital Storybook?	IESTNA 1: “No” IESTNA 2: “No” IESTNA 3: “No”
1.1.5 What do you think of IDS?	IESTNA 1: “Interesting Integration in learning Math” IESTNA 2: “Interesting” IESTNA 3: “Another interesting integration in learning Science”
1.1.6 Did you attend seminars/ webinars about IDS? Write your insights.	IESTNA 1: “No, I did not attend any seminars about IDS” IESTNA 2: “No, there is a lack of training about IDS.” IESTNA 3: “No, I did not attend any IDS seminars”
1.1.7 Do you think a teaching-learning material called Interactive Digital	IESTNA 1: “Yes because learners can see the process”

Storybook (IDS) is useful in teaching Separating Mixtures? Why?	IESTNA 2: “Yes, because teaching separating mixtures is engaging activity” IESTNA 3: “Yes because learners learn more on what they see”
1.1.8 Comments and Suggestions	IESTNA 1: “This will be sustained and integrated.” IESTNA 2: “Hopefully this IDS will be implemented in public schools because it can help our students learn.” IESTNA 3: “Integration and Innovation”

The table shows that most of the respondents don’t have an idea about the Interactive Digital Storybook however most of them believe that it is an interesting integration. Numerous studies prove that most in-service teachers are showing limited uptake and awareness about Interactive Digital Storybooks (Zhang et al, 2021; Nuroh et al, 2022; Suparman et al, 2024). It was also stated that there are no seminars or training about IDS.

Most studies show that the In-Service Teachers have limited training and exposure to technology, specifically Interactive Digital Storybooks (Agonas et al, 2024; Datugan et al, 2023; Mastul et al, 2023).

The table shows that most of the respondents believe that IDS is useful and engaging for learning separating mixtures. This was supported by numerous studies claiming that Interactive Digital Storybook is useful and has positive effect in teaching Science (Ambalong et al, 2024; Kurniadin, 2025; Nurhidayah et al, 2025). The respondents also made comments and suggestions like IDS should be implemented, integrated and innovated in public schools.

**Significant Difference Between the Pretest and Posttest of the Students after using the Interactive storybook.**

**Table 2.2 (Controlled Group)**

Paired Statistics and Significance of Difference on mean pretest and posttest scores of

	Paired Statistics				Significance of Difference					
	N	Mean (M)	Std. Deviation (SD)	Std. Error Mean (SEM)	Mean (d)	Std. Deviation (sd)	Std. Error Mean	t	df	p
<b>Pretest</b>	36	14.25	6.148	1.025	- .639	3.498	.583	- 1.678	35	.281
<b>Posttest</b>	36	14.89	5.439	.907						

There are 36 students in the Control Group. The mean pretest score was 14.5 (SD = 6.148), while the mean posttest score slightly increased to 14.89 (SD= 5.439). The mean score increased somewhat, the mean difference was only -0.639 which indicates minimal improvement. The computed value of  $t = -1.678$  with 35 degrees of freedom and a p-value of .281 are displayed in the paired t-test result.

The difference between the pretest and posttest scores is not statistically significant since the p-value is higher than the 0.05 level of significance. This finding suggests that the control group's students' performance did not significantly improve.

Students' learning results were not considerably impacted by the instruction given to this group, indicating that traditional or non-interactive teaching strategies were insufficient on their own to yield significant improvements.

**Table 2.3 (Experimental Group)**

Paired Statistics and Significance of Difference on mean pretest and posttest scores of

	Paired Statistics				Significance of Difference					
	N	Mean (M)	Std. Deviation (SD)	Std. Error Mean (SEM)	Mean (d)	Std. Deviation (sd)	Std. Error Mean	t	df	p
<b>Pretest</b>	36	17.03	4.657	.776	-2.11	3.196	.533	-	35	<.001
<b>Posttest</b>	36	19.14	4.324	.721						

There were 36 pupils in the experimental group. The mean posttest score rose to 19.14 (SD = 4.324) from the mean pretest score of 17.03 (SD = 4.657). A noticeable improvement in student performance following the intervention is indicated by the mean difference of -2.11. With 35 degrees of freedom, the paired t-test produced a t-value of -3.963 and a p-value of less than .001. The difference between the pretest and posttest scores is statistically significant because the p-value is below the 0.05 level of significance. This result suggests that students' learning was significantly improved by using the interactive digital storybook. The findings imply that the intervention was successful in improving students' comprehension of the topic Separating Mixtures.

