

VOLUME 1

ISSUE 4

OCTOBER–DECEMBER

2026

NOMINEE
2026 INTERNATIONAL PUBLISHERS
ASSOCIATION (IPA)
PRIX VOLTAIRE AWARD

AWARDEE
2026 SCHOOL PRESS ADVISERS' MOVEMENT
(SPAM), INC.'S INTERNATIONAL
PUBLISHING EXCELLENCE AWARD
FOR
THE HEAVENWARD MAGAZINE

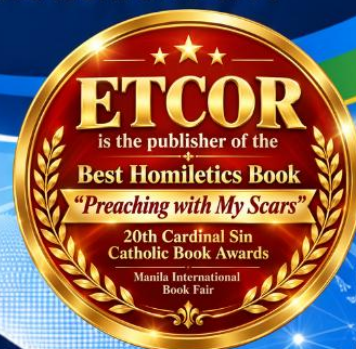
AWARDEE
2026 SCHOOL PRESS ADVISERS' MOVEMENT
(SPAM), INC.'S INTERNATIONAL
PUBLISHING EXCELLENCE AWARD
FOR
THE EXIGENCY MAGAZINE



Print ISSN: 3116-3769



Electronic ISSN: 3116-3777



INJELPS

**International Journal of Education,
Learning, and Pedagogical Sciences**

A Quarterly Peer-Reviewed International Research Journal



EDUCATION



LEARNING



PEDAGOGY



INNOVATION



IMPACT

PUBLISHED BY

ETCOR
EDUCATIONAL RESEARCH
CENTER



GLOBAL
PERSPECTIVES



QUALITY
RESEARCH



ETHICAL
PUBLICATION



EDUCATIONAL
EXCELLENCE

Doray the Catbaloganon Explorer on Probability: Validation of a Mathematics Strategic Intervention Material (SIM)

Ma Rialyn A. Rivera*¹, Emma Q. Tenedero²

¹Comprehensive National High School, Catbalogan City, Samar, Philippines

²Samar State University, Catbalogan City, Samar, Philippines

*Corresponding Author email: ma.rialyn.anez@deped.gov.ph

Received: 19 July 2026

Revised: 01 August 2026; 31 August 2026; 25 September 2026;
02 October 2026; 11 October 2026

Accepted: 18 October 2026

Available Online: 19 October 2026

Volume 1 (2026), Issue 4, P-ISSN – 3116-3769; E-ISSN - 3116-3777

<https://doi.org/10.63498/injelps117>

Abstract

Aim: This study aimed to develop and validate Doray the Catbaloganon Explorer on Probability, a culturally contextualized and gamified Strategic Intervention Material (SIM) for teaching probability to Grade 8 learners.

Methodology: The study employed a descriptive-evaluative research design. Five experts and Grade 8 students evaluated the developed SIM in terms of content validity, clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability.

Results: All 14 indicators obtained an Item-Level Content Validity Index (I-CVI) of 1.00, resulting in a Scale-Level Content Validity Index (S-CVI) of 1.00, indicating excellent content validity. The SIM received Very High/Excellent ratings across all evaluation dimensions, with mean scores ranging from 4.89 to 4.98 and standard deviations ranging from 0.02 to 0.08. Reliability received the highest rating among both experts ($M = 4.97$, $SD = 0.03$) and students ($M = 4.98$, $SD = 0.02$).

Conclusion: The developed SIM demonstrated excellent content validity and very high ratings for instructional quality, usability, and acceptability. It may therefore be used as a supplementary instructional resource for teaching probability to Grade 8 learners.

Keywords: *Strategic Intervention Material (SIM), probability, content validity, gamification, contextualized mathematics instruction*

INTRODUCTION

Mathematics education is essential for developing reasoning, problem-solving, and decision-making skills. Within mathematics, probability is particularly important because it develops reasoning about uncertainty, chance, and possible outcomes. However, probability is also conceptually challenging because learners often struggle with randomness, compound events, and the transition from intuitive judgments to formal probabilistic reasoning (Batanero & Álvarez-Arroyo, 2024). These challenges highlight the need for instructional approaches that move beyond procedural teaching toward active, meaningful, and well-supported learning experiences.

