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Development and Validation of InfoSIM for Grade 1 Mathematics Instruction

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Abstract — This study assessed the level performance in Mathematics instruction of the Grade 1 pupils of Palacpalac Elementary School based on the Pre-test and Post-test during the school year 2020-2021 as the basis for the development and validation of InfoSIM in Mathematics to improve the performance of Grade 1 pupils. This study used the Descriptive and Developmental method of research to determine and analyze the difficulty of Grade 1 pupils based on the learning competency of K to 12 Basic Education. The developed InfoSIM was based on the least mastered competencies from the first quarter to the second quarter, following the steps in instructional materials development. The sources of data in the study consisted of education specialists in Mathematics. Findings of the study are the following: (1.0) On the performance of the pupils, post-test scores showed high rating upon the administration of the InfoSIM among Grade 1 pupils

Keywords — Strategic Instructional Material, Infographics

I. Introduction

Teachers are the best evaluator. Teachers used different assessment tools to check the knowledge, skill, and comprehension of the learners, in which they can identify the least learned competencies among learners. The Department of Education (DepEd) also recognizes the need and importance of preparing the youth to develop and achieve the required competencies. In 21st century education, according to Oksana Duchak (2014), the ability to interpret digital, visual, and audio media is a form of basic literacy as reading and writing skills. Visual literacy is required as much as textual literacy.

In the study of Ferreira (2014), she mentioned infographics as essential in visual representations of information. Various graphics tell stories, convey ideas, or explore issues. Also, Infographics are widely used today in mainstream media to increase reader's understanding of a particular topic or issue, and they find infographics in many digital publishing channels. Increasingly they are being produced by a range of public and private sector institutions as part of publications strategies. According to the study of Smiciklas (2012), Infographic is a visualization of ideas or data that tries to carry complex information to the listener that can easily understood.

The power of Infographics can be a technique that delivers the maximum amount of content in the least amount of space while being precise and clear. Consistently, Infographics have visual presentations and can quickly tell a story, show relationships, and reveal a more vivid structure (Joanna, 2016). The influence of infographics in the educational setting is shown in the study of Cupita and Franco (2019). The pedagogical intervention was carried out in English classes

in a public university in Colombia. Infographics in this study is beneficial to learners; their reading skills-from literal to critical comprehension of short academic texts in English were developed. Infographics can be exceedingly effective educational tools in the delivery of the curriculum. Asuncion et al. (2017, stated that they developed an instructional material in Mother Tongue-Based Multilingual Education (MTB-MLE), particularly in Iloko, using infographics. Documentary was analyze to gauge the different topics in the MTB MLE along with community, family, self, sanitation, hygiene, culture, and disaster preparedness.

Similarly, Quiambao & Punzalan (2019) developed and validated instructional materials using infographics based on least mastered competencies in Physics. The said teaching-learning material increases student's performance in content knowledge acquisition. Mathematics remains to be an indispensable subject in the primary school curriculum. Despite its relative importance, learners showed poor performance, as stated in the result of 2019 TIMMS. Gafoor & Karukkan (2015) mentioned that students dislike mathematics which is attributed to factors related to instruction and student's cognitive, affective and psychomotor attributes.

The long-term effect of covid-19 continues to impact peoples' livelihood, health and security system; However, classes are slowly resuming in many public schools in the country, the need to prepare supplementary learning materials is imperative to ensure continuity of teaching and learning the present situation. Consequently, the researcher conceptualized the development and validation of InfoSIM for mathematics to address identified problems in the least learned competencies in the subject and improve the performance of Grade 1 pupils of Palacpalac Elementary School in Tarlac Province in Mathematics Instruction.

Literature Review

According to the study of Cordova (2019), that competency-based strategic intervention materials are materials used in developing the least mastered skills of the learners. These materials were being anchored by the objectives of the K-12 Curriculum, and wherein no learners will be left behind. With the use of these intervention materials, learners could come with the mastery of the least mastered skills. Oksana Duchak (2014) stated that visual literacy is vital for learning and teaching in educational practice. Furthermore, the study showed that visual literacy is an essential component in science and technology education today. Using and integrating visible treatments in every lesson will raise learning with various degrees of success.

