

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LEARNERS' COMPETENCE IN STATISTICS: BASIS FOR THE DEVELOPMENT OF
INTERVENTION MATERIAL FOR STATISTICS IN RESEARCH (IMSIR)

A Dissertation Presented to the
Faculty of the Graduate School
College of Education
West Visayas State University
La Paz, Iloilo City

In Partial Fulfilment
of the Requirements for the Degree
Doctor of Philosophy in Science Education
(Mathematics)

by

Jane Gonzales-Añes

June 2022

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

APPROVAL SHEET

A Dissertation for the Degree
Doctor of Philosophy in Science Education
(Mathematics)

by

Jane Gonzales-Añes

Approved by the Research Committee:

DOLLY ROSE F. TEMELO, Ph.D., Chair

ELVIRA L. ARELLANO, Ph.D., Member

ROSEMARIE G. FELIMON, Ph.D., Member

LOURDES N. MORANO Ed.D., Outside Expert

ROBERTO G. SAGGE JR., Ph.D., Adviser

RICKY M. MAGNO, Ph. D.
Dean

June 2022

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

Añes, Jane G., "*Learners' Competence in Statistics: Basis for the Development of Instructional Material for Statistics in Research (IMSIR)*," Dissertation for Doctor of Philosophy in Science Education (Mathematics), West Visayas State University, Iloilo City, June 2022.

Abstract

This study developed an instructional material for statistics in research (IMSIR) to enhance learners' competence in statistics for research. Design research utilizing ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model is used in this study. The instruments used in this study are the researcher-made diagnostic test to determine the learner's competence in Statistics for Research and the learners' and experts' evaluation form to evaluate the IMSIR. In order to determine the least learned competency of the learners in Statistics for Research, this research utilized 156 Grade 12 HUMSS learners. In addition, 30 HUMSS learners and a teacher-implementer participated in the online implementation of the material. Descriptive statistics were employed to analyze and interpret quantitative data, namely frequency count, percentage, and mean. Results of the study revealed that Grade 12 HUMSS learners are fairly competent in Statistics for research and the learned competencies were sampling techniques, hypothesis testing, and descriptive vs. inferential statistics. The developed instructional material for Statistics in Research (IMSIR) covered the three least learned competencies in Statistics for Research and has the following parts: cover page, rationale, title card, guide card, activity card, assessment card, enrichment card, answer key card and reference card. Based on the result, the learners agreed that the IMSIR is

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

excellent. In terms of the design of the IMSIR, readability, and ease of task completion, learners rated the IMSIR as very good. To improve the material, learners suggested using minimalist design and font variations and using fewer words in some cards. Furthermore, learners rated IMSIR as excellent in terms of clarity of directions used, the importance of content, appropriateness of the activities, opportunities for active learning, and usefulness. Moreover, based on experts' evaluation, the IMSIR was rated excellent in all aspects of the focus area. When students were asked about their experiences using IMSIR, their responses presented the idea that the IMSIR was useful, helpful, understandable, and commendable. This implies that the intervention material for statistics in research (IMSIR) built on a constructivist perspective can help improve learners' competence in statistics which can be applied in quantitative research. Thus, this material can be used by teachers teaching practical research II, especially for those with difficulties in statistics.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

TABLE OF CONTENTS

	Page
Title Page	i
Approval Sheet	ii
Acknowledgment	iii
Abstract	v
Table of Contents	viii
List of Tables	xii
List of Figures	xiii
List of Appendices	xiv
 Chapter	
1 INTRODUCTION TO THE STUDY	1
Background of the Study	2
Theoretical Framework of the Study	5
Statement of the Problem	9
Definition of Terms	9
Delimitation of the Study	10
Significance of the Study	11
2 REVIEW OF RELATED LITERATURE	14
Strategic Intervention Material (SIM)	14
What is Strategic Intervention Material?	14

