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Research Article

Remediating Strategic Intervention Material (RSIM) for Statistics and Probability

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ABSTRACT

This multiphase mixed methods design research was conducted to develop a Remediating Strategic Intervention Material (RSIM) for Statistics and Probability for Grade 10 students. Research findings revealed that problem solving as the most essential skill in any area of learning is not given too much attention and importance as shown by the least learned competencies in Statistics and Probability of the majority of Aklanon students. In fact, 4 out of 4 or 100% of their least learned competencies involve problem solving activities. These competencies are: (1) Solves problems involving permutations and combination, (2) Solves problems involving probability, (3) Calculates specified measure of position (e.g., 90th percentile) of a set of data and (4) Finds the probability of (A U B). Hence, the researcher developed a Remediating Strategic Intervention Material (RSIM) in response to these competencies with the integration of different learning activities in line with the suggested teaching strategies of the teachers. The developed material was then evaluated by the students and teachers using the Pilot Testing Tool and Learning Resource (LR) Quality Assurance Tools. After the evaluation, the material was found acceptable in terms of its content, language and layout and format. Moreover, students and teachers expressed their satisfaction with the material highlighting its suitability, simplicity, relatability and comprehensiveness These results underscore the potential of targeted intervention materials in strengthening problem solving competencies, a challenge common in mathematics education worldwide. This offers valuable insights to curriculum developers and educators to bridge foundational skills through localized and innovative intervention materials.

Keywords*: Remediating Strategic Intervention Material (RSIM), Least Learned Competencies, Statistics and Probability*

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Background

The poor performance of Filipino students in mathematics is further highlighted by the 2018 Programme for International Student Assessment (PISA) results, where the Philippines ranked second lowest in mathematical literacy among 79 participating countries. This alarming trend has prompted the Department of Education (DepEd) to introduce Strategic Intervention Materials (SIM) as a tool for remediation, aimed at improving the academic performance of low-achieving students. The DepEd Memorandum No. 117, s. 2005, encourages teachers to develop and utilize SIM to address students' individual needs through targeted interventions.

Strategic Intervention Material (SIM) is a teaching aid to reteach the lessons which are not clear to the learners and help them gain mastery of the skills (DepEd, 2005). Moreover, it aims to stimulate students' interest, enhance understanding on mathematical concepts and apply these into real life situations (Dumigsi & Cabrella, 2019). Supporting this view, Rodrigo (2015) emphasized that strategic intervention materials guarantee alignment of activities with the tasks/objectives, keep the activities short and simple, provide a variety of activities to cater the diverse learners. This also encourage learners become independent and successful (Blalock, 2010) by providing multidimensional (Dy, 2011) competency-based strategies focused on least mastered skills (DepEd, 2009).

These characteristics of SIM is appropriate for teaching Mathematics (Dumigsi & Cabrella, 2019) particularly Statistics and Probability since it has significant challenges for mathematics educators as students viewed it as one of the hardest mathematics subjects (Robinson, 2017). As Kandeel (2019) notes, many students struggle with the subject, often resulting in below-average performance. This struggle can be attributed to several factors, including the continued reliance on traditional teaching methods, the neglect of individual differences, and the lack of instructional materials that effectively clarify complex mathematical concepts and relationships (Roman, 2020; Arum, 2018).

In situations where students are struggling, it becomes imperative for teachers to use various assessments to identify areas of need (Malonisio & Malonisio, 2023), and should use the data to choose remediations (Kautzman, 2012). Interventions could be in variety of methodologies such as lectures, team work, and mentoring (Kovacs et.al., 2021), using visual representations (Torrens, 2020), collaborative and active learning strategies (Nazareth & Coronel, 2019), problem-based learning (Amalia & Syahputra, 2017), and blended learning (Malonisio, 2023).

Evidence from users highlighted that SIM is effective in mastering competency-based skills in Mathematics (Soberano, 2011), enhancing mathematics performance (Arpilleda, 2020), and is suitable and appropriate for the STEM students (Luzana, 2020). Moreover, Escoreal (2012) emphasized that SIM should be implemented to avoid marginalization of students in Mathematics class.

Teachers must continuously develop and implement intervention materials and strategies that align with students' evolving needs to enhance the teaching-learning process (Gari & Malonisio, 2023). The use of well-designed instructional materials plays a crucial role in effective teaching, making lessons more accessible and meaningful for students. By introducing diverse learning experiences, teachers can accommodate various learning styles, ensuring that each student has the opportunity to succeed (Pasion, 2019).

At Lilo-an National High School in the province of Aklan, students have consistently shown poor academic performance in Statistics and Probability This issue is compounded by the lack of instructional and remediation materials to address the students' learning gaps. In response to these challenges, this study seeks to develop a Remediating Strategic Intervention Material (RSIM) tailored for Grade 10 students, focusing on enhancing their understanding of Statistics and Probability.

In response with the identified problems, the researcher decided to develop a Remediating Strategic Intervention Material for Statistics and Probability for Grade 10 students. Specifically, the study answers the following questions. What are the least learned competencies of Grade 10 students in Statistics and Probability? What suggested teaching strategies can be used in the least learned competencies of Grade

10 students in Statistics and Probability? What Remediating Strategic Intervention Material (RSIM) can be developed to cater the least learned competencies of Grade 10 students in Statistics and Probability? What is the acceptability of the Remediating Strategic Intervention Material (RSIM) as evaluated by the students? What is the acceptability of the Remediating Strategic Intervention Material (RSIM) as evaluated by the teachers in terms of its: a. Content b. Language c. Layout and Format? RQ6. How do the students and teachers find the Remediating Strategic Intervention Material (RSIM) beneficial in learning Statistics and Probability?

Methods

This study utilized mixed-methods design to develop a Remediating Strategic Intervention Material (RSIM) for Statistics and Probability tailored for Grade 10 students during S.Y. 2022-2023 employing Multiphase Design following ADDIE (ADDIE (Analysis-Design-Development-Implementation-Evaluation) Model as its framework.

The study was conducted in the Division of Aklan, encompassing 32 DepEd Mathematics Teachers from different Public Secondary Schools. The selection criteria were based on their involvement in teaching Statistics and Probability and their ability to identify least learned competencies and teaching strategies.

Additionally, a subgroup of eight (8) teachers were purposely selected from this group to engage in a Focus Group Discussion (FGD). They were chosen for their vast experience in teaching the subject, making them ideal in validating the results of the checklist. It was then evaluated by a panel of teacher evaluators, including 8 selected teacher participants, an English Critic, a District Mathematics Coordinator and a District LRMDS Coordinator.

The study utilized multiple data collection instruments to gather both quantitative and qualitative data. This includes checklist for the identification of the least learned competencies and suggested teaching strategies, interview guides for the Focus Group Discussion (FGD), DepEd's Pilot Testing Tool for RSIM's acceptability to students and Learning Resource (LR) Quality Assurance Tools for RSIM's acceptability of its content, language and layout and format as evaluated by teachers.