SIM are also an instructional materials meant to instill concepts that are considered the least learned by the students who are working below national expectations but can meet standards if given appropriate support and proper motivation (Barredo KJ, 2013). Moreover, Bunagan (2012) considered SIM as a learning kit to be given to learners to assist them in acquiring mastery in competency-based skills, which they could not achieve during regular class. Additionally, it is a compelling strategic teaching aid for teachers in carrying out objectives on least learned lessons (Dy L., 2011).

II. Methodology

The study sought to determine the performance of the Grade 1 pupils in mathematics in Palacpalac Elementary School as the basis for the development and validation of InfoSIM during the school year 2020-2021. Using the descriptive-developmental research method, it determined and analyzed the weakness of Grade 1 pupils in Mathematics based on the identified least learned competencies of DEPED Mathematics 1. InfoSIM was developed and validated following the steps in instructional development.

The research Descriptive and Developmental Method (DM), according to Gillaco (2014), discussed that the descriptive method seeks the facts to a current situation. Furthermore, the primarily work on the description, comparison, analysis, and interpretation of existing data. Likewise, Beb (n.d.) defined the developmental method as a body of research literature that pertains directly to instructional development, which means the output will be developed after conducting this research. Mainly, the descriptive developmental method is a systematic study of putting into the design, developing, and careful evaluation of instructional programs, processes, and products that must meet the standard or criteria. Similarly, Rita C. Richey et al. (2005) she defined developmental research as the systematic study of designing, developing, and evaluating instructional programs, processes, and products that must meet criteria of internal consistency and effectiveness. Also, the most common types of developmental research involve situations in which the product-development process is analyzed and described, and the final product is evaluated.

Population and Locale of the Study

The respondents of this study were the Grade 1 pupils in Palacpalac Elementary School, Tarlac Province, during the school year 2020-2021. The class was heterogeneous and composed of 26 pupils. During the first and second quarter grading period, students showed low performance in mathematics which sought to determine the least learned competencies in the said quarter periods. These pupils were also the recipient of intervention material which is the INFOSIM.

Data Gathering Tool

To gather the data needed, the researcher used the results from the Pre-test in Mathematics 1 instruction during the school year 2020-2021. A pre-test was prepared and subjected to validation in terms of face content and Item Analysis. The Pre-test was being delivered via a distance modular learning modality where the face-to-face classes were prohibited due to the health and safety protocols observed in the region. The result of this pre-test showed the weaknesses and difficulties of the pupils in mathematics one during the first and second quarters periods. Also, the least learned competencies were also recognized in the first and second quarter periods, which is the firm basis of the development and validation of InfoSIM.

Data Gathering Procedure

In this study, the researcher used his advisory class to conduct the pretest to determine the least learned competencies in mathematics 1. The pre-test covered the most essential learning competencies in the first and second quarter periods. After the pre-test analysis, the result shown the least learned competencies. This is the basis of the development and validation of InfoSIM.

Development of the InfoSIM

1. Planning Stage

After the researcher identified the learners' performance and least mastered competencies in the first and second quarter period in Grade 1 Mathematics instruction, the researcher referred to various reference materials in Grade 1 Mathematics, curriculum guide, learning activity sheets, mathematics skill books, and even experts in infographics to ensure that the instructional materials will be captivating, adequate, suitable to pupils' level of understanding, and relevant to the needs of the learners.

2. Development and Designing

This phase included the writing of the least learned topics in the first and second quarter periods in Grade 1 Mathematics. The researcher organized the InfoSIM with the following parts; lesson title, lesson objectives, and various cards such as guide card, activity card, assessment card, enrichment card, reference card, and answer key. The development of the learning material employed the element and design of infographics to improve the visual and cognitive skills of the learners. Further, the researcher used the DEPED guidelines in contextualizing learning resources with an emphasis on localization and indigenization.