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

	SIM and SIM Development	19
	Benefits of Strategic Intervention Material	27
	Practical Research 2	35
	What is Statistics?	36
	Statistics in Research	37
	Synthesis	41
3	RESEARCH DESIGN AND METHODOLOGY	44
	Research Design	45
	Methodology	45
	Subjects of the Study	45
	Ethical Considerations	47
	Instrumentation	48
	Data Gathering Procedure	52
	Data Analysis Procedure	57
4	RESULTS AND DISCUSSIONS	61
	Level of Competence of Grade 12 HUMSS Learners in Statistics for Research	61
	Least Learned Competencies in Statistics for Research	63
	<i>Developed Intervention Material in Statistics for Research (IMSIR)</i>	66
	Cover Page	66
	Rationale Card	68

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

Title Card	69
Guide Card	70
Activity Card	71
Assessment Card	74
Enrichment Card	75
Answer Key Card	76
Reference Card	77
Evaluation of IMSIR	78
Learners' Evaluation of the IMSIR	78
Experts' Evaluation of the IMSIR	83
Cover, Title, Design, Paging, Printing, Lay-out and Binding	83
Learning Competency, Objectives and Subtasks	85
Guide Card/Information/Content and Format	86
Activity Card	89
Assessment Card and Answer Keys Provided	84
Enrichment Card	86
Reference Card	87
Accuracy and Up-to-datedness of Information	94
Summary of Experts Evaluation of the IMSIR	95
Experiences of Learners in Using the IMSIR	97

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

5	SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS	100
	Summary of the Problem, Method, and Findings	100
	Conclusions	103
	Implications	104
	Recommendations	106
	REFERENCES	108
	APPENDICES	118

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF TABLES

Table		Page
1	<i>The Participants and Their Research Tasks</i>	47
2	Level of Competence of Grade 12 HUMSS Learner in Statistics for Research	63
3	Least Learned Competencies in Statistics for Research	65
4	Results of the Learners' Evaluation on the IMSIR	82
5	Experts Evaluation of the IMSIR with Respect to Cover, Title, Design PAGING, Printing, Lay-out and Binding	84
6	Experts Evaluation of the IMSIR with Respect to Learning Competency, Objectives and Subtasks	86
7	Experts Evaluation of the IMSIR with Respect to Guide Card/ Information/ Content and Format	88
8	Experts Evaluation of the IMSIR with Respect to Activity Card	89
9	Experts Evaluation of the IMSIR with Respect to Assessment Card and Answer Keys Provided	91
10	<i>Experts Evaluation of the IMSIR with Respect to Enrichment Card</i>	93
11	Experts Evaluation of the IMSIR with Respect to Reference Card	94
12	Experts Evaluation of the IMSIR with Respect to Accuracy and Up-to-Datedness of Information	95
13	Summary of Experts Evaluation of the IMSIR	96

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF FIGURES

Figure		Page
1	Paradigm of the Study	8
2	Instructional Design Model of SIM-MOD by Saclao (2016)	23
3	Instructional Design Model of the Study	53
4	Screenshot of the Members of the Research Committee Together with the Teacher-Implementer and the Researcher during the Implementation of IMSIR	56
5	Screenshot of the Participants during the Implementation of IMSIR	56
6	The Sample Cover page of IMSIR	67
7	The Sample Rationale Card of the IMSIR	68
8	The Sample Title Card of the IMSIR	69
9	The Sample Guide of the IMSIR	70
10	The Sample Activity Cards 1 of the IMSIR	71
11	The Sample Activity Cards 2 of the IMSIR	72
12	The Sample Activity Cards 3 of the IMSIR	73
13	The Sample Assessment Card of the IMSIR	74
14	The Sample Enrichment Card of the IMSIR	75
15	The Sample Answer Key Card of the IMSIR	76
16	The Sample Reference Card of the IMSIR	77

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF APPENDICES

Appendix		Page
A	<i>Permission to Conduct the Study</i>	119
B	Curriculum Guide in Practical Research 2	121
C	Diagnostic Test in Statistics for Research	126
D	Table of Specification for Diagnostic Test	137
E	Experts Evaluation Form for IMSIR	140
F	Learner IMSIR Evaluation Sheet	143
G	Intervention Material for Statistics in Research	146