**Evaluation of the Developed Interactive Digital Storybook on a Science Lesson on Separating Mixtures**

**Table 3.2 Lrmds Assessment and Evaluation Rating Sheet for Non Print Materials (Adapted from DepEd)-ICT Personnel**

Factor A. Content Quality	Mean	SD	Interpretation
1. Content is consistent with topics/skills found in the DepED Learning Competencies for the subject and grade/year level it was intended.	3.33	0.58	Very Satisfactory
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	3.67	0.58	Very Satisfactory
3. Content is accurate.	3.33	0.58	Very Satisfactory
4. Content is up-to-date.	3.33	0.58	Very Satisfactory
5. Content is logically developed and organized.	3.33	0.58	Very Satisfactory
6. Content is free from cultural, gender, racial, or ethnic bias	3.33	0.58	Very Satisfactory
7. Content stimulates and promotes critical thinking.	3.33	0.58	Very Satisfactory
8. Content is relevant to real-life situations.	3.67	0.58	Very Satisfactory
9. Language (including vocabulary) is appropriate to the target user level.	3.67	0.58	Very Satisfactory
10. Content promotes positive values that support formative growth.	3.33	0.58	Very Satisfactory
<b>Weighted Mean</b>	3.43	0.58	Very Satisfactory
Factor B. Instructional Quality			
1. Purpose of the material is well defined.	3.67	0.58	Very Satisfactory
2. Material achieves its defined purpose.	3.33	0.58	Very Satisfactory
3. Learning objectives are clearly stated and measurable.	3.67	0.58	Very Satisfactory
4. Level of difficulty is appropriate for the intended target user.	3.67	0.58	Very Satisfactory

5. Graphics / colors / sounds are used for appropriate instructional reasons.	4	0	Very Satisfactory
6. Material is enjoyable, stimulating, challenging, and engaging.	3.33	0.58	Very Satisfactory
7. Material effectively stimulates creativity of target user.	3.67	0.58	Very Satisfactory
8. Feedback on target user's responses is effectively employed.	3.33	0.58	Very Satisfactory
9. Target user can control the rate and sequence of presentation and review.	3.33	0.58	Very Satisfactory
10. Instruction is integrated with target user's previous	3.33	0.58	Very Satisfactory
<b>Weighted Mean</b>	3.53	0.52	Very Satisfactory
<b>Factor C. Technical Quality</b>			
1. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	3.67	0.58	Very Satisfactory
2. Visual presentations (non-text) are clear and easy to interpret.	3.33	0.58	Very Satisfactory
3. Visuals sustain interest and do not distract user's attention.	3.33	0.58	Very Satisfactory
4. Visuals provide accurate representation of the concept discussed.	3.67	0.58	Very Satisfactory
5. The user support materials (if any) are effective.	3.33	0.58	Very Satisfactory
6. The design allows the target user to navigate freely through the material.	3.33	0.58	Very Satisfactory
7. The material can easily and independently be used.	3.33	0.58	Very Satisfactory
8. The material will run using minimum system requirements.	3.67	0.58	Very Satisfactory
9. The program is free from technical problems.	3.67	0.58	Very Satisfactory
<b>Weighted Mean</b>	3.48	0.58	Very Satisfactory

**Note:** 3.26 - 4.00 - Very Satisfactory (VS), 2.51 - 3.25 - Satisfactory (S), 1.76 - 2.50 - Poor, 1.00 - 1.75 - Not Satisfactory (NS)

Factor D. Other Findings	Mean	SD	Interpretation
1. Conceptual errors.	3	1.73	Present but very minor & must be fixed
2. Factual errors.	2.67	1.53	Present but very minor & must be fixed
3. Grammatical and / or typographical errors.	2.67	1.53	Present but very minor & must be fixed
4. Other errors (i.e., computational errors, obsolete information, errors in the visuals, etc.).	2.33	1.56	Present & requires major redevelopment
<b>Weighted Mean</b>	2.67	1.49	Present but very minor & must be fixed

**Note:** 3.26 - 4.00 - Not Present, 2.51 - 3.25 - Present but very minor & must be fixed, 1.76 - 2.50 - Present & requires major redevelopment, 1.00 - 1.75 - Do not evaluate further