3. Evaluation Stage

The InfoSIM developed was evaluated based on content validity, adequacy, and suitability. The researcher sought the education specialist in Mathematics in the city Division Office of Tarlac to evaluate the InfoSIM using the questionnaire adopted from the study of Arquines 2011. Each evaluator was given a hard and soft copy of the learning material with the evaluation tool to input their comments and suggestions in the said instructional material.

4. Revision and the Final draft of InfoSIM

The comments, suggestions, and recommendations of the evaluators in terms of content validity, adequacy and suitability, and other remarks were all considered in the changes and revision of the draft to produce the final form of the InfoSIM in Grade 1 Mathematics instruction. The InfoSIM is now ready to administer to grade 1 pupils of Palacpalac Elementary school. Also, the researcher developed a PowerPoint presentation and printed copies of this material for pupils' utilization.

After administering the InfoSIM to learners, the post-test was conducted covering the most essential learning competencies in the first and second quarter periods. After the post-test, scores were analyzed to evaluate the impact of InfoSIM.

Treatment of Data

The following appropriate statistical tools were used to answer the specific problem of the study:

1. The researcher presented pre-test and post result with the following indices highest and lowest score and the mean.

2. Concerning the status of InfoSIM in Grade 1 Mathematics in terms of content validity, adequacy, and suitability, the average weighted mean was utilized. Shown below is the formula.

$$AWM = \frac{\sum f_i x_i}{n}$$

Where:
AVM= Average Weighted Mean of each category
f-Number of evaluators
x-Point value classification of each evaluation
n- Total number of respondents

The point value classification utilized in evaluating the content validity, adequacy and suitability of the development and validation of InfoSIM in Grade 1 Mathematics was shown below with five (5) point Likert scale.

Point Value	Mean Scale	Content Validity	Adequacy	Suitability
5	*4.50 – 5.00*	Highly Valid	Highly Adequate	Highly Suitable
4	*3.50 – 4.49*	Valid	Adequate	High Suitable
3	*2.50 – 3.49*	Moderately Valid	Moderately Adequate	Suitable
2	*1.50 – 2.49*	Slightly Valid	Slightly Adequate	Slightly Suitable
1	*1.00 – 1.49*	Not Valid	Not Adequate	Not Suitable

To determine the significant difference between pre-test and post-test performance, a paired t-test was employed.

III. Results and Discussion

This chapter analysis and presents the results and interpretation of data relative to the questions raised on the development and validation of the InfoSIM for Grade 1 Mathematics instruction.

Performance of the Respondents

Table 3 below shows the result of the pre-test and post-test in Grade 1 Mathematics.

Table 4

Performance of the Respondents in the Pre-test and Post-test

Pre-test and Post-test Performance

First Quarter		Second Quarter	
Pre-Test		Pre-Test	
Highest Score	19	Highest Score	15
Lowest Score	7	Lowest Score	
Mean Score	**14.27**	Mean Score	**10.23**
Post-Test		Post-Test	
Highest Score	25	Highest Score	
Lowest Score	15	Lowest Score	15
Mean Score	**21.00**	Mean Score	**22.31**

The result shows the scores of the pupils in the pre-test of the first and second-quarter periods. There are significantly lower compared to Post-test in the first and second quarter grading period. The Pre-test scores suggest that pupils struggle to understand and master the concepts. In addition, the mean scores are also lower than the passing average, especially in the second-quarter period. Gafoor & Karukkan (2015) mentioned that students dislike mathematics which is attributed to factors related to instruction and students' cognitive, affective and psychomotor attributes. Further, Tazimah et al. (2010) cited that deficiency of these mathematical skills and cognitive abilities inhibits the mathematics problem-solving ability.

The identified least learned competencies of the Grade 1 pupils in Mathematics led to the development and validation of Mathematics I InfoSIM. The proposed learning material addresses the learners' needs to achieve the required MELCs in Mathematics 1 instruction. The material is different from the rest of the usual intervention material because of its infographic design appealing to 21st-century visual learners. The Proposed Learning Material (InfoSIM) meets the criteria of Content Validity Adequacy and Suitability.