References

- Abrazaldo, Christian Paul B., et. al (2017). *Difficulties Encountered in practical research I of 12 STEM PM classes of PHINMA-Upang College Urdaneta*.
<https://pdfcoffee.com/quantitative-sample-research-pdf-free.html>
- Agarwal, Seema & Ijmtst, Editor. (2021). Use of statistics in research. *International Journal for Modern Trends in Science and Technology*, 7(11):98-103.
DOI:10.46501/IJMTST0711017
- Alair, G. (2020). Strategic Intervention Materials: their effects on the academic performance in science of Grade-8 Students of Bai Saripinang National High School. *International Journal of Scientific Engineering and Applied Science (IJSEAS)*, 6(12). <http://ijseas.com/volume6/v6i12/ijseas20201209.pdf>
- Ali, Z., & Bhaskar, S. B. (2016). Basic statistical tools in research and data analysis. *Indian journal of anaesthesia*, 60(9), 662–669.
<https://doi.org/10.4103/0019-5049.190623>
- Apuke, O. D. (2017). *Quantitative Research Methods : A Synopsis Approach*. *Research Gate*.https://www.researchgate.net/publication/320346875_Quantitative_Research_Methods_A_Synopsis_Approach
- Armeza, R.P., Alaska, J. O., & Echanes, J. L. M. (n. d.) *Development and evaluation of strategic intervention materials (SIM) for grade eleven earth and life science in Quezon national high school-senior high school*.
https://www.academia.edu/37083240/Development_And_Validation_Of_Strategi

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

110

c_Intervention_Materials_Sim_For_Grade_Eleven_Earth_And_Life_Science_In_Q
uezon_National_High_School-Senior_High_School

Babbie, E. R. (2010). *The Practice of Social Research*. 12th ed. Belmont, CA: Wadsworth
Cengage

Begum, K. J., & Ahmed, A. (2015). The importance of statistical tools in research work.
International Journal of Scientific and Innovative Mathematical Research
(IJSIMR), 3(12), 50-58.

Bhandari, P. (2021, December 8). *An introduction to quantitative research*. Scribbr.
<https://www.scribbr.com/methodology/quantitative-research/>

Birisçi, S & Metin, M. (2010, June). Developing an instructional material using a concept
cartoon adapted to the 5E model: a sample of teaching erosion. *Asia-Pacific Forum on*
Science Learning and Teaching, 11(1), Article 19, p.1.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative*
Research in Psychology, 3(2), 77-101. ISSN 1478-0887.
<http://eprints.uwe.ac.uk/11735>

Braun, V. & Clarke, V. (2013) Teaching thematic analysis: Overcoming challenges and
developing strategies for effective learning. *The Psychologist*, 26(2). 120-123.
ISSN 0952-8229. <http://eprints.uwe.ac.uk/21155>

Brillantes, K. D. B., Orbeta Jr., A. C., Francisco-Abrigo, K. A., Capones, E. M., &
Jovellanos, J. B. B. (2019, December). *Status of Senior High School*
Implementation: A Process Evaluation. PIDS.Gov.Ph.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

111

<https://www.pids.gov.ph/publication/discussion-papers/status-of-senior-high-school-implementation-a-process-evaluation>

Bunagan, F. (2012). *Simtalk*. https://www.slideshare.net/felixbunagan/simtalk-felix-t-bunagan?qid=e82ae734-d8a8-4122-9b3a-0ee8e47f7a3e&v=&b=&from_search=1

Chetty, P. (2020, February 7). Limitations and weakness of quantitative research methods. *Knowledge Tank*. <https://www.projectguru.in/limitations-quantitative-research/>

Chua, R. (n.d.). *Definition and goals of strategic intervention material (SIM)*. <https://www.coursehero.com/file/28873233/Definition-and-Goals-of-Strategic-Intervention-Materialdocx/>

Cubillas, T. E. (2018). Development and validation of strategic intervention materials (SIMs) in teaching elementary English 4-content validation. *International Journal of Development Research* 8(6). 21252-21259. <https://www.journalijdr.com/development-and-validation-strategic-intervention-materials-sims-teaching-elementary-english-4>