ICT personnel rated the Interactive Digital Storybook's overall content, pedagogical, and technological quality as Very Satisfactory. With consistent agreement among assessors, content quality received a weighted mean of 3.43 (SD = 0.58), suggesting alignment with DepEd competencies, accuracy, relevance, proper language use,

and development of critical thinking. With a weighted mean of 3.53 (SD = 0.52), the instructional quality demonstrated clear objectives, an acceptable level of difficulty, successful multimedia integration, learner engagement, and support for learner-centered instruction suited for sixth-grade science. With a weighted mean of 3.48 (SD = 0.58), technical quality was also scored as Very Satisfactory, indicating that the storybook is easy to use, aesthetically pleasing, technically sound, and prepared for use in the classroom. Only slight conceptual, factual, and grammatical changes were suggested, despite the "Other Findings" category yielding a reduced weighted mean of 2.67 (SD = 1.49).

**Table 3.3 Lrmds Assessment and Evaluation Rating Sheet for Non Print Materials (Adapted from DepEd) - Teachers**

<b>Factor A. Content Quality</b>	<b>Mean</b>	<b>SD</b>	<b>Interpretation</b>
1. Content is consistent with topics/skills found in the DepED Learning Competencies for the subject and grade/year level it was intended.	3.67	0.58	Very Satisfactory
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	4	0	Very Satisfactory
3. Content is accurate.	3.67	0.58	Very Satisfactory
4. Content is up-to-date.	3.67	0.58	Very Satisfactory
5. Content is logically developed and organized.	4	0	Very Satisfactory
6. Content is free from cultural, gender, racial, or ethnic bias	4	0	Very Satisfactory
7. Content stimulates and promotes critical thinking.	3.67	0.58	Very Satisfactory
8. Content is relevant to real-life situations.	4	0	Very Satisfactory
9. Language (including vocabulary) is appropriate to the target user level.	4	0	Very Satisfactory
10. Content promotes positive values that support formative growth.	4	0	Very Satisfactory
<b>Weighted Mean</b>	3.87	0.23	Very Satisfactory
<b>Factor B. Instructional Quality</b>			
1. Purpose of the material is well defined.	3.67	0.58	Very Satisfactory
2. Material achieves its defined purpose.	4	0	Very Satisfactory
3. Learning objectives are clearly stated and measurable.	3	1	Very Satisfactory
4. Level of difficulty is appropriate for the intended target user.	3.67	0.58	Very Satisfactory
5. Graphics / colors / sounds are used for appropriate instructional reasons.	4	0	Very Satisfactory
6. Material is enjoyable, stimulating, challenging, and engaging.	3.67	0.58	Very Satisfactory
7. Material effectively stimulates creativity of target user.	4	0	Very Satisfactory
8. Feedback on target user's responses is effectively employed.	4	0	Very Satisfactory
9. Target user can control the rate and sequence of presentation and review.	4	0	Very Satisfactory
10. Instruction is integrated with target user's previous	4	0	Very Satisfactory
<b>Weighted Mean</b>	3.8	0.27	Very Satisfactory

<b>Factor C. Technical Quality</b>			
1. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	3.33	1.16	Very Satisfactory
2. Visual presentations (non-text) are clear and easy to interpret.	3.67	0.58	Very Satisfactory
3. Visuals sustain interest and do not distract user's attention.	3.67	0.58	Very Satisfactory
4. Visuals provide accurate representation of the concept discussed.	3.33	1.16	Very Satisfactory
5. The user support materials (if any) are effective.	3.67	0.58	Very Satisfactory
6. The design allows the target user to navigate freely through the material.	3.67	0.58	Very Satisfactory
7. The material can easily and independently be used.	3.67	0.58	Very Satisfactory
8. The material will run using minimum system requirements.	4	0	Very Satisfactory
9. The program is free from technical problems.	4	0	Very Satisfactory
<b>Weighted Mean</b>	<b>3.67</b>	<b>0.58</b>	<b>Very Satisfactory</b>

**Note:** 3.26 - 4.00 - Very Satisfactory (VS), 2.51 - 3.25 - Satisfactory (S), 1.76 - 2.50 - Poor, 1.00 - 1.75 - Not Satisfactory (NS)