The quantitative data were analyzed using descriptive statistics such as frequency count, percentage and mean. These analyses were performed through the aid of Statistical Package for the Social Sciences (SPSS), which provided comprehensive view of the trends of data particularly in identifying the least learned competencies and the acceptability ratings of the RSIM. Meanwhile, qualitative data were subjected to thematic analysis using Atlas.ti, a software that supports systematic coding and categorization of themes, allowing for the rich interpretation of the participants' feedback.

Result and Discussion

Least Learned Competencies of Grade 10 Students in Statistics and Probability

The identification of the least learned competencies was based on the previous records and observations of 32 DepEd Mathematics Teachers teaching Statistics and Probability in the Division of Aklan. Table 1 shows that out of 16 competencies, only 4 competencies received an at least 75% of the total teachers' responses. These competencies are: (1) "Solves problems involving permutations and combinations" with a frequency of 29 or 90.63% of the total responses (2) "Solves problems involving probability" and (3) "Calculates specified measure of position (e.g., 90th percentile) of a set of data" which both received 27 or 84.38% of the total responses, and (4) "Finds the probability of (A U B)" with 25 or 78.13% of the total responses.

Furthermore, the teacher participants shared the reasons why students have least learned competencies in Statistics and Probability during the Focus Group Discussion.

Teacher A stated: "These competencies are really complex and complicated. Aside from the fact that students lack fundamental skills on Statistics and Probability, their analyzation skills are the main problem. They must be trained on problem solving."

By wherein Teacher B agreed: "I agree with you ma'am. Students nowadays are poor in problem solving. These competencies require problem solving skills, that's why I had a hard

time teaching these before. It takes 2 sessions or more for me to finish each competency."

Teacher C added: "The retention of the students on mathematical concepts is weak. They easily forget the lessons and concepts taught to them."

Teacher D further explained: "A lot of class interruptions are happening during third and fourth quarter. Thus, the pacing of the classes becomes fast because the teacher wants to cover all the competencies. The instructional quality is affected."

Teacher E concluded: "The curriculum is too congested. The competencies are too many in a way that it becomes a burden already for the students to learn. Sometimes, they get to be anxious because of the pressure that they have to learn everything."

Based on the observations of the teachers, students have least learned competencies in Statistics and Probability because they have poor problem-solving skills, they lack fundamentals and they have short retention. Another contributory factor is the curriculum itself. It is too congested which a lot of competencies must be taken up with a short period of time.

These findings are strengthened by study of Kandeel (2019) that learning statistics and probability presents numerous academic challenges. And to the fact that the subject itself is difficult because of its abstract nature and despite educators strive to connect our probability theory to observed events, the exercise is unfamiliar to the average student (Ramsey, 2008). Similarly, Gari and Malonisio (2023) highlighted in their study that this is due to students' lack of strong mathematical background and problem-solving skills. This is supported by Roman (2020), stating that teaching Statistics and Probability is a challenging role for mathematics teachers. While the subject is integrated in the curricula in the elementary and secondary, students still experience difficulties which could be attributed to low interest and readiness among them. Despite initiatives on the use of different approaches in teaching this subject, reports on the performance of students still below the average competencies.These concerns are particularly concentrated in permutation, combination, probabilities and random variables topics- reflecting the identified least learned competencies found in the current study. This alignment proves that the present findings conform within the broader academic context.

Table 1. Least Learned Competencies of Grade 10 Students in Statistics and Probabilit

Competencies	**F**	**%**	**Least Learned Competencies** (≥75%)
1. Illustrates the permutation of objects.	1	3.13	
2. Solves problems involving permutations.	18	56.25	
3. Illustrates the combination of objects	1	3.13	
4. Differentiates permutation from combination of n objects taken r at a time.	4	12.5	
5. Solves problems involving permutations and combinations.	**29**	**90.63**	**/**
6. Illustrates events, and union and intersection of events.	4	12.5	
7. Illustrates the probability of a union of two events.	16	50	
8. Finds the probability of (A U B)	**25**	**78.13**	**/**
9. Illustrates mutually exclusive events.	14	43.75	
10. Solves problems involving probability.	**27**	**84.38**	**/**

Competencies	F	%	Least Learned Competencies (≥75%)
11. Illustrates the following measures of position: quartiles, deciles and percentiles.	6	18.75	
12. Calculates a specified measure of position (e.g. 90th percentile) of a set of data.	**27**	**84.38**	**/**
13. Interprets measures of position.	21	65.63	
14. Solves problems involving measures of position.	23	71.88	
15. Formulates statistical mini research.	16	50	
16.Uses appropriate measures of position and other statistical methods in analyzing and interpreting research data.	22	68.75	

Note: Competencies are considered least learned if it received at least 75% of the total responses (≥75%)

Suggested Strategies in the Least Learned Competencies

The identification of the strategy to be used in teaching the least learned competencies was based on the experiences and suggestions of the 32 DepEd Mathematics Teachers teaching Statistics and Probability in the Division of Aklan.

The strategies with the highest frequency in the identified least learned competencies were incorporated in the learning activities of the RSIM.

"Solves Problems Involving Permutations and Combinations". Table 2A below shows the suggested teaching strategies of the teacher participants in teaching the competency "Solves problems involving permutations and combinations". The strategy with the highest frequency is Cooperative Learning with 18 or 56.25% of the total teachers' responses.

The teachers stated their reasons why Cooperative learning should be incorporated in teaching this competency.

Teacher A explained: "Cooperative learning is my frequently used strategy in teaching mathematical concepts. Permutations and Combinations are heavy topics that's why students need each other to accomplish the activities. It is also one way to improve their socialization."

Teacher B added: "Cooperative learning is suited in teaching permutations and combinations because its examples and applications are related to students especially to a certain circle of friends, like their arrangement in picture taking, combination of their dresses and many more. This is really motivating because the feeling is the best when learning is done with classmates and peers.

Teacher C further explained and shared: Through cooperative learning, students become responsible of their own learning and the learning also of his/her classmates. We give them a chance to become teachers for a moment and a chance also to help others who have difficulties."

Cooperative learning promotes socialization and active learning among students. It gives them confidence and motivation to learn because they feel that they are not alone in accomplishing the tasks. Through cooperative learning, students become the facilitators of their own learning and also the learning of the others.

These findings are similar to the study of Cockerill, Craig and Thurston (2018) which indicated that students can be effective teachers in different learning contexts. They can help their classmates to learn while they learn at the same time during group activities. Moreover, it also conforms to the statement of the National Council of Teachers of Mathematics (2019) that one way for teachers to incorporate active learning in their classes is to structure opportunities for students to learn together.ls.