International research increasingly emphasizes contextualized, learner-centered, and engaging mathematics instruction. Real-world contexts can help learners connect probability to familiar situations and develop probabilistic reasoning, while gamification can increase motivation and participation when game elements align with learning objectives (Kacmaz & Dubé, 2022; Ratinho et al., 2026). Culturally responsive mathematics education further emphasizes the use of learners' experiences, community contexts, and cultural knowledge as resources for mathematical learning (Abdulrahim & Orosco, 2020; Kong et al., 2022). These approaches suggest that effective instructional materials should be engaging, meaningful, culturally relevant, and cognitively supportive.

These concerns are particularly relevant in the Philippines, where mathematics achievement remains below international benchmarks. In PISA 2022, only 16% of Filipino 15-year-old students attained at least Level 2 proficiency in mathematics, compared with 69% across OECD countries (OECD, 2023). National education reviews have likewise

identified continuing challenges in foundational learning and the availability and quality of instructional support. The MATATAG Curriculum addresses these concerns by emphasizing essential competencies and meaningful learning experiences. For Grade 8 mathematics, probability includes the competency of calculating the probability of simple combined events using appropriate representations such as listing, possibility diagrams, and tree diagrams.

Strategic Intervention Materials (SIMs) provide a practical mechanism for addressing identified learning gaps. Philippine studies indicate that SIM-based interventions can improve mathematics performance, while localized materials can strengthen learners' engagement and connection to mathematical concepts (Pecson, 2026). Local evidence from Catbalogan City also demonstrates the use of SIMs in mathematics intervention, although previous work has focused on competencies such as integer operations rather than probability (Uy, 2018).

Despite evidence supporting SIMs, gamification, contextualization, cultural relevance, and scaffolding, these approaches have rarely been deliberately integrated into a single probability-focused instructional material for junior high school learners. The present study addresses this gap through the development and validation of Doray the Catbaloganon Explorer on Probability, a gamified and culturally contextualized Strategic Intervention Material for teaching the probability of simple combined events to Grade 8 learners. By combining local contexts, interactive activities, storytelling, and scaffolded tasks, the study seeks to provide a validated instructional resource that is both locally meaningful and responsive to broader developments in mathematics education.

Review of Related Literature and Studies

Probability Learning

Probability is recognized as a challenging area of mathematics because learners must reason about uncertainty, randomness, and multiple possible outcomes. Difficulties become more evident when students encounter combined events that require systematic organization of outcomes and connections between different representations (Sullivan, 2022). Contemporary probability education therefore emphasizes meaningful contexts, visual representations, experimentation, and guided reasoning rather than formulas alone (Batanero & Alvarez-Arroyo, 2024).

Strategic Intervention Materials

Strategic Intervention Materials are designed to address identified learning gaps through structured and learner-centered activities. Evidence from Philippine studies suggests that SIMs can improve mathematics achievement when they are aligned with specific competencies and learner needs (Borabo & Dio, 2025). Probability-specific intervention studies likewise indicate that carefully developed materials can be acceptable in terms of content, language, presentation, and usability (Tambong & Malonisio, 2025). However, the effectiveness of a SIM depends not simply on its format but on the quality of its instructional design.

Gamification

Gamification incorporates selected game elements—such as challenges, progression, feedback, narratives, and rewards—into learning activities. Research suggests that gamification can enhance motivation and engagement in mathematics, but its effectiveness depends on how well the game elements support mathematical learning rather than merely increasing competition or entertainment (Kacmaz & Dubé, 2022; Ratinho et al., 2026). Thus, in the present study, gamification is used as a design strategy to sustain participation and provide structured progression through probability tasks.

Contextualization and Cultural Relevance

Contextualized instruction connects mathematics with learners' experiences and real-world situations. In probability education, meaningful contexts can help students interpret uncertainty, identify possible outcomes, and apply mathematical ideas to familiar situations (Kacmaz & Dubé, 2022). Culturally responsive mathematics education extends this approach by recognizing learners' culture, community, language, and prior experiences as resources for learning (Abdulrahim & Orosco, 2020; Kong et al., 2022). Consequently, localization should go beyond changing names or places; local contexts should contribute meaningfully to mathematical reasoning.

Scaffolding

Scaffolding provides temporary instructional support that enables learners to perform tasks that may initially be beyond their independent capability (Wood et al., 1976). In probability instruction, scaffolding may include guided

questions, examples, visual representations, feedback, and progression from simple to complex tasks. Such support is particularly useful when learners must coordinate multiple representations and reasoning processes in solving combined-event problems (Sullivan, 2022).

