

Effectiveness of Digital Learning Activities Using Tablets in Improving the Numeracy Level of the Identified Grade 10 Non-Numerates

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Abstract—Learners are the core of the educational process, which entails day-to-day activities and performances. Teachers need to make extra efforts to supplement their teachings from time to time. Most of these students attend their everyday classes to pass their assessments that will assure them that learning is essentially understood. Unfortunately, there are students who fail in some of the assessments provided to them. With the goal of no child being left behind, teachers must do some interventions to address the gap in learning. One of which is the conduct of remedial classes to students who fail or did not meet the expectations. In the conduct of remedial classes, teachers must provide interactive, relevant and comprehensive learning materials which will boost the interest and motivation of the students to learn and achieve positive learning outcomes. Digital learning activities using tablets is one of the interventions created by the researcher to address the problems on numeracy. Thus, this study is conducted to evaluate the effectiveness of this intervention. After a series of examinations and intervention activities, the study revealed a significant difference in the pre-test and post-test numeracy performances of the identified Grade 10 non-numerate students before and after the utilization of digital learning activities using tablets. Provision of additional learning support materials and activities using tablets with applications during remedial classes is effective in improving the numeracy performance of the identified non-numerate students.

Keywords — *Effectiveness, Remedial Activities, Teaching Numeracy, Improving, Performance, Grade 6 Non-Numerates*

I. Introduction

Competence in literacy and numeracy is fundamental and integral to effective learning in all subject areas and across all years of schooling from preschool to grade 12 (Barr, 2009). He also emphasized that numeracy is the effective use of mathematics to meet the general demands of life at school and at home, in paid work, and for participation in community and civic life. It is important to always improve the numeracy learning of every student for a greater purpose. It is not only needed or required to pass in school but also to survive all the challenges in life.

Science Education Institute, Department of Science and Technology (SEI-DOST) and the Philippine Council of Mathematics Teacher Education (MATHTED) (2011), assert that competence in math entails more than just computing and performing algorithms and mathematical procedures but an array of aptitudes including mathematical skills and reasoning in other subjects and everyday experiences, seeing patterns in diverse phenomena, connecting mathematics to other learning, reading and communicating mathematics with clarity and coherence in speech and writing, and expressing ideas in useful and comprehensible ways. The researcher believes that the school must strengthen the foundation of the students in basic number skills to produce mathematically competent students. But how can this be achieved, where most of the students today were identified non-numerates during the numeracy assessment conducted to the students in all schools in the region. In fact, in the school where the researcher is teaching, her 69 Grade 10 students, 22 of them were identified non-numerates. This means that their scores got zero in any of the four fundamental operations.

Numeracy skills is one of the most essential skills to be learned by the students even at the start of schooling. Early Language, Literacy and Numeracy (ELLN) Program emphasized the importance of learning literacy and numeracy in the early grades because it is believed that when students have learned literacy and numeracy skills at an early age, effective learning in all subject areas and across all years of schooling will be achieved (Barr, 2009).

Regional Memorandum No. 280, series of 2021 entitled “Reiteration of Regional Memorandum No. 279, s. 2019 Re: Institutionalization of the Conduct of the Unified Numeracy Test” emphasize the identification of students considered as numerates and non-numerates. This issue in numeracy level of the students after the pandemic is expected and is given more attention by curriculum implementers in the field today. With the issuance of this memorandum, it is mandated that all students will be given a numeracy assessment using the tool crafted by the region to provide baseline data for the intervention to be given to identified students which needs immediate attention to address the learning loss created during the two-year of suspension of in person classes. The memorandum also identified guidelines on the conduct of the assessment and provided appropriate tools for each of the key stages.

As stipulated in the memorandum, students will be identified highly numerate if he/she got correct answers in the 4 sub-tests (addition, subtraction, multiplication and addition) while moderately numerates if the student got one (1) or more mistakes in any of the 4 sub-tests and non-numerate if the student got a score of zero in any of the 4 sub-tests. The identified highly numerate students will no longer be needing intervention but enhancement activities. On the other hand, students identified as moderately numerates will be provided with enrichment activities in the area of the sub-tests which incurred mistakes and non-numerate students will be provided with intervention. With the available baseline data, teachers have to craft intervention programs to address the need of the students to improve their numeracy performance at the end of the grade level.

The above performance of the students provided a basis on how teachers start remediation activities through interventions and strategized methods of increasing student numeracy performance. Providing digital learning activities to the students is one of the interventions identified by the researcher to improve the 22 identified non-numerates of Grade 10 in Kananga National High School-Kawayan Annex.

Addressing the problem of strengthening the numeracy learning of the students would be of great help in improving the mathematical skills as well as the performance of the students in mathematics. And this is the very reason why this study is conducted to evaluate the effectiveness of this intervention conducted to the identified non-numerate grade 10 students. A proposed improvement plan will be formulated based on the findings of the study. Additionally, it is in this premise that the researcher who is currently a Grade 10 Mathematics teacher in the above mentioned local, would like to delve worthy research undertaking that will benefit herself, the school she is currently teaching and that of her Graduate Program she is enrolled at.

This study evaluates the effectiveness of digital learning activities using tablets in improving the numeracy level of the identified Grade 10 non-numerates of Kananga National High School-Kawayan Annex of Kananga II District, Leyte Division for School Year 2022-2023. The findings of the study were the basis for the proposed improvement plan.

Specifically, this study sought to answer the following questions:

1. What is the level of numeracy performance of the Grade 10 students before the utilization of digital learning activities using tablets?
2. What is the level of numeracy performance of the Grade 10 students after the utilization of digital learning activities using tablets?
3. Is there a significant difference in the level of numeracy performance of Grade 10 students before and after the utilization of digital learning activities using tablets?
4. What improvement plan can be proposed based on the findings of this study?