Table 2A. Suggested Strategy in Teaching the Competency "Solves problems involving permutations and combinations"

Least Learned Competency	Strategies	f	%	Rank
Solves problems involving permutations and combinations	Peer Tutoring	4	12.5	8.5
	Drill and Practice	14	43.75	3
	Problem Solving	15	46.88	2
	Role Playing	1	3.13	11
	Think-Pair-Share	3	9.38	10
	Discovery Learning	5	15.63	6.5
	Direct Instruction	8	25	4
	Game-based Learning	5	15.63	6.5
	Cooperative Learning	**18**	**56.25**	**1**
	Practical Work	4	12.5	8.5
	Video-based Learning	6	18.75	5
	Others	0	0	12

"Finds the probability of (A U B)". Table 2B presents the suggested teaching strategies of the teacher participants in teaching the competency "Finds the probability of (A U B)". The data revealed, that the teachers prefer Problem Solving Strategy in teaching this competency as it received 22 or 68.75% of the total teachers' responses.

The teachers explained why Problem-Solving Strategy should be incorporated in teaching this competency during the Focus Group Discussion.

Teacher A shared: "Problem Solving Strategy promotes critical thinking skills. Through this, we teach them to solve real-life problems beyond the four corners of the room."

Teacher B added: "Through problem solving, students would appreciate more the importance of mathematics in real life. They will become aware that every day we encounter mutually and non-mutually exclusive events and other concepts of probability"

Teacher C expressed: "Problem Solving Strategy gives students a chance to explore and use their preferred ways in solving the problems. We give them a freedom on what approach they will use as long as they arrive at the correct answer."

Problem Solving Strategy develops students' critical thinking skills. This also enables them to give more appreciation in Mathematics because of the real-life examples and situations which are related to them. These results are similar with the studies of Amalia (2017) and Wilson, Fernandez and Hadaway (2011) expressing that mathematics teachers have to teach students not only to solve the problem but also to learn about mathematic through problem solving for the main goal in teaching mathematical problem-solving is for the students to develop a generic ability in solving real-life problems, apply mathematics in real life situations.

Table 2B. Suggested Strategy in Teaching the Competency "Finds the probability of (A U B)"

Least Learned Competency	Strategies	f	%	Rank
Finds the probability of (A U B)	Peer Tutoring	7	21.88	6
	Drill and Practice	14	43.75	3
	Problem Solving	**22**	**68.75**	**1**
	Role Playing	3	9.38	10.5
	Think-Pair-Share	3	9.38	10.5
	Discovery Learning	15	46.88	2
	Direct Instruction	6	18.75	7.5
	Game-based Learning	6	18.75	7.5
	Cooperative Learning	**10**	**31.25**	4
	Practical Work	5	15.63	9
	Video-based Learning	8	25	5
	Others	0	0	12

"Solves problems involving probability". Table 2C shows the suggested teaching strategies of the teacher participants in teaching the competency "Solves problems involving probability". The data revealed that the teachers prefer Problem Solving Strategy in teaching this competency as it received 20 or 62.5% of the total teachers' responses.

During the Focus Group Discussion, the teachers shared their reasons why Problem-Solving Strategy should be incorporated in teaching this competency.

Teacher A said: "As what I have mentioned earlier, problem solving strategy is very essential because it teaches students to solve real life problems and situations and this is the very essence of learning mathematics."

Teacher B agreed and explained: "I agree with you ma'am. Especially this competency, there are a lot of real-life situations and scenarios that we can integrate in our discussions. This is an exciting topic."

Teacher C concluded: "Problem solving strategy also teaches our students to follow systematic steps and procedures in order to solve problems. It looks like giving a lesson that problems could not be solved right away, you need to take various steps and processes first before you can arrive at a precise solution."

This only suggests that problem-solving is not just an academic exercise but a practical skill that students can use outside the classroom. These results conform with the study of Amalia (2017) that PBL exists as a teaching strategy based on the ideals of constructivism and student-centered learning. When using the PBL, teachers help students to focus on solving problems in the context of real life, encouraging them to consider the situation in which there is a problem and try to find a solution. Moreover, the study of Adebayo and Idris (2023) revealed that academic performance and problem-solving proficiency are strongly and positively correlated with each other. Their findings revealed that students who possess high critical thinking skills and persistence in problem solving are most likely to succeed academically. Also, students who are exposed in problem-solving environments with regular engagement in real life situations develop strong metacognitive skills. This only depicts that problem solving is not only a supplementary skill but a core component of academic success and teachers should always integrate in teaching, not only mathematics and science subjects but across the curricula.

Table 2C. Suggested Strategy in Teaching the Competency "Solves problems involving probability"

Least Learned Competency	Strategies	F	%	Rank
Solves problems involving probability	Peer Tutoring	5	15.63	6
	Drill and Practice	17	53.13	3
	Problem Solving	**20**	**62.5**	**1**
	Role Playing	1	3.13	11
	Think-Pair-Share	4	12.5	7.5
	Discovery Learning	4	12.5	7.5
	Direct Instruction	10	31.25	5
	Game-based Learning	2	6.25	9.5
	Cooperative Learning	15	46.88	4
	Practical Work	2	6.25	9.5
	Video-based Learning	18	56.25	2
	Others	0	0	12

"Calculates a specified measure of position (e.g. 90th percentile) of a set of data". Table 2D illustrates the suggested teaching strategies of the teacher participants in teaching the competency "Calculates a specified measure of position (e.g. 90th percentile) of a set of data". The table showed that, teachers prefer Drill and Practice Strategy as it has the highest frequency with 19 or 59.38% of the total teachers' responses.

The teachers explained why Drill and Practice should be incorporated in teaching this competency during the Focus Group Discussion.

Teacher A stated: "We have that saying, practice makes perfect. Measures of Position consist of quartile, decile and percentile and mastering these requires constant drill and practice."

Teacher B added: "Better retention is achieved through drill and practice. Their accuracy also in solving will improve."

Wherein Teacher C further explained: "Drill and practice strategy builds confidence of the students because every time they get a correct answer on the drill, they will become more motivated to solve and practice until they achieve the mastery."

This implies that drill and practice strategy improves students' accuracy in solving problems. Mastery of concepts and skills becomes possible through constant calculations and practice. Regular involvement with repeated problem-solving exercises enables learners to internalize various procedural steps in calculating and solving problems leading to improvement of attitudes and perceptions about learning mathematics.

These results conform with the study of Lim (2021) that drill and practice is a disciplined and repetitious exercise, used as a mean of teaching and perfecting a skill or procedure. As an instructional strategy, it promotes the acquisition of knowledge or skill through systematic training by multiple repetitions, rehearse, practice, and engages in a rehearsal in order to learn or become proficient. Drill practice can improve mastery of the fundamental processes, and as mastery grows, an individual will be able to apply it to even the most basic daily and professional settings. Moreover, Eres (2022) pondered the importance of this strategy as timed drills significantly increase students' mastery, deductive reasoning abilities and fluency in calculating mathematical concepts and solving problems.