Synthesis and Research Gap

The literature indicates that SIMs, gamification, contextualization, cultural relevance, and scaffolding address different but complementary dimensions of mathematics learning. SIMs provide a structure for targeted intervention; gamification supports engagement; contextualization and cultural relevance promote meaningfulness; and scaffolding supports conceptual development.

However, existing studies have generally examined these approaches separately, and relatively few have integrated them into a single validated material for a specific probability competency. In the Philippine context, and particularly in Catbalogan City, there is limited evidence on a Grade 8 probability SIM that deliberately combines gamification, cultural contextualization, and scaffolding. The present study addresses this design-integration gap through Doray the Catbaloganon Explorer on Probability. Its contribution lies not in introducing each strategy as new, but in demonstrating how established pedagogical principles can be integrated into a culturally situated and curriculum-aligned probability intervention material.

Theoretical Framework

This study is anchored on three complementary perspectives, with gamification serving as an instructional design strategy: Sociocultural/Constructivist Learning Theory explains how learners construct mathematical understanding through prior knowledge, experience, interaction, and meaningful contexts; Scaffolding Theory (Wood et al., 1976) explains how learning is supported through guided examples, visual representations, prompts, feedback, and progression from simple to complex probability tasks; and Culturally Responsive Mathematics Education explains how mathematics is connected to learners' culture and experiences. In this study, Catbalogan-based contexts make probability concepts more relevant and meaningful. Gamification supports engagement and participation through challenges, narratives, progression, interaction, and feedback. These perspectives guide the development of Doray the Catbaloganon Explorer on Probability as a contextualized, scaffolded, culturally relevant, and engaging Strategic Intervention Material for Grade 8 probability.

Statement of the Problem

Probability is an important component of mathematics education because it develops learners' understanding of uncertainty, randomness, and quantitative reasoning. However, its abstract concepts can be challenging for junior high school learners, creating a need for instructional materials that provide clear explanations, meaningful contexts, appropriate scaffolding, and engaging learning activities. Although Strategic Intervention Materials (SIMs), gamified instruction, and contextualized learning have been used to address learning difficulties, limited research has focused on integrating these approaches into a culturally contextualized SIM specifically designed for Grade 8 probability.

In Catbalogan City, the need for an appropriate and validated instructional material for probability provides a local context for addressing this gap. The developed Doray the Catbaloganon Explorer on Probability integrates localized contexts, storytelling, gamified activities, and structured learning tasks intended to make probability concepts more accessible and meaningful to Grade 8 learners. However, before such a material can be recommended for classroom use, its content validity and instructional quality must be systematically evaluated.

Accordingly, this study was undertaken to determine the content validity of the developed SIM based on expert evaluation and to assess the material as evaluated by experts and Grade 8 students in terms of clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability. The study seeks to provide evidence regarding the quality and suitability of the developed SIM as a supplementary instructional resource for Grade 8 probability instruction.

Research Objectives

General Objectives

This study aimed to develop and validate Doray the Catbaloganon Explorer on Probability, a culturally contextualized and gamified Strategic Intervention Material (SIM) for Grade 8 mathematics.

Specific Objectives

Specifically, the study sought:

1. To determine the content validity of the developed Strategic Intervention Material (SIM) based on expert evaluation using the Item-Level Content Validity Index (I-CVI) and Scale-Level Content Validity Index (S-CVI).
2. To evaluate the developed SIM as assessed by experts and Grade 8 students in terms of clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability.

Research Questions

This study sought to answer the following questions:

1. What is the content validity of the developed Strategic Intervention Material (SIM) based on expert evaluation, as indicated by the Item-Level Content Validity Index (I-CVI) and Scale-Level Content Validity Index (S-CVI)?
2. How do experts and Grade 8 students evaluate the developed SIM in terms of clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability?

METHODOLOGY

Research Design

The study employed a descriptive-evaluative research design to develop, validate, and evaluate *Doray the Catbalogan Explorer on Probability*, a culturally contextualized and gamified Strategic Intervention Material (SIM) for Grade 8 mathematics. The study involved expert validation of the instructional material, pilot testing of the evaluation instrument, and evaluation of the developed SIM by experts and Grade 8 students.