Daclumos, L. P. N. (2016). Perspective of secondary teachers in the utilization of science strategic intervention material (SIM) in increasing learning proficiency of students in science education. *Asten Journal of Education*, 1(2). <http://po.pnuresearchportal.org/ejournal/index.php/asten/article/view/293/193>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

112

- Dangle, Ysthr Rave P. & Sumaoang, Johnine D. (2020). The implementation of modular distance learning in the Philippine secondary public schools. *Proceedings of The 3rd International Conference on Academic Research in Science, Technology, and Engineering*. DOI: <https://www.doi.org/10.33422/3rd.icate.2020.11.132>
<https://www.dpublication.com/wp-content/uploads/2020/11/27-427.pdf>
- DeBell, Andrew. (2020). *What is the ADDIE model of instructional design?* Water bear Learning. <https://waterbearlearning.com/addie-model-instructional-design/>
- Department of Mines, Regulation, and Safety (2022, March 31). *What is competency and how it is assessed?*. <https://www.dmp.wa.gov.au/Safety/What-is-competency-and-how-is-it-5973.aspx>
- Dy, J. O. (2014) *SIM in teaching Physics: Its effectiveness SIM in Teaching Science*.
[IV.112.cgpublisher.com/publisher.com/proposals/149/index.html](http://iv.112.cgpublisher.com/publisher.com/proposals/149/index.html)
- Facts and Trends (2017). *10 traits of generation z*.
<https://factsandtrends.net/2017/09/29/10-traits-of-generation-z/>
- Fraserhealth (n.d.). Introduction to Statistics and Quantitative Research Methods.
- Frost, J. (2017). *The importance of Statistics*.
<http://statisticsbyjim.com/basics/importance-statistics/>
- Geronimo, E. (n.d.). *Summary of practical research 2*. Ajaia.educ.ph. Retrieved May 11,
<https://ajia.educ8.ph/course/info.php?id=147>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

113

Gultiano, A. P. (2012). *Effects of strategic intervention materials (SIM) on the academic achievement in chemistry of public high school students.*

<https://www.slideshare.net/neoyen/strategic-intervention-material>

Herrera, F. T. & Soriano, A. T. (2016). The efficacy of the strategic intervention materials (SIM) to the achievement in Physics of a selected group of public school students in Las Nieves, Agusan del Norte. *Annals of Studies in Science and Humanities, 2(2)*. <http://journal.carsu.edu.ph/index.php/assh/article/view/84>

Jhpiego (2019). *Instructional design and materials development.*

<http://reprolineplus.org/taxonomy/term/333>

Kudituwakku, W.& Perera, H. (2014). *Role of Statistics in Scientific Research.*

<https://www.slideshare.net/vharshana/role-of-statistics-in-scientific-research>

Leonares, J. M. (2019). Challenges encountered by senior high school students in their research undertakings. *Ascendens Asia Journal of Multidisciplinary Research Abstracts, 3(2C)*.

<https://ojs.aaresearchindex.com/index.php/AAJMRA/article/view/5911>

Lumabit, A. (2018). *Development and Evaluation of an Inquiry-Based Learning Module for General Mathematics* (Unpublished doctoral dissertation). West Visayas State University, Iloilo City, Philippines.

McGraw, T. H. (2007). Why you need to use statistics in your research.

www.kerrypress.co.uk.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

114

McGriff, S. J. (2000). *Instructional System Design (ISD): Using the ADDIE Model*.

Instructional Systems, College of Education, Penn State University

McNulty, N. (2016). Design Based Research in Education.

<http://www.niallmcnulty.com/2016/06/design-based-research-in-education/>

Mercado, K. C. & Tandog, V. S. J. (2016). Integrating MALMATH and DESMOS in conversational strategic intervention material (CSIM) to enhance students' achievement in mathematics. *International Journal of Science and Research (IJSR)*, 7(2).

<https://pdfs.semanticscholar.org/1b70/e68f001595ce02b6888561686c0baa6cd627.pdf>

Merriam-Webster (2018). <https://www.merriam-webster.com/dictionary>

Memebrebe, N. Q. & AnadiaAiselle (2015). Improving Student Achievement for science in Grade 7 using Strategic Intervention Material. [www.iamsted.org/wp-content/uploads/2015/06/Science Education and Teaching](http://www.iamsted.org/wp-content/uploads/2015/06/Science_Education_and_Teaching).