Table 2D. Suggested Strategy in Teaching the Competency "Calculates a specified measure of position (e.g. 90th percentile) of a set of data"

Least Learned Competency	Strategies	f	%	Rank
Calculates a specified measure of position (e.g. 90th percentile) of a set of data	Peer Tutoring	12	37.5	4
	Drill and Practice	**19**	**59.38**	**1**
	Problem Solving	13	40.63	3
	Role Playing	2	6.25	11
	Think-Pair-Share	8	25	6
	Discovery Learning	11	34.38	5
	Direct Instruction	6	18.75	7
	Game-based Learning	4	12.5	9
	Cooperative Learning	15	46.88	2
	Practical Work	3	9.38	10
	Video-based Learning	5	15.63	8
	Others	0	0	12

Remediating Strategic Intervention Material for Statistics and Probability

In designing and developing the Remediating Strategic Intervention materials, the researcher followed the standardized elements prescribed by the Department of Education Learning Resources Management and Development System (LRMDS) which includes: (1) Title card (2) Guide card (3) Activity card (4) Assessment card (5) Enrichment card (6) Reference Card and (7) Answer Card.

The tables below show the four Remediating Strategic Intervention Materials and the corresponding elements and its functions.

Table 3A. Remediating Strategic Intervention Material Topics

RSIM Number	Title/Competency
1	Solves Problems Involving Permutations and Combinations.
2	Finds the probability of (AUB)
3	Solves Problems Involving Probability.
4	Calculates a specified measure of position (e.g. 90th percentile) of a set of data.

Table 3B. Elements of Remediating Strategic Intervention Material and its Functions.

Elements	Functions
Title Card	This section includes the content and performance standard, and the learning competency to be addressed.
Guide Card	This provides the topic under focus and the skills the student should master. It includes discussion which could help the students in answering the other cards.
Activity Card	Considered as the heart of the Remediating Strategic Intervention Material. It defines the tasks that the students should undertake in order to develop the knowledge or skill.
Assessment Card	This section consists of tests that measure how much the students learned from the given activities in the activity card.
Enrichment card	This section extends learning through providing additional concepts and exercises for further application of knowledge or skills.
Reference card	Includes title of the books, websites, or any other electronic or printed materials which became the basis on the development of the RSIM.

Elements	Functions
Answer Card	Contains all the answers to the different activities found in the activity card, assessment card and enrichment card.

Cover Page

LRMDS prescribes that cover art/page should be appropriate, relevant, and interesting.

Front Matter

This section includes copyright page, introduction, parts of the RSIM and table of contents.

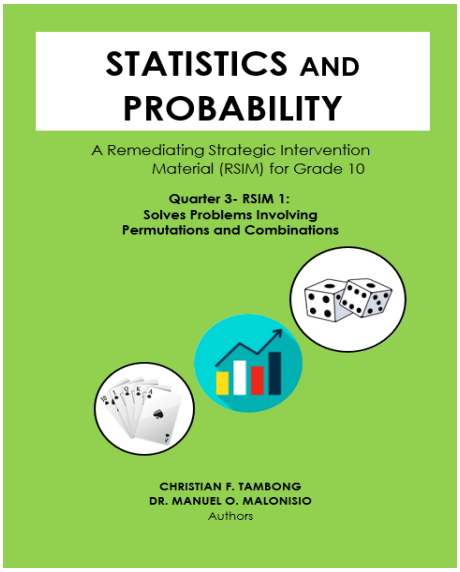
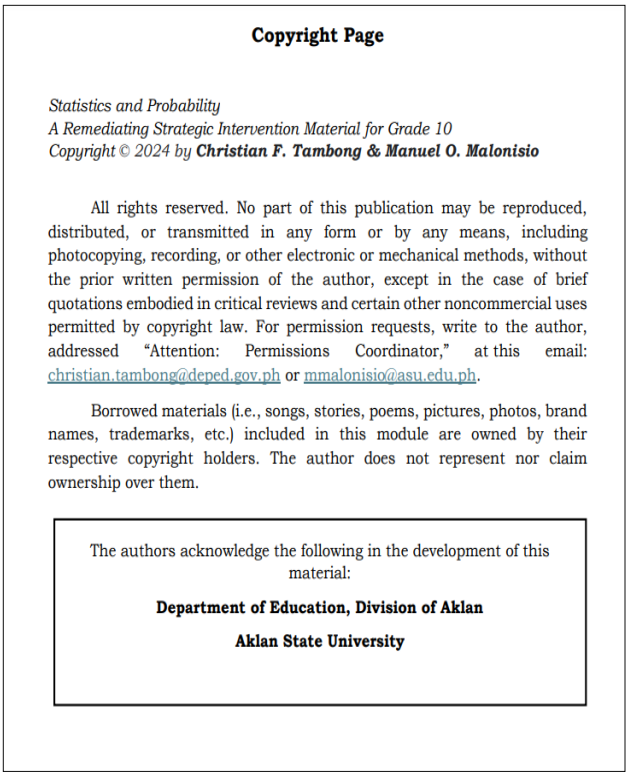


Figure 1. Cover page of the RSIM



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Statistics and Probability
A Remediating Strategic Intervention Material for Grade 10
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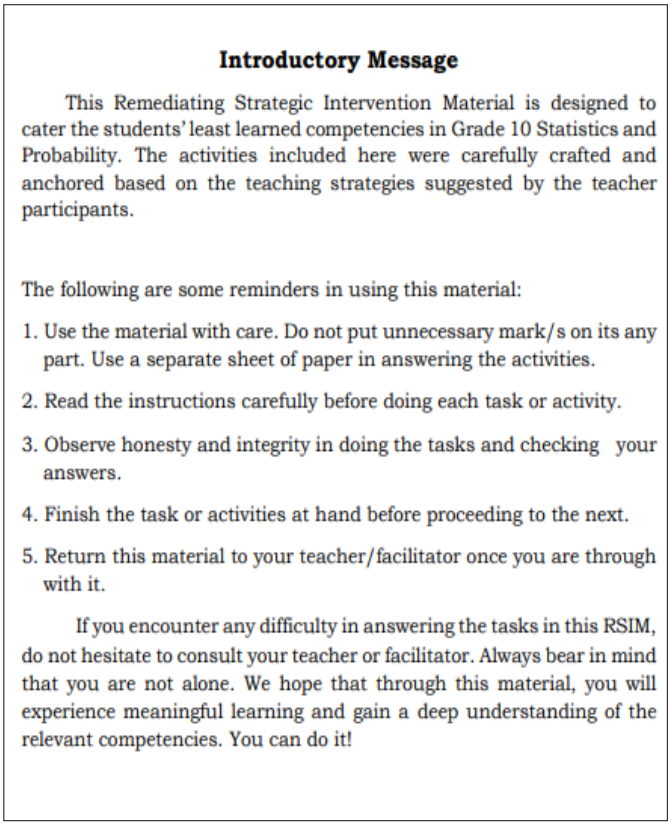
Aklan State University

Figure 2. Copyright Page of the RSIM



Introductory Message

This Remediating Strategic Intervention Material is designed to cater the students' least learned competencies in Grade 10 Statistics and Probability. The activities included here were carefully crafted and anchored based on the teaching strategies suggested by the teacher participants.