Population and Sampling

The study involved three participant groups: 68 Grade 8 students, five expert validators who were carefully selected based on their professional qualifications and extensive experience in mathematics education. Two of the validators were Master Teachers from the Department of Education, Catbalogan City, each with over 10 years of classroom teaching experience in secondary mathematics and a track record of mentoring new teachers. The remaining three validators were university professors with doctoral degrees in mathematics education, possessing strong expertise in curriculum development, instructional material design, and research-based validation of educational tools, and 50 teacher evaluators using the SIM Evaluation Checklist, for a total of 123 participants/evaluators. The 68 Grade 8 students were enrolled at Catbalogan National Comprehensive High School, Schools Division of Catbalogan City, during School Year 2025–2026. They were selected through purposive sampling based on comparable academic performance in mathematics during the preceding grading period and their availability during the data-collection period. The students served as the target learners who evaluated the developed Strategic Intervention Material (SIM) based on their actual learning experience with the material.

The five expert validators were separate from the 50 teacher evaluators. The experts evaluated the developed SIM for content validity, alignment with the intended learning competencies, clarity, appropriateness, and instructional quality.

The 50 teacher evaluators were additional participants and were not included among the five expert validators. They were mathematics teachers from schools within the Schools Division of Catbalogan City who were qualified to evaluate instructional materials based on their teaching experience and familiarity with mathematics instruction. They assessed the SIM in terms of clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability. Their ratings were treated separately from those of the expert validators and were included in the corresponding results.

Research Instruments

The study utilized two researcher-developed instruments: the Content Validation Checklist and the SIM Evaluation Checklist. Both instruments were developed based on the study objectives, the MATATAG K to 10



International Journal of Education, Learning, and Pedagogical Sciences (INJELPS)

P - ISSN 3116-3769; E - ISSN 3116-3777

National Book Development Board (NBDB)
Registration as Book Publisher
(Print & Digital): 6312

PRC-CPD Accredited Provider:
PTR-2025-749

Mathematics Curriculum Guide, relevant Department of Education guidelines, and principles of instructional material development.

The Validation Checklist consisted of 14 items and was administered to five expert validators to assess the developed Strategic Intervention Material (SIM) in terms of its relevance and clarity of the six dimensions: Content (3 items), Clarity and Readability (2 items), Engagement and Motivation (2 items), Practicality and Usefulness (2 items), Design and Visual Appeal (2 items), Reliability (1 item), and Usability (2 items). Specifically, the checklist examined whether the SIM accurately covered Probability of Simple Combined Events, including sample space, counting principle, and probability computation, included prerequisite competencies for statistical reasoning readiness, and aligned with DepEd curriculum standards for probability problem-solving. It also assessed whether the explanations were understandable to Grade 8 learners and the activities were logically sequenced; whether gamification elements and localized Catbalogan contexts promoted learner engagement; whether the material was feasible for a 60-minute Grade 8 classroom session and addressed least-mastered probability competencies; whether its visual elements and layout were appropriate and appealing to junior high school learners; whether it provided consistent scaffolding from basic to complex tasks; and whether it was easy to navigate and functioned effectively as supplementary curriculum material.

Each of the 14 items was rated using a four-point scale. For the content-validation component, the indicators were evaluated in terms of relevance and clarity, with ratings of 1 = Not Relevant/Not Clear, 2 = Needs Some Revision, 3 = Relevant/Clear but Needs Minor Revision, and 4 = Very Relevant/Very Clear.

The Item-Level Content Validity Index (I-CVI) for each indicator was computed as the proportion of the five expert validators who assigned a rating of 3 or 4. The Scale-Level Content Validity Index based on the average method (S-CVI/Ave) was subsequently calculated as the mean of the I-CVI values across the 14 items.