Oxford University Press (2019). *Competence*.

<http://enoxforddictionaries.com/definition/competence>

Paña, G. U. (2016). *Strategic intervention material (SIM) improves the academic performance of grade 9 peace students of New Nongnongan NHS in Araling Panlipunan*. <http://geraldpana21.blogspot.com/>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

115

Policarpio, J. (2012). *Guide in revising intervention materials*.

<https://tsoktok.blogspot.com/2012/08/sim-101-guide-in-reviewing-intervention.html>

Richey, R. C. & Nelson, W. A. (2001). *Developmental Research*. Bloomington, IN: The Association for Educational Communication and Technology.

<http://members.aect.org/edtech/ed1/42/index.html>

Proctan, A. J. C. (2014). *Strategic intervention materials (SIMs): A tool in enhancing students' performance in araling panlipunan IV*.

<https://prezi.com/knuxgf9g68xy/strategic-intervention-materials-sims-a-tool-in-enhancing/>

Roderos, R. B. (2018). Enhancing students' performance in grade 8 math using strategic intervention materials. *Masters thesis*. De La Salle University-Dasmariñas.

<https://thesis.dlsud.edu.ph/6146/>

Rodrigo, R. T. (2015). *Importance of strategic intervention materials*.

http://udyong.gov.ph/index.php?option=com_content&view=article&id=6925:importance-of-strategic-intervention-materials&catid=90&Itemid=1267

Saclao, J. G. (2016). Development and impact of SIM-MOD (strategic intervention material and module combined) on students' academic achievement in mathematics in the 8th grade. *13th National Convention on Statistics (NCS)*.

<https://psa.gov.ph/content/development-and-impact-sim-mod-strategic-intervention-material-and-module-combined-students>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

116

- Salviejo, E. I., Aranes, F. Q. & Espinosa, A. A. (2014). Strategic intervention material-based instruction, learning approach and students' performance in chemistry. *International Journal of Learning, teaching and Educational research* 2(1), 91-123. <http://www.ijlter.org/index.php/ijlter/article/view/10>
- Siddique, M. (2020). *Importance of statistics in research*. Ultra Updates. <https://www.ultraupdates.com/2020/11/importance-of-statistics-in-research/>
- Soberano, A. (2012) Strategic Intervention Materials in Chemistry: Development and effectiveness. [www.scribd.com / doc /49021505/STRATEGIC_INTERVENTION](http://www.scribd.com/doc/49021505/STRATEGIC_INTERVENTION)
- GOVPH. (n.d.). *The K to 12 basic education program*. Official Gazette of the Republic of the Philippines. <https://www.officialgazette.gov.ph/k-12>
- Towson, M. D. (2017). *The role of Statistics in Research*. http://www.bcps.org/officer/lis/researchcourse/statistics_role.html
- UC Regents (2019). Statistics. <http://www.stat.uci.edu/what-is-statistics/>
- Umar. (2020). *5 reasons why research is important*. India Study Channel. Retrieved May 25, 2022, from <https://www.indiastudychannel.com/resources/179836-reasons-why-research-is-important>
- Villones, G. L. (2018). Use of SIM (strategic intervention material) as strategy and the academic achievement of grade 7 students on selected topic in Earth science. *International Journal of teaching, education, and Learning*, 2(3), 78-88. DOI: 10.20319/pijtel.2018.23.7888

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

117

Wallstreetmojo Editorial team. (2022). *Statistics*. Wallstreetmojo. [https:// www.](https://www.wallstreetmojo.com/statistics/)

[Wallstreetmojo.com/statistics/](https://www.wallstreetmojo.com/statistics/)

Zarah, L. (2022, May 8). *7 reasons why research is important*. Owlcation.

[https://owlcation.com/academia/Why-Research-is-Important-Within-and-Beyond-](https://owlcation.com/academia/Why-Research-is-Important-Within-and-Beyond-the-Academe)
[the-Academe](https://owlcation.com/academia/Why-Research-is-Important-Within-and-Beyond-the-Academe)