The following are some reminders in using this material:

1. Use the material with care. Do not put unnecessary mark/s on its any part. Use a separate sheet of paper in answering the activities.
2. Read the instructions carefully before doing each task or activity.
3. Observe honesty and integrity in doing the tasks and checking your answers.
4. Finish the task or activities at hand before proceeding to the next.
5. Return this material to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this RSIM, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone. We hope that through this material, you will experience meaningful learning and gain a deep understanding of the relevant competencies. You can do it!

Figure 3. Introduction of the RSIM

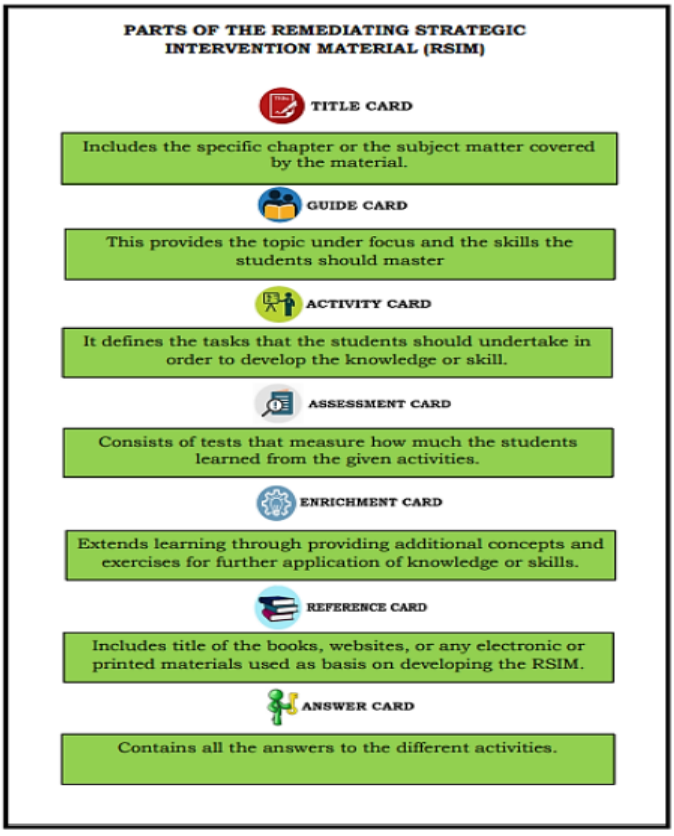


Figure 4. Parts of the RSIM

Table of Contents

Figure 5. Table of Content

Title Card

This section includes the content and performance standard, and the learning competency to be addressed. It also introduces the main task and subtask.

Guide Card

This section provides the topic under focus and the skills the student should master. It includes discussion which could help the students in answering the other cards.

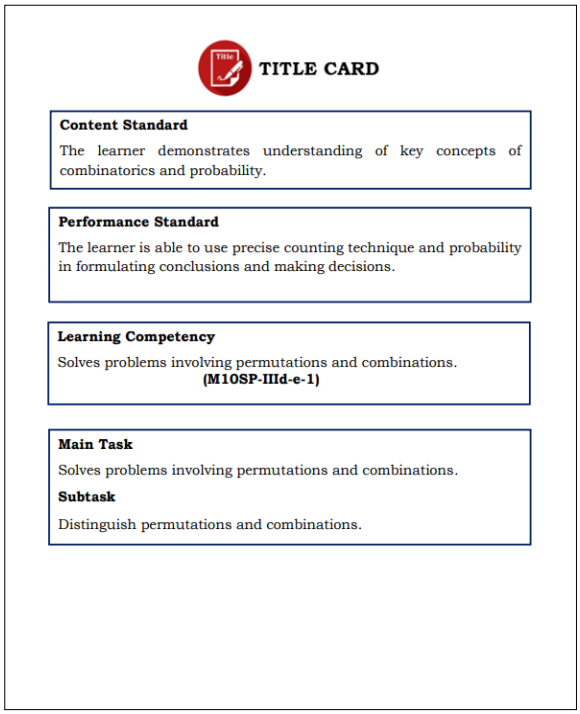


Figure 6. Title Card of the RSIM

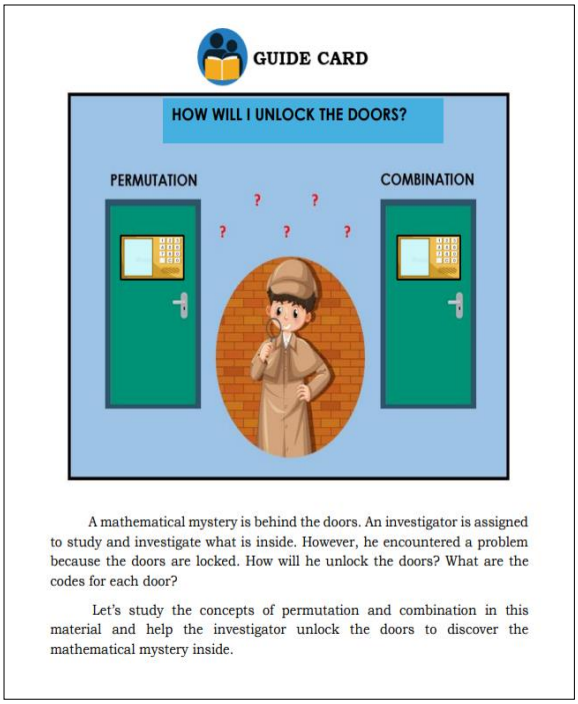


Figure 7. Guide Card of the RSIM

Activity Card

Considered as the heart of the Remediating Strategic Intervention Material. It defines the tasks that the students should undertake in order to develop the knowledge or skill.

Assessment Card

This section consists of tests that measure how much the students learned from the given activities in the activity card.