On the other hand, the SIM Evaluation Checklist was used to assess the content accuracy, instructional quality, pedagogical appropriateness, and overall usability of the developed Strategic Intervention Material (SIM). The checklist consisted of 35 items distributed equally across five dimensions, with seven items per dimension: (1) Clarity and Readability, (2) Engagement and Motivation, (3) Practicality and Usefulness, (4) Design and Visual Appeal, and (5) Usability. The Clarity and Readability dimension assessed the clarity of mathematical explanations, activity instructions, terminology and formulas, step-by-step presentation of examples and solutions, logical sequencing of lessons, alignment of learning objectives and activities, and appropriateness of language for Grade 8 learners. The Engagement and Motivation dimension examined the extent to which the SIM encouraged interest in mathematics, active participation, engagement through the *Doray the Catbaloganon Explorer on probability* theme, completion of exercises, classroom discussion, curiosity and exploration, and sustained attention. The Practicality and Usefulness dimension assessed the SIM's contribution to students' understanding, relevance to real-life situations, usefulness as supplementary learning material and reviewer, development of problem-solving skills, reinforcement of previously learned concepts, and appropriateness for classroom and independent learning. The Design and Visual Appeal dimension evaluated the organization and attractiveness of the layout, readability of fonts, usefulness of illustrations and diagrams, presentation of headings and subheadings, effectiveness of colors and visual elements, age appropriateness of visual aids, and clarity and relevance of figures and diagrams. Finally, the Usability dimension examined whether the SIM could be used with minimal teacher assistance, supported independent and self-paced learning, was manageable within the suggested time frame, was appropriate for Grade 8 learners, could be integrated effectively into classroom instruction, and had an overall structure that was easy to use.

Each of the 35 items was rated using a five-point Likert scale: 5 = Strongly Agree (SA), 4 = Agree (A), 3 = Neutral (N), 2 = Disagree (D), and 1 = Strongly Disagree (SD). For scoring, the numerical responses for the items under each dimension were averaged to obtain a dimension mean, and the mean of all 35 item ratings was computed to obtain the overall SIM evaluation mean. Higher mean scores indicated more favorable evaluations of the SIM.

The mean scores were interpreted using the following criteria: 4.21–5.00 - Strongly Agree (Very High/Excellent), indicating that the criterion was highly evident and the SIM exceeded expectations; 3.41–4.20 - Agree (High), indicating that the SIM met expectations with strong evidence; 2.61–3.40 = Neutral (Moderate), indicating that the criterion was moderately evident; 1.81–2.60 - Disagree (Low), indicating limited evidence of the criterion; and 1.00–1.80 - Strongly Disagree (Very Low), indicating that the SIM did not meet expectations.

The checklist also provided a space for comments and suggestions after each dimension, allowing evaluators to provide qualitative feedback for further improvement of the SIM.

Content Validation

Content validity was established through evaluation by five expert validators selected based on their qualifications and experience in mathematics education. Two (2) were DepEd Master Teachers with more than 10 years



International Journal of Education, Learning,
and Pedagogical Sciences

International Journal of Education, Learning, and Pedagogical Sciences (INJELPS)

P - ISSN 3116-3769; E - ISSN 3116-3777

National Book Development Board (NBDB)
Registration as Book Publisher
(Print & Digital): 6312

PRC-CPD Accredited Provider:
PTR-2025-749

of secondary mathematics teaching experience, while three (3) were university professors with doctoral degrees in education or mathematics and expertise in curriculum development, instructional design, and educational research.

The validators evaluated each test item and questionnaire indicator using a four-point content-validation scale: 1 = Not Relevant/Not Clear, 2 = Needs Some Revision, 3 = Relevant/Clear but Needs Minor Revision, and 4 = Highly Relevant/Very Clear. In rating the items, validators considered their relevance to the intended learning competency, alignment with the MATATAG K to 10 Mathematics Curriculum Guide, clarity, appropriateness for Grade 8 learners, and adequacy in representing the intended content or construct. For the computation of the Item-Level Content Validity Index (I-CVI), ratings of 3 (Relevant/Clear) and 4 (Highly Relevant/Very Clear) were classified as relevant, while ratings of 1 and 2 were classified as not relevant. The I-CVI was first computed for each item as the proportion of the five expert validators who rated the item as 3 (Relevant/Clear) or 4 (Highly Relevant/Very Clear) on the four-point relevance scale. The S-CVI/Ave was then computed as the average of the I-CVI values for all questionnaire items. The resulting S-CVI/Ave of 1.00 indicates that all items achieved an I-CVI of 1.00 and, consequently, demonstrated excellent scale-level content validity.

Reliability Testing

The SIM Evaluation Checklist was pilot-tested with 32 Grade 8 students who were not included in the actual study sample. Cronbach's alpha was computed to assess the evaluation instrument's internal consistency. The resulting coefficient of 0.80 indicated acceptable internal consistency.

Data Collection Procedure

Before data collection, the researcher secured approval from the University Ethics Review Board and obtained the necessary permissions from the Schools Division Superintendent, Public Schools District Supervisor, school principal, Mathematics Department Head, and concerned teachers. The study received Ethics Review Board approval under IHERC Code 2026-0005-G.