Status of the InfoSIM

On Content Validity

Learning materials are learning resources that were utilized in the process. The researchers conducted the validity test to measure the expected learning outcomes. Table 4 below presents the overall Content Validity of the developed InfoSIM.

Table 5
Status of InfoSIM in terms of Content Validity
n=5

Indicators	WM	DE	Rank
1. The directions given are clear in a subsection of the materials.	5	HV	1
2. Each item is clearly stated.	5	HV	1
3. Each of the items is readable: i.e. the items are easily read.	4.8	HV	2
4. Each of the items are attractive to read; enough space is provided to avoid crowding among items	4.8	HV	2
5. The instrument is comprehensive; i.e. it covered all areas that are important in the study.	4.6	HV	3
6. Each item is focused on one particular thought or idea.	5	HV	1
7. The items are objective; i.e. the responses to be elicited are neither biased nor reactive.	5	HV	1
8. The items are formulated following the explicit/implicit objectives of the study	4.8	HV	2
9. The items are systematically arranged according to a desirable sequence.	5	HV	1
10. The items do not overlap with each other; no duplication is observed.	4.6	HV	3
Overall Weighted Mean	4.86	HV	

Mean Scale Range	**Descriptive Equivalent (DE)**
4.50 – 5.00	Highly Valid (HV)
3.50 – 4.49	Valid (V)
2.50 – 3.49	Moderately Valid (MV)
1.50 – 2.49	Slightly Valid (FV)
1.00 – 1.49	Not Valid (NV)

Table 5 shows the result of content validity of the InfoSIM in terms of giving instruction, readability, objectives, presentation, and organization of the items as a whole earned an overall weighted mean of 4.86, which is highly valid (HV). The things that show the highest weighted mean and were interpreted as highly valid are indicators 1, 2, 6, 7, and 9. Likewise, the lowest ratings were being noted in indicators 5 & 10, which also revealed highly valid. The ratings only showed that the InfoSIM that was developed and validated are appropriate for the learning needs of the pupils. The objectives set are also attainable and measurable. Since the SIM was also integrated with infographic components, the activities are also attractive and engaging.

On Adequacy

Teaching and learning resources contain a variety of techniques to use by the teachers to support their teaching and make it most effective. When the teaching and learning resources are

available, adequate, and properly used, they may help the learners to perform concrete physical actions or use them to clarify concepts. Table 6 shows the status of InfoSIM in terms of adequacy.

Table 6
Status of InfoSIM in terms of Adequacy

Indicators	WM	DE	Rank
1. There are enough objectives in each lesson that manifest the intended purpose to be measured.	4.8	HA	2
2. The discussions per topic are enough to fully realize the objectives of the subject.	4.8	HA	2
3. The activities /exercises are enough to develop the skills of the pupils.	4.8	HA	2
4. The presentation is enough to manifest cohesiveness and unity of thoughts.	4.6	HA	3
5. The exercises are enough to meet the objectives of the lesson.	5	HA	1
6. The illustrations/examples are enough to gain an understanding of the topics presented.	4.8	HA	2
7. There is enough variety of sample problems illustrated to gain mastery of concepts.	5	HA	1
8. The evaluation exercises are enough to enhance the skills of the users.	4.6	HA	3
9. The scope is sufficient to cover the whole quarter.	5	HA	1
10. The instructional materials in general can enhance the skills of the users.	5	HA	1
Overall Weighted Mean	**4.84**	**HA**	

Legend:	***Descriptive Equivalent (DE)***
Mean Scale Range	
4.50 – 5.00	*Highly Adequate (HA)*
3.50 – 4.49	*Adequate (HA)*
2.50 – 3.49	*Moderately Adequate (MA)*
1.50 – 2.49	*Fairly Adequate (FA)*
1.00 – 1.49	*Not Adequate (NA)*

Based on the table, as to the adequacy status, the overall weighted mean is 4.84, which means that the InfoSIM as supplementary material is Highly Adequate (HA). The material is sufficient for objectives, discussions, activities, illustrations, evaluation, and other criteria required in any learning materials. The highest among indicators are 5, 7, 9, and 10, which reveals highly adequate. On the other hand, the lowest among the indicators are 4 & 8, which are also highly adequate in terms of descriptive rating. The InfoSIM as a supplementary material provides proficiency and learning reinforcement in the required competencies in the grading period.