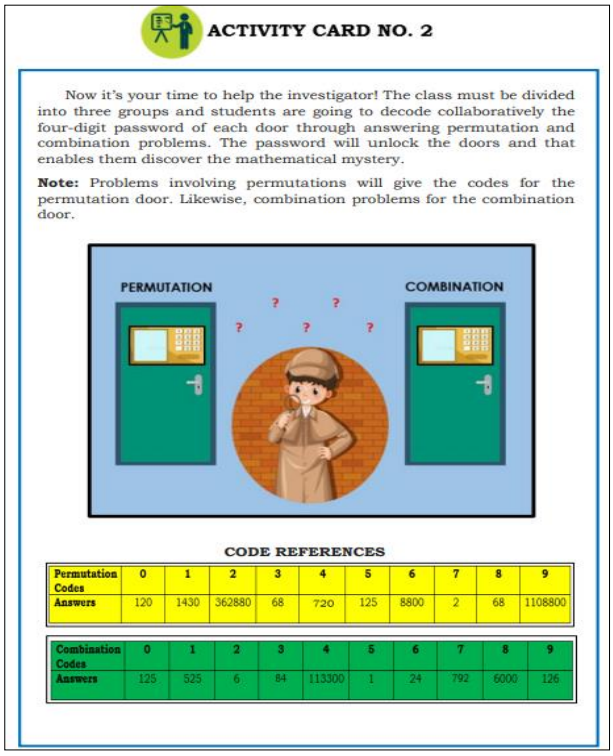


Figure 8. Activity Card of the RSIM

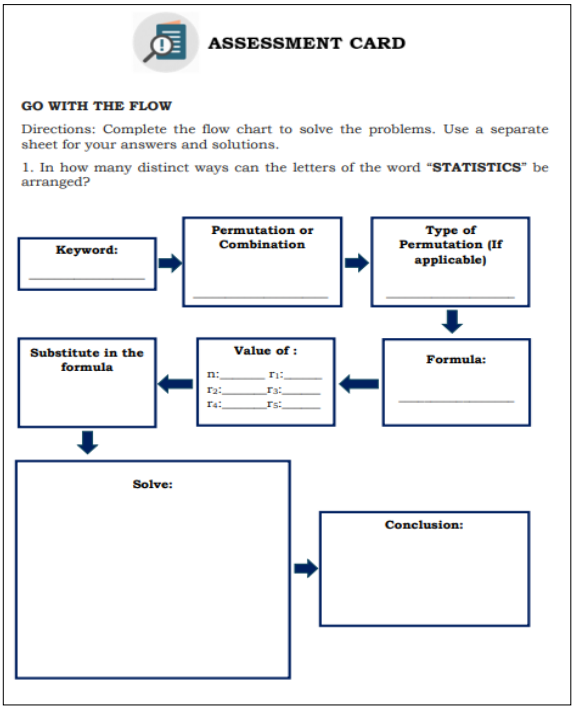


Figure 9. Assessment Card of the RSIM

Enrichment Card

This section extends learning through providing additional concepts and exercises for further application of knowledge or skills. It provides opportunity to apply learned concept in a new context.

Reference Card

This section includes title of the books, websites, or any other electronic or printed materials which became the basis on the development of the RSIM.

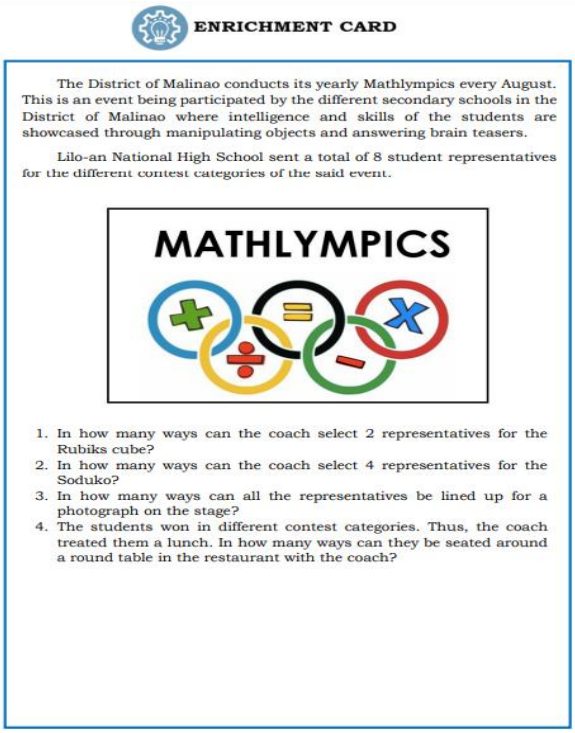
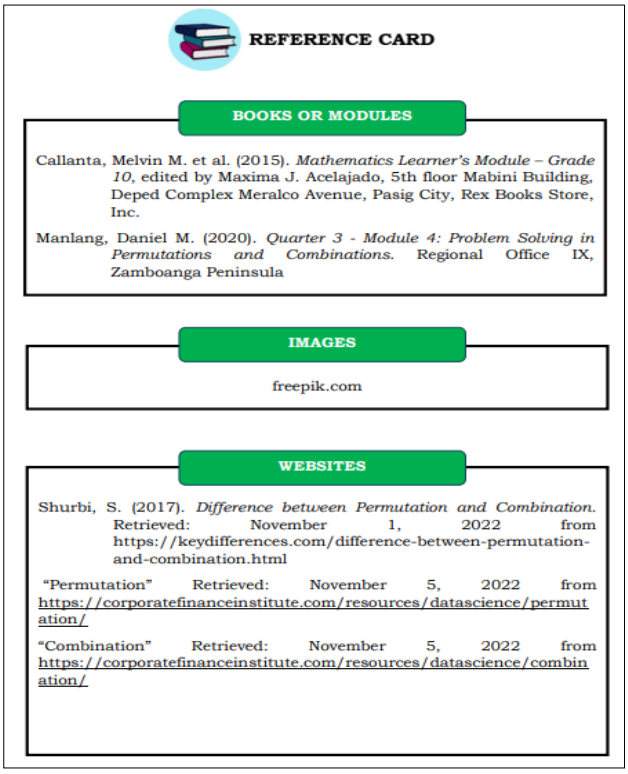


Figure 10. Enrichment Card of the RSIM



REFERENCE CARD

BOOKS OR MODULES

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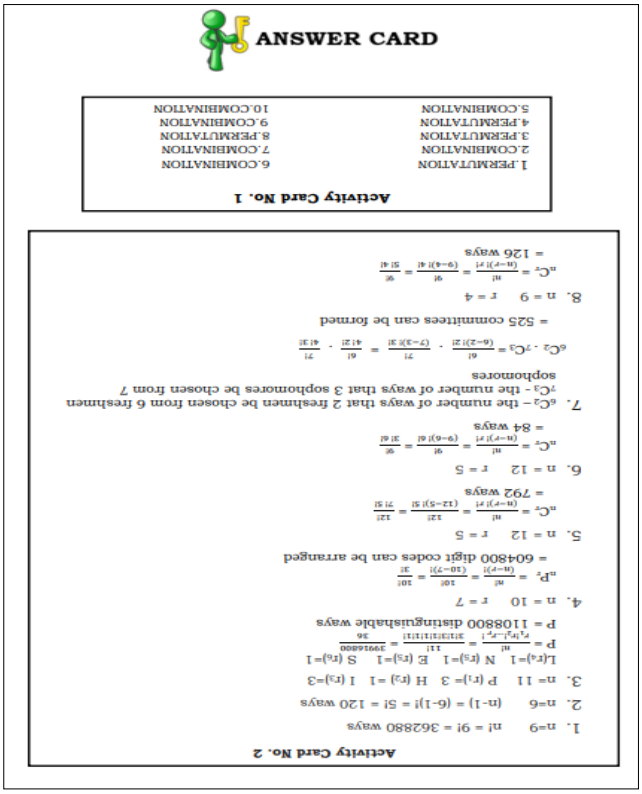
"Combination" Retrieved: November 5, 2022 from https://corporatefinanceinstitute.com/resources/datascience/combination/

Figure 11. Reference Card of the RSIM

Answer Card

This section contains all the answers to the different activities found in the RSIM.