The study involved three distinct evaluator groups: five expert validators, 50 teacher evaluators, and 68 student evaluators. The expert validators evaluated the content validity and appropriateness of the research instruments and developed SIM. The teacher evaluators assessed the SIM in terms of clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability. The student evaluators assessed the same six dimensions based on their actual learning experience with the SIM. The ratings of the three evaluator groups were analyzed and reported separately according to their respective roles.

All completed evaluation forms were collected and checked for completeness before encoding and statistical analysis. The ratings of the expert validators, teacher evaluators, and student evaluators were maintained as separate datasets to ensure that the results accurately represented the perspectives of each evaluator group.

Treatment of Data

Descriptive statistical procedures were used to summarize the evaluation of the developed SIM. The mean was used to determine the average rating assigned by the expert and student evaluators for each evaluation dimension, while the standard deviation was used to describe the variability of the ratings.

The Item-Level Content Validity Index (I-CVI) was computed to determine the proportion of expert validators who considered each content-validation item relevant. The Scale-Level Content Validity Index (S-CVI) was calculated to summarize the instrument's overall content validity. Cronbach's alpha was used to determine the internal consistency of the SIM Evaluation Checklist based on the pilot-test responses.

The resulting mean scores were interpreted using the following scale: 4.21–5.00 = Very High/Excellent; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; and 1.00–1.80 = Very Low.

Ethical Considerations

The study was reviewed by the University's Ethics Review Board under IHERC Code 2026-0005-G. The researchers obtained institutional permissions before data collection. Participation was voluntary, and the study secured informed consent and, where applicable, parental or guardian consent and student assent. The researchers treated participants' identities and responses confidentially and used them solely for research purposes. Data were reported in aggregate form to protect participant privacy.

RESULTS AND DISCUSSIONS

Table 1 presents the content validation results of the developed Strategic Intervention Material (SIM), Doray the Catbaloganon Explorer on Probability, as evaluated by five experts. All 14 indicators obtained an Item-Level Content Validity Index (I-CVI) of 1.00, resulting in a Scale-Level Content Validity Index (S-CVI) of 1.00, which exceeds the recommended threshold of 0.90 for excellent content validity (Polit & Beck, 2006). This indicates unanimous expert agreement that the SIM adequately represents the intended construct.

The expert ratings indicated that the material was aligned with the MATATAG Grade 8 curriculum and was perceived as developmentally appropriate, logically sequenced, and adequately scaffolded.

Table 1
Content Validation of the Developed SIM as Evaluated by Experts

	Statement	Validator 1	Validator 2	Validator 3	Validator 4	Validator 5	I- CVI
1	SIM content accurately covers Probability of Simple Combined Events (sample space, counting principle, probability computation) per MATATAG Grade 8	4	3	4	4	4	1
2	Includes prerequisite competencies for statistical reasoning readiness	4	4	4	4	4	1
3	Aligns with DepEd curriculum standards for probability problem-solving	4	4	4	4	4	1
4	Explanations of probability concepts are understandable for Grade 8	4	3	4	4	4	1
5	Activity instructions are logically sequenced	4	4	4	4	3	1
6	Gamification elements motivate learners	3	4	4	4	4	1
7	Localized Catbaloganon contexts sustain student interest	3	4	4	4	4	1
8	Feasible for Grade 8 classroom implementation (60 mins)	4	4	4	4	3	1
9	Addresses least-mastered probability competencies	4	4	4	4	4	1
10	Visual elements enhance probability comprehension	4	4	4	4	4	1
11	Layout appeals to junior high school learners	4	4	4	4	4	1
12	Provides consistent scaffolding from basic to complex tasks	4	4	4	4	3	1
13	Easy navigation for teachers and independent student use	4	4	4	3	3	1
14	Functions effectively as supplementary curriculum material	4	4	4	4	4	1
S-CVI							1

Legend:

S-CVI Value	Interpretation
≥ 0.90	Excellent Content Validity
$0.80 - 0.89$	Good
< 0.80	Needs Revision

Source: Polit & Beck (2006)



International Journal of Education, Learning, and Pedagogical Sciences (INJELPS)

P - ISSN 3116-3769; E - ISSN 3116-3777

National Book Development Board (NBDB)
Registration as Book Publisher
(Print & Digital): 6312

PRC-CPD Accredited Provider:
PTR-2025-749

Moreover, experts rated the SIM as highly engaging and contextually relevant. The findings indicate that evaluators perceived the SIM as engaging and potentially motivating.