On Suitability

Teaching-learning materials are essential elements that have to exist to conduct teaching-learning activities. Learning materials must be suitable for students' difficulty level, need, and objective of the teaching the teachers have designed. Table 6 below shows the status of InfoSIM in terms of suitability.

Table 7
Status of InfoSIM in terms of Suitability

Indicators	WM	DE	Rank
1. The cover design reflects the discipline	4.6	HS	3
2. The organization and presentation of the instructional material fit the objectives of each lesson.	5	HS	1
3. There is consistency between objectives and exercises made in the instructional materials.	4.8	HS	2
4. The instructional materials motivate the users.	5	HS	1
5. The instructional material arouses the interest of the user.	4.8	HS	2
6. Topics are properly arranged and logically sequenced.	4.8	HS	2
7. The words used are simple for better understanding.	5	HS	1
8. The presentations are made based on the kind of discipline they manifest.	4.6	HS	3
9. The illustrations and graphics are suitable in the understating of the lesson	5	HS	1
10. The evaluation exercises are arranged based on the objectives of each topic.	5	HS	1
Overall Weighted Mean	**4.86**	**HS**	

Legend:

Mean Scale Range	Descriptive Equivalent (DE)
4.50 – 5.00	Highly Suitable (HS)
3.50 – 4.49	Suitable (S)
2.50 – 3.49	Suitable (S)
1.50 – 2.49	Slightly Suitable (SS)
1.00 – 1.49	Not Suitable (NS)

According to table 7, the overall weighted mean of the InfoSIM in terms of suitability is 4.86, which means highly suitable. It signifies that the learning material is acceptable to learners' level of understanding. The infographics applied to this learning material that enhance the cognitive skills of the learners with difficulty in mathematics I.

In addition, the highest indicators are numbers 2,7, 9, and 10, which shows highly suitable (HS). Hartman (2002) expounds that for the students to learn the simple lesson, teachers need to revise and construct activities and topics that are easier to comprehend. Teachers need to make instructional material to guide learners to understand and master competency in the subject or lesson

Table 8
Summary in terms of the status of the InfoSIM

Status in terms of	Overall weighted mean
Content Validity	4.86
Adequacy	4.84
Suitability	4.86

Table 8 shows the overall weighted mean of InfoSIM in terms of Content validity with a 4.8 overall weighted mean. Adequacy earned an overall weighted mean of 4.84, and suitability has an overall weighted mean of 4.86. The learning material or the InfoSIM is highly valid, highly adequate, and highly suitable to use by the learners in Mathematics Grade I Instruction.

Differences between the Pre-test and Post-Test Performance

Tables 9 & 10 show the paired t-Test on the significant difference between the pre-test and post-test in the first and second quarter periods.

Table 9

Significant Difference between Pre-test and Post-Test Performance in the First Quarter Period

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Posttest - Pretest	6.73077	3.49351	.68513	5.31971	8.14183	9.824	25	.000

It is shown in table 9 the result of the t-test for the significant differences in the pre-test and post-test in the first quarter grading period. The significance value indicator of .000 is lower than the remarkable value of 0.05 level of significance. The result means that the significant difference warrants the acceptance of the null hypothesis that there is a significant difference between the pre-test and post-test performance. According to the study of Espinar and Ballado (2016) the content validity and acceptability of developed worktext in Basic Mathematics 2. Revealed a significant difference between pre-test and post-test where students performed better

in the post-test, which concluded the effectiveness of the worktext in Basic Mathematics 2. The integration of infographics in the learning materials influence the performance of the pupils as mentioned by Ozdamli et al. (2014) stated that infographics are helpful material for information transfer that can be employed by the learners to transfer information, especially in the long text, significant figures, and numerical data.