<b>Factor D. Other Findings</b>	<b>Mean</b>	<b>SD</b>	<b>Interpretation</b>
1. Conceptual errors.	3.33	1.16	Not Present
2. Factual errors.	3	1.73	Present but very minor & must be fixed
3. Grammatical and / or typographical errors.	3.67	0.58	Not Present
4. Other errors (i.e., computational errors, obsolete information, errors in the visuals, etc.).	3	1.73	Present but very minor & must be fixed
<b>Weighted Mean</b>	<b>3.25</b>	<b>1.30</b>	<b>Not Present</b>

**Note:** 3.26 - 4.00 - Not Present, 2.51 - 3.25 - Present but very minor & must be fixed, 1.76 - 2.50 - Present & requires major redevelopment, 1.00 - 1.75 - Do not evaluate further

Teachers gave the content even higher ratings in this second assessment. Technical Quality (WM = 3.67), Instructional Quality (WM = 3.80), and Content Quality (WM = 3.87) were all rated as Very Satisfactory. These findings support the educational material's consistency and dependability, showing that repeated assessments validate the Interactive Digital Storybook's excellent quality, efficacy as a teaching tool, and technical soundness. The most errors were either nonexistent or very little as indicated by the weighted mean of 3.25, which was read as Not Present. This demonstrates that the content had no significant conceptual, grammatical, or technical problems after refining, enhancing its suitability for use in the classroom.

**Table 3.4 Lrmds Assessment and Evaluation Rating Sheet for Non Print Materials (Adapted from DepEd) - Content Validator**

<b>Factor A. Content Quality</b>	<b>Rating</b>	<b>Interpretation</b>
1. Content is consistent with topics/skills found in the DepED Learning Competencies for the subject and grade/year level it was intended.	4	Very Satisfactory

2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	4	Very Satisfactory
3. Content is accurate.	3	Very Satisfactory
4. Content is up-to-date.	4	Very Satisfactory
5. Content is logically developed and organized.	4	Very Satisfactory
6. Content is free from cultural, gender, racial, or ethnic bias	4	Very Satisfactory
7. Content stimulates and promotes critical thinking.	4	Very Satisfactory
8. Content is relevant to real-life situations.	4	Very Satisfactory
9. Language (including vocabulary) is appropriate to the target user level.	4	Very Satisfactory
10. Content promotes positive values that support formative growth.	4	Very Satisfactory
<b>Weighted Mean</b>	3.9	Very Satisfactory

**Note:** 3.26 - 4.00 - Very Satisfactory (VS), 2.51 - 3.25 - Satisfactory (S), 1.76 - 2.50 - Poor, 1.00 - 1.75 - Not Satisfactory (NS)

The Interactive Digital Storybook received a weighted mean rating of 3.9 from the content validator, which is considered Very Satisfactory. Every indication received a high rating, including alignment with DepEd competencies, correctness, organization, relevance, encouragement of critical thinking, and positive values. This enhances the storybook's credibility as a teaching tool by demonstrating that its material is appropriate for Grade 6 Science, pedagogically sound, and academically valid.

## CONCLUSION

The study focused on the development of Interactive Storybook about Separating Mixtures for Grade 6 pupils to improve their reading comprehension and better grasp of difficult Scientific concepts. The study used a mixed method, quasi experimental design using a one controlled group and two uncontrolled groups pretest-posttest approach, guided by constructivist theory, story-based learning, the TPACK Framework, and the Cognitive Theory of Multimedia Learning. The results showed enhanced student performance following exposure to the Interactive Storybook. In line with the research objectives, the results show that both students and science instructors thought the Interactive Storybook was a useful teaching tool for science ideas, especially mixtures. The storybook's interactive features, clear content, and visual and multimedia components effectively increased learner engagement, motivation, and comprehension. Inquiry-based learning, idea reinforcement, and lesson delivery were all found to benefit from it. Even so, the results showed areas for improvement, such as the need for more interactivity, improved availability, and improved technical design. These findings have significant implications for the Interactive Storybook's future development and implementation.

The study's results lead to the following conclusions:

1. The improvement in students' posttest scores over their pretest scores shows that the Interactive Storybook is an effective teaching tool for the science subject of separating mixtures.
2. Students' reading comprehension, engagement, and conceptual grasp of complex science subjects were all improved by the use of story, multimedia, and interactive aspects.
3. The Interactive Storybook is seen by science teachers as a useful instructional tool that promotes inquiry-based learning, discussion, and student motivation.
4. Despite its efficacy, in order to optimize its long-term educational use, it needs to be improved in terms of availability, technical design, and interactivity.

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