These findings align with studies showing that high Content Validity Index (CVI) values reflect strong expert agreement on the relevance, clarity, and representativeness of instructional materials (Estrada et al., 2021). An I-CVI of 1.00 signifies excellent content validity (Estrada et al., 2021). Thus, the unanimous ratings confirm that the developed Strategic Intervention Material is highly suitable for Grade 8 mathematics instruction.

Table 2 presents the evaluation of the developed Strategic Intervention Material (SIM) by experts and Grade 8 students across six quality dimensions: clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability.

Table 2
Evaluation of the SIM by the Experts and Students

Parameter	Experts			Students		
	Mean	SD	Interpretation	Mean	SD	Interpretation
Clarity and Readability	4.95	0.02	SA/Very High	4.95	0.02	SA/Very High
Engagement & Motivation	4.96	0.03	SA/Very High	4.93	0.05	SA/Very High
Practicality & Usefulness	4.95	0.05	SA/Very High	4.89	0.08	SA/Very High
Design & Visual Appeal	4.95	0.05	SA/Very High	4.95	0.05	SA/Very High
Usability	4.96	0.02	SA/Very High	4.94	0.03	SA/Very High

Legend:

Mean	Response	Interpretation	Description
4.21 - 5.00	Strongly Agree (SA)	Very High/Excellent	The SIM is highly evident in this criterion and exceeds expectations.
3.41 - 4.20	Agree (A)	High	The SIM meets expectations with strong evidence.
2.61 - 3.40	Neutral (N)	Moderate	The SIM moderately meets expectations.
1.81 - 2.60	Disagree (D)	Low	The SIM shows limited evidence.
1.00 - 1.80	Strongly Disagree (SD)	Very Low	The SIM does not meet expectations.

Overall, respondents rated the SIM highly for its potential to support motivation, problem-solving, classroom learning, and independent use ($M = 4.89-4.98$).

The findings indicate that the SIM received favorable ratings from the teacher and student evaluators in terms of clarity and readability, engagement and motivation, practicality and usefulness, design and visual appeal, and usability. The respondents' ratings reflected their perceptions of the SIM's appropriateness for Grade 8 learners, engagement and motivational appeal, potential to support problem-solving activities, practicality for classroom and independent use, clarity in presenting probability concepts, and quality of its organized, localized, and interactive design. These ratings represent perceived characteristics and potential instructional value of the material, rather than objectively measured improvements in motivation, problem-solving performance, independent learning, or academic achievement.

These results support established instructional design principles that emphasize clear organization, engaging and contextualized activities, effective visual design, and learner-centered materials to promote meaningful learning, motivation, comprehension, and self-regulation (Ryan & Deci, 2020; Mayer, 2021; Schunk & Zimmerman, 1994).

Conclusion

The findings support using the developed SIM as a supplementary instructional resource for teaching probability. Its integration of localized contexts, gamified activities, and structured learning tasks provides a potentially useful model for developing contextualized mathematics materials. However, the present findings are based on expert and student evaluations and therefore do not establish the SIM's causal effectiveness in improving students' academic achievement or mathematical performance. Future research using experimental or quasi-experimental designs may determine its effects on learning outcomes.

Recommendations

1. Mathematics teachers may use the developed Doray the Catbaloganon Explorer on Probability as a supplementary instructional resource for Grade 8 probability lessons, particularly when contextualized and engaging learning activities are needed.



International Journal of Education, Learning, and Pedagogical Sciences (INJELPS)

P - ISSN 3116-3769; E - ISSN 3116-3777

National Book Development Board (NBDB)
Registration as Book Publisher
(Print & Digital): 6312

PRC-CPD Accredited Provider:
PTR-2025-749

2. Mathematics teachers may adapt the SIM's design principles, including localized contexts, storytelling, gamified activities, and structured learning tasks, when developing supplementary materials for other mathematics competencies.
3. School instructional leaders and Mathematics departments may consider using validated and contextually appropriate instructional materials as part of their planning for supplementary learning resources and curriculum implementation.
4. Curriculum developers and teacher educators may use the findings as a reference when designing professional-learning activities on instructional-material development, contextualization, gamification, and material validation.
5. Future researchers may conduct experimental or quasi-experimental studies to determine whether using the SIM produces measurable improvements in students' probability achievement, conceptual understanding, retention, or problem-solving performance.
6. Future studies may develop and validate similarly contextualized instructional materials for other mathematics competencies, grade levels, and educational contexts to determine the approach's applicability beyond the present setting.