Table 10

Significant Difference between Pre-test and Post-Test Performance in the Second Quarter Period

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Posttest - Pretest	12.07692	3.11028	.60998	10.82065	13.33319	19.799	25	.000

It is shown in table 10 the result of the paired t-test for the significant differences in the pre-test and post-test in the second quarter grading period. The significance value indicator of .000 is lower than the 0.05 level of significance. The result means that the notable difference warrants the acceptance of the null hypothesis that there is a significant difference between the pre-test and post-test performance. It is shown in table 10 the result of the paired t-test for the significant differences in the pre-test and post-test in the second quarter grading period. The significance value indicator of .000 is lower than the 0.05 level of significance. The result means that the notable difference warrants the acceptance of the null hypothesis that there is a significant difference between the pre-test and post-test performance. According to the study conducted by Quiambao & Punzalan (2019) the development and validation of instructional materials using infographics based on least mastered competencies in Physics. The said material promoted students' performance in content knowledge acquisition and further supported science literacy.

IV. Conclusion

These are the following conclusions based on the findings of the study.

1. The developed and validated InfoSIM for Grade 1 Mathematics improved the performance of the pupils based on the result where the post-test was higher than the pre-test result.
2. Based on the education specialist and experts who evaluated the InfoSIM, the material is highly valid, adequate, and suitable, and best be utilized by the grade 1 pupils.
3. The InfoSIM developed and validated as a supplementary material proved to increase the level of performance of grade 1 pupils in Mathematics.
4. The respondents performed better in the post-test than in the pre-test.

V. Recommendations

In the light of the aforementioned reflections, the following are submitted as my recommendations and future possibilities:

REFERENCES

[1] Asuncion et al. (2017), they developed an instructional material in Mother Tongue-Based Multilingual Education (MTB-MLE)
[2] Armeza, R. et. al. (2018) Development And Validation Of Strategicintervention Materials (Sim)For Grade Eleven Earth And Life Science In Quezonnational High School-Senior High School
[3] Ballesteros et al (2017 pp. 1-2). On Infographics in MTB – MLE.
[4] Bransford, Brown, & Cocking (2000 p.2). How People Learn: Brain, mind, experience and school.
[5] Brill J. et.al, (2007 pp.47-60). Visual Literacy Defined—The Results of a Delphi Study: Can IVLA (Operationally) Define Visual Literacy.
[6] Bunagan, F. (2012).Science intervention materialRetrieved
[7] fromhttp://www.slideshare.net/felixbunagan/strategic-intervention-materia
[8] Cardova, R. (2019) Effectiveness of Competency-Based Strategic Intervention
[9] Materials in English 7
[10] Cubillas, T (2020) Development and Validation of Strategic Intervention Materials (SIMs)
[11] Daet Annie (2016, p. 867) Development And Validation Of Big Boooks For Grade I Mtb-Mle Curriculum , Apayao State College
[12] DepED MEMORANDUM. No. 117, S. 2005. Training workshop on strategic interventions for successful learning.
[13] Duchak, O. (2014 p.41). Visual literacy in educational practice.
[14] Dunlap, J. et al. (2016). Getting graphic about infographics: design lessons learned from popular infographics.
[15] Dumigsi, M and Cabrella, J. (2019 p.3). Effectiveness of Strategic Intervention Material in Mathematics as Remediation for Grade 9 Students in Solving Problems Involving Quadratic Functions.