ANSWER CARD

Activity Card No. 1

1.PERMUTATION
2.COMBINATION
3.PERMUTATION
4.PERMUTATION
5.COMBINATION
6.COMBINATION
7.COMBINATION
8.PERMUTATION
9.COMBINATION
10.COMBINATION

Activity Card No. 2

1. $n=9 \quad n! = 9! = 362880$ ways
2. $n=6 \quad (n-1) = (6-1)! = 5! = 120$ ways
3. $n= 11 \quad P(r_1)=3 \quad H(r_2)=1 \quad I(r_3)=3$
$L(r_4)=1 \quad N(r_5)=1 \quad E(r_6)=1 \quad S(r_7)=1$
$P = \frac{n!}{r_1!r_2!...r_7!} = \frac{11!}{3!3!1!1!1!1!1!} = \frac{39916800}{36}$
$P = 1108800$ distinguishable ways
4. $n = 10 \quad r = 7$
$_nP_r = \frac{n!}{(n-r)!} = \frac{10!}{(10-7)!} = \frac{10!}{3!}$
$= 604800$ digit codes can be arranged
5. $n = 12 \quad r = 5$
$_nC_r = \frac{n!}{(n-r)!\,r!} = \frac{12!}{(12-5)!\,5!} = \frac{12!}{7!\,5!}$
$= 792$ ways
6. $n = 12 \quad r = 5$
$_nC_r = \frac{n!}{(n-r)!\,r!} = \frac{9!}{(9-6)!\,6!} = \frac{9!}{3!\,6!}$
$= 84$ ways
7. $_6C_2$ – the number of ways that 2 freshmen be chosen from 6 freshmen
$_7C_3$ – the number of ways that 3 sophomores be chosen from 7 sophomores
$_6C_2 \cdot {}_7C_3 = \frac{6!}{(6-2)!\,2!} \cdot \frac{7!}{(7-3)!\,3!} = \frac{6!}{4!\,2!} \cdot \frac{7!}{4!\,3!}$
$= 525$ committees can be formed
8. $n = 9 \quad r = 4$
$_nC_r = \frac{n!}{(n-r)!\,r!} = \frac{9!}{(9-4)!\,4!} = \frac{9!}{5!\,4!}$
$= 126$ ways

Figure 12. Answer Card of the RSIM

Acceptability of the Remediating Strategic Intervention Material (RSIM) as Evaluated by Students.

The RSIM was subjected into a one-week trial implementation among 25 Grade 10 students of Lilo-an National High School. This process was done to assess its effectiveness and also to identify potential problem areas and deficiencies which could be used in improving the RSIM.

The students attended classes for one week with the aid of the developed material and guidance of the researcher. After they have completed answering the different activities, they were given a Pilot Testing Tool. A Focus Group Discussion (FGD) was then conducted to verify their answers on the tool.

Data revealed that all the criterion items received 100% "Yes" markings. This means that the RSIM's language and instructions are clear and comprehensible, the activities could be performed and accomplished on time, the illustrations or pictures are clear, interesting and helpful, the layout and format are organized and consistent, and most especially it is free from offensive and bias content. In general, the RSIM excellently met and complied the standards set by DepEd on Locally Developed Materials as evaluated by the students.

Table 4. Results of the Acceptability of the Remediating Strategic Intervention Material (RSIM) as Evaluated by Students.

Criterion Items	Number of "Yes" Markings	Percentage of "Yes" Markings (%)
1. Is the language used in the LR easily understood by the target user?	25	100
2. Are the instructions easily understood by the target user?	25	100
3. Can the target user accomplish the activities?	25	100
4. Can the target user perform the activities on a required period of time?	25	100
5. Are the illustrations/pictures interesting?	25	100
6. Are the illustrations/pictures helpful to the target user in understanding the lessons and activities?	25	100
7. Are the illustrations/pictures clear?	25	100
8. Is lay out of the LR attractive, orderly, and consistent?	25	100
9. Is the LR free from offensive content on gender, cultural and race?	25	100
Note: Percentage to comply the criterion: (≥70%)	**Mean Percentage: 100% Interpretation: Complied**	

Acceptability of the Remediating Strategic Intervention Material (RSIM) as Evaluated by the Teachers

The acceptability of the RSIM in terms of its content, language and layout and format was determined by 11 teacher evaluators which include 8 DepEd Mathematics Teachers teaching Statistics and Probability, District Mathematics Coordinator, District LRMDS Coordinator and an English Critic using the Learning Resource (LR) Quality Assurance Tools.

Content. Table 5A shows the acceptability of the RSIM in terms of its content. Out of six (6) criteria, five (5) of such were rated with 100% complied markings. These are: (1) Intellectual Property Rights Compliance, (2) Learning Competencies, (3) Instructional Design and Organization of Material, (4) Assessment, and (5) Presentation and Organization. On the other hand, the criterion item; Instructional Quality got a 98% complied marking. Thus, all the criterion items for content are all complied.

This only implies that the content of the RSIM has no copyright violations and plagiarism issues. It is aligned with the DepEd's learning competency and is suited to students' learning needs and difficulties. Moreover, it is free from factual errors and the content is accurate and up to-date. It also provides variety of activities and assessment methods to ensure active learning. Finally, the overall presentation is interesting, engaging and understandable.

Table 5A. Results of the Content Evaluation Tool

Criteria	Total number of criterion items	Number to comply the criterion	Percentage to comply the criterion	Total no. of complied markings (mean)	Percentage of complied markings	Interpretation
1.Intellectual property rights compliance	4	3	75%	4	100%	**Complied**
2. Learning competencies	1	1	100%	1	100%	**Complied**
3. Instructional design and organization	7	5	71.43%	7	100%	**Complied**
4. Instructional quality	9	6	60%	8.82	98%	**Complied**
5. Assessment	**7**	**5**	71.43%	7	100%	**Complied**
6. Presentation and organization	5	3	60%	5	100%	**Complied**

Language. Table 5B presents the acceptability of the RSIM in terms of its Language. Criterion items such as Coherence and Clarity of Thought, and Spelling and Punctuation were rated with 100% complied markings. On the other hand, criterion item; Grammar and Syntax got 97% complied markings. In general, all the criterion items for language are all complied.

These findings imply that the RSIM's language is appropriate and suited to students' level of understanding (Dañas et al., 2024). The sentences are brief and concise. Correct subject verb agreement, accurate spellings and punctuations were all observed.