REFERENCES

- Abdulrahim, N. A., & Orosco, M. J. (2020). Culturally responsive mathematics teaching: A research synthesis. *The Urban Review*, 52(1), 1–25. <https://doi.org/10.1007/s11256-019-00509-2>
- Batanero, C., & Álvarez-Arroyo, R. (2024). Teaching and learning of probability. *ZDM–Mathematics Education*, 56(1), 5–17. <https://doi.org/10.1007/s11858-023-01511-5>
- Borabo, J. G., & Dio, R. V. (2025). Effectiveness of Strategic Intervention Material (SIM) in Improving Filipino Student's Performance in Science and Mathematics: A Meta-analysis. *Journal of Basic Education Research*, 6(2), 79–89. <https://doi.org/10.37251/jber.v6i2.1420>
- Kacmaz, G., & Dubé, A. K. (2022). Examining pedagogical approaches and types of mathematics knowledge in educational games: A meta-analysis and critical review. *Educational Research Review*, 35, Article 100428. <https://doi.org/10.1016/j.edurev.2021.100428>
- Kong, J., Arizmendi, G., & Doabler, C. (2022). Implementing the Science of Math in a Culturally Sustainable Framework for Students With and at Risk for Math Learning Disabilities. *TEACHING Exceptional Children*, 56(1), 44–51. <https://doi.org/10.1177/00400599221127385>
- Mayer, R. E. (2021). Evidence-based principles for how to design effective instructional videos. *Journal of Applied Research in Memory and Cognition*, 10(2), 229–240. <https://doi.org/10.1016/j.jarmac.2021.03.007>
- Mingorance-Estrada, Á. C., Granda-Vera, J., Rojas-Ruiz, G., & Alemany-Arrebola, I. (2021). Validação do questionário sobre a utilização de Dispositivos Móveis Interativos no Ensino Superior. *Revista Latino-Americana de Enfermagem*, (29), Article e3418. <https://doi.org/10.1590/1518-8345.3374.3418>
- OECD (2023), *PISA 2022 results (Volume I): The state of learning and equity in education*, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/53f23881-en>.
- Pecson, R. (2026). Development and validation of modified strategic intervention materials as self-learning materials for the new normal in education. *Asian Journal of Applied Education*, 5(1), 233–252. <https://doi.org/10.55927/ajae.v5i1.15424>
- Polit, D. F., & Beck, C. T. (2006). *Nursing research: Principles and methods* (7th ed.). Lippincott Williams & Wilkins.
- Ratinho, E., Figueiredo, M., Estêvão, D., Faísca, L., & Martins, C. (2026). Gamification on Mathematics Engagement and Motivation in Secondary School and Higher Education: A Systematic Review and Meta-Analysis. *Educ Psychol Rev* 38, Article 16. <https://doi.org/10.1007/s10648-025-10108-1>
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, Article 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Sullivan, P. (2022). Using CODAP to grow students' probabilistic reasoning. *Mathematics Teacher: Learning and Teaching PK–12*, 115(4), 283–293. <https://doi.org/10.5951/MTLT.2021.0103>
- Tambong, C. F., & Maloniso, M. O. (2025). Remediating strategic intervention material (RSIM) for statistics and probability. *International Journal of Multidisciplinary: Applied Business and Education Research*, 6(4), 1832–1854. <https://doi.org/10.11594/ijmaber.06.04.21>

- Uy, E. L. (2018). Teacher-made comic strip: A Strategic Intervention Material in teaching fundamental operations on integers. *JPAIR Multidisciplinary Research Journal*, 33(1), 89–104. https://www.researchgate.net/publication/328933698_TeacherMade_Comic_Strip_A_Strategic_Intervention_Material_in_Teaching_Fundamental_Operations_on_Integers
- Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89–100. <https://doi.org/10.1111/j.1469-7610.1976.tb00381.x>
- Schunk, D. H., & Zimmerman, B. J. (Eds.). (1994). Self-regulation of learning and performance: Issues and educational applications. Routledge. <https://doi.org/10.4324/9780203763353>