[16] Espinar, M and Ballado, R. (2016 p.72). Content Validity and Acceptability of a Developed Worktext in Basic Mathematics 2
[17] Felten, P. (2008 pp. 60-64). Visual Literacy. Change: the magazine of higher learning.
[18] Ferreira, J. (2014 p.3) Infographics
[19] Funa, A and Ricafort, J (2019 p.168) Validation of Gamified Instructional Materials in Genetics for Grade 12 STEM Students
[20] Gafoor and Karkkan, (2015 p.23). Why High School Students Feel Mathematics Difficult? An Exploration of Affective Beliefs
[21] Gillaco M, (2014 p.70) Level of Word Recognition and Reading Comprehension: A Basis for a Reading Program
[22] Grant L, et. al, (2003) The Personalized System of Instruction: Review and Application to Distance Learning
[23] Hartman, H. (2002 pp.23-69). Scaffolding & Cooperative Learning. Human Learning and Instruction. New York: City College of City University of New York
[24] Hattwig, D. et.al, (2013, pp. 61-68). Visual literacy standards in higher education: New opportunities for libraries
[25] Locoro, A. et.al, (2017, pp. 240-257). Static and interactive infographics in daily tasks: A value-in-use and quality of interaction user study.
[26] Magno, C. (2014 p.3).Strategies in Teaching the Least Mastered Skills.
[27] Metros, S. (2008 pp. 102-109). The Educator's Role in Preparing Visually Literate Learners.
[28] Mohammed Kamal Afify, (2008,p.208). The Effect of the Difference Between Infographic Designing Types (Static vs Animated) on Developing Visual Learning Designing Skills and Recognition of its Elements and Principles
[29] and student learning.
[30] Nool, Nelvin R. (2018). Development and Validation of a Worktext in Fundamentals of Mathematics. Presented at the In-House Review of Completed Researches, Tarlac State University, Tarlac City
[31] Ozdamli, F. et. al. (2016, p.371) Statistical reasoning of impact of infographics on education
[32] Quiambao C.,and Punzalan J. (2019) Development and Validation of Infographics Based on the Least Mastered Competencies in Physics
[33] Raymond (2000, p.176). The scaffolding teaching strategy provides individualized support based on the learner's ZPD
[34] Raid S. Aisami, (2014, p. 542). Learning styles and visual literacy for learning and performance
[35] Richey, Rita C. (1994, p.9) Developmental Research: The Definition and Scope.
[36] Richey, Rita C. and Klein J, (2014 p. 12) Design and development research
[37] Richey R, and Klein J, (2005, p35.)Developmental Research Methods: Creating Knowledge from Instructional Design and Development Practice
[38] SAGE, (2017) Encyclopedia of Communication Research Methods
[39] Smiciklas, (2012, p. 1) The Power of Infographics
[40] Sudakov, I. et.al, (2014 pp. 1-2). Infographics and Mathematics: a Mechanism for Effective Learning in the Classroom.
[41] Tarzimah Tambychika, et.al, (2010 pp.171) International Conference on Learner Diversity 2010 Mathematics Skills Difficulties: A Mixture of Intricacies

[42] Tarzimah Tambychika, et.al, (2010 pp.142-151) Students' Difficulties in Mathematics Problem-Solving: What do they Say?
[43] Van Der Stuyf , R (2002 p.2) Scaffolding as a Teaching Strategy
[44] Williams, F. M. (2002). Diversity, thinking styles, and infographics. 12th International Conference of Wome0n Engineers and Scientists
[45] Zarate, M.R.G. (2012). Development of a Workbook in Secondary Physics. Urdaneta City University , Urdaneta City
[46] https://www.simplypsychology.org/Zone-of-Proximal-Development.html
[47] https://info.hsls.pitt.edu/updatereport/2015/january-2015/improve-information-communication-with-infographics/

AUTHOR'S PROFILE

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Mervin D. Gaña finished his bachelor's degree at Tarlac State University in 2009 with the degree of Bachelor of Science in Industrial Education Major in Industrial Arts. He started teaching in year 2010 as a secondary teacher at Osias Colleges, Inc. In the year 2017 he was hired at the Department of Education as Elementary teacher. His passion in teaching leads him to pursue his dream and took Master's Degree at Urdaneta City University. Mervin D. Gaña is currently teaching at Palacpalac Elementary School as grade 1 teacher.