Table 5B. Results of the Language Evaluation Tool

Criteria	Total number of criterion items	Number to comply the criterion	Percentage to comply the criterion	Total no. of complied markings (mean)	Percentage of complied markings	Interpretation
1. Coherence and clarity of thought	9	7	77.78%	9	100%	**Complied**
2. Grammar and syntax	7	5	71.43%	6.82	97%	**Complied**
3. Spelling and punctuation	5	3	60%	5	100%	**Complied**

Layout and Format. Table 5C shows the acceptability of the RSIM in terms of its Layout and Format. All Criterion items such as: (1) Physical Attributes (2) Book Layout and Design, (3) Typographical Organization, and (4) Visuals were all rated with 100% complied markings. Thus, all criterion items for the Layout and Format are all complied.

This only means that the RSIM's Layout and Format excellently met the standards set by DepEd. All necessary elements are present, the cover art is relevant and interesting, size of letters is readable and appropriate, and the visuals illustrate and clarify concept and do not distract attention.

Table 5C. Results of the Evaluation Tool for Layout and Format

Criteria	Total number of criterion items	Number to comply the criterion	Percentage to comply the criterion	Total no. of complied markings (mean)	Percentage of complied markings	Interpretation
1. Physical attributes	12	10	83.33%	12	100%	**Complied**
2. Book layout and design	7	5	71.43%	7	100%	**Complied**
3. Typographical organization	5	3	60%	5	100%	**Complied**
4. Visuals	13	3	23.08%	13	100%	**Complied**

Perceived Benefits of Remediating Strategic Intervention Material (RSIM)

After thorough identification, examination, and interpretation of patterns and themes of the qualitative data, it was found out that students and teachers were satisfied with their total experience after using the RSIM highlighting the material's suitability, simplicity, relatability and effectiveness. Moreover, the material contains comprehensive content and varied learning activities that makes it a perfect remediation material for students experiencing difficulties in Statistics and Probability.

Student Satisfaction. The students expressed their satisfaction with the RSIM, highlighting its suitability, simplicity, and effectiveness.

One student remarked: "The RSIM is great because it's really suitable for our level. It's not too difficult, but it's also not too easy. It's just right."

They found that the RSIM is easy to use and well-suited to their needs, which made it more appealing. Additionally, they emphasized how effective the RSIM was in helping them learn and retain the mathematical concepts.

Another student added: "The RSIM is very simple and straightforward, which I really appreciate. I don't feel overwhelmed or confused when I use it."

Overall, the students appeared to have positive experience with the RSIM and were satisfied with their performance.

Relatability to Students' Experiences. The students appreciated the RSIM's relatable examples and activities, which made the learning process more engaging and enjoyable.

One student noted: "I like how the RSIM uses real-life examples that we can relate to. It makes it more interesting and easier to remember."

By providing relatable content, the students were more likely to pay attention and remain interested in the material. This approach helped to create a more engaging and enjoyable learning experience.

Another student explained: "The activities in the RSIM are really fun. I don't feel like I'm just memorizing things. I feel like I'm actually learning."

The researcher-developer of the RSIM recognized the importance of relatability in learning, thus integrating contextualized lessons and concepts is very vital.

Comprehensive Content. The teachers praised the RSIM's detailed and complete content, which effectively catered the least learned competencies of the students.

One teacher noted: "The RSIM covers all the competencies that the students need to know, and it goes into a lot of detail. It's really comprehensive."

The comprehensive content helped to ensure that students had a complete understanding of the material, and it catered to a wide range of learning styles and abilities. This approach helped to make the RSIM an effective tool for both remedial and advanced learning.

Another teacher added: "The RSIM has everything we need. We don't have to use any other materials or resources."

The RSIM's comprehensive content seemed to be effective in meeting the needs of the students.

Learning Variations. The teachers acknowledged the RSIM's variation of learning activities, which helped to catch the students' full attention and curiosity.

One teacher observed: "The RSIM has a lot of different activities, which is great because it keeps the students interested and engaged."

By using a variety of learning activities, the RSIM was able to engage students in different ways and provide a more well-rounded learning experience. This approach helped to make the RSIM more appealing to students and increased the likelihood that they would retain the material.

Another teacher added: "The variety of activities in the RSIM is very helpful. Some students prefer reading, while others prefer listening or watching videos."

The variation of learning activities also helped to accommodate different learning styles and abilities.

Appropriate for Remediation. The teachers also pointed out that the RSIM's clear and simple content and structure made it well-suited for remediation purposes.

One teacher noted: "The RSIM is great for remediation because it's very straightforward and easy to follow. It helps the students fill in the gaps in their knowledge."

By using clear and simple language, the system was able to help students who were struggling with the material to catch up more easily. The comprehensive content also helped to ensure that students who needed remediation had access to all the necessary information they needed to succeed.

Another teacher expounded: "The RSIM is a great tool as a review material."

This approach helped to make the RSIM an effective tool for remediation and helped to ensure that all students could benefit from it.

Conclusion

Educational challenges in Aklan, specifically in the field of Mathematics are highly concerning. Problem solving as the most essential skill in any area of learning is not given too much emphasis and importance as reflected by the least learned competencies of the Aklanon students in Statistics and Probability, where 4 out of 4 competencies (100%) identified involve problem-solving activities.

Mathematics teachers were challenged to improve the performance of the students in this present time. A key factor contributing to this concern is the lack of carefully and strategically crafted instructional materials available in schools and within the DepEd as a whole. Unfortunately, existing modules and learning activity sheets are not suitable to the level of understanding of the students.

It is the teachers' responsibility and accountability to ensure that students receive the highest quality of mathematics education. The actual observation on the challenges of students' learning could serve as foundation for various initiatives and innovations. Among these solutions, designing and developing instructional materials such SIMs, offer a promising approach in addressing these pressing problems effectively.

Thus, the researcher developed a Remediating Strategic Intervention Material (RSIM) designed to serve as both a remediation and enrichment material for students with varying abilities. This material was rigorously evaluated and found to meet all the necessary standards in terms of its content, language and layout and format set by DepEd on Locally Developed Material. Both students and teachers were satisfied with the RSIM citing its suitability, relatability, simplicity and effectiveness.

To maximize its impact, scaling and adapting the material to other subject areas or educational contexts are highly recommended. RSIM's framework could be expanded to cover other mathematical topics, such as Geometry, Algebra, and Trigonometry. Additionally, its model could be adapted for other subjects such as English or Science, by tailoring its design to address subject-specific learning competencies and concepts.

Future research could delve the material's adaptability and scalability in different educational settings, investigating its effectiveness in diverse regions with similar challenges. Longitudinal study could also be conducted to examine its long-term impact on the problem-solving skills and over-all mathematical proficiency of the students. Moreover, integrating RSIMs with digital tools, such as e-learning platforms or interactive applications could significantly enhance its accessibility and engagement, Aproviding students with more interactive and technology-enhanced experiences.

Acknowledgement

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