II. Methodology

Design. This study employed the quasi-experimental research design utilizing the pre-test and post-test to evaluate the effectiveness of digital learning activities using tablets in improving the numeracy level of the identified Grade 10 non-numerates for School Year 2022-2023 Kananga National High School-Kawayan Annex of Kananga II District, Leyte Division is the main locale of the study. The 22 identified non-numerates in Grade 10 who are currently enrolled in the said locale are the main respondents of the study. The instrument used in this study is the numeracy test for Grade 10 provided by DepEd Region 8. It is a 20-item test which focuses on the four fundamental operations. Each operation has 5 test items. The guidelines and mechanics on the

administration of the test will be based on Regional Memorandum No. 280, series 2021. This tool was used before and after the utilization of digital learning activities using tablets provided during remedial classes. Moreover, the researcher crafted remedial plans for remedial instructions which were conducted to the identified non-numerates. Varied and differentiated digital learning activities using tablets were listed in the plan and were conducted as intervention to improve the numeracy performance of the identified non-numerates. The activities include parallel test questions to the numeracy test conducted from DepEd, audio-video lessons, learning activity sheets and other mathematical games with time constraints to practice the pupils in answering with speed and some mathematical applications for online and offline utilization which is relevant for utilization to address the needs of the students like the digital slides, boom cards, digital task cards, digital escape room, digital quiz and digital worksheets and workbooks. These materials were presented and submitted to the District Quality Assurance Team for checking and validation before it was given to the students as intervention activities. Matrix of activities were crafted to track the activities provided by the researcher in the duration of data gathering procedure. This research focused on evaluating the effectiveness of digital learning activities using tablets in improving the numeracy level of the identified Grade 10 non-numerates through the pre-test and post-test and its significant difference. A Proposed Improvement Plan based on the findings of the study is the output.

Sampling. The respondents of this study were the twenty-two (22) identified Grade 10 non-numerates during the numeracy assessment conducted in the first 2 months of the opening of classes. These students were provided with intervention programs crafted by the researcher. Hence, face-to-face classes has already been implemented during the data gathering process, the research instruments were administered face-to-face with consent from the parents and Local IATF and strictly following the prescribed Health Protocol during the limited face-to-face classes.

Research Procedure. The researcher prepared the research design and tools utilized in the study. Approval and recommendation from the Panel of Examiner of the Graduate Studies was sought. A letter request to conduct this study was forwarded to the Office of the Schools Division Superintendent. Upon approval, permission from the District Supervisor and School Head was secured before the actual gathering of data. Orientation of the participants and administration of the pre-test was done face-to-face after the approval of the permit from the parents of the respondents. The tools used in the study were digital learning activities, lesson plans, Regional-Based Numeracy Assessment Tool, and matrix of activities. These tools underwent a series of validation by the experts like the District Math Coordinator, School, and District Head before it was given to the pupils. After the approval of the tools, these were reproduced as to the number of student-respondents. In the conduct of the pre-test, the researcher requested his fellow teacher to do the administration of the pre-test. After accomplishing the pre-test, intervention was given within four weeks. The implementation of the approved and checked lesson plans highlighting the utilization of the digital learning activities was done in the duration of the data gathering process. After the four-week intervention, the post-test was administered. Results of the tests were

collected. Data were tallied and submitted for statistical treatment. Analysis and Interpretation of Data. Making of Proposed Improvement Plan followed.

Ethical Issues. The researcher properly secured the permission to conduct the study from the authorities through written communication. In the formulation of the intervention materials that was used in the study, the use of offensive, discriminatory or other unacceptable language was avoided. The respondents' names and other personal data were not included in this study to protect their privacy. Participation of the respondents was also voluntary. Orientation was conducted for the respondents with their parents. In the orientation, issues and concerns were addressed and consent to be included in the study were signed. The researcher-maintained objectivity in analyzing and discussing the results. All authors whose works were mentioned in this study were properly quoted and were acknowledged in the reference.

Treatment of Data. The Simple Percentage was employed to evaluate the pre-test and post-test numeracy performance of the Grade 10 students before and after the utilization of digital learning activities. **t-Test of Mean Difference** was used to determine the significant difference in the pre-test and post-test performances of the Grade 10 students.

III. Results and Discussion

Table 1
Pre-Test Numeracy Performance of Grade 10 Students

Score Range	Description	PRETEST	
		Frequency	%
17-20	Excellent	0	0
13-16	Very Good	17	77
9-12	Good	5	23
5-8	Fair	0	0
0-4	Poor	0	0
Total		22	100
Weighted Mean		13.25	Very Good

Table 1 presents the pre-test numeracy performance of the Grade 10 students before the utilization of digital learning activities using tablets in teaching remedial classes. It was revealed on the table that among the 22 Grade 10 students, 17 or 77% got a score of 13-16 which is interpreted as very good. This means that most of the students have mastered the four fundamental operations. This implies that the students already had the knowledge of numeracy skills. Knowing that they achieve very good numeracy performance in their pre-test does not mean that they are already able to master the skills. These students still need intervention activities because there are those students who cannot give the solution to the correct answer that they get. So, this is the reason why they still need to have intervention activities to help them with their

numeracy problems be addressed and be able to use their knowledge in their day-to-day activities. Further, it was also shown on the table that there are 5 Grade 10 students or 23% got a score of 9-12 which is interpreted as good. This means that these students got almost half of the test items. This means that teachers should provide alternative learning materials and activities to address the problem. A digital learning activity where students can use the tablets provided to them by DepEd. The tablets will be downloaded with applications useful to the digital learning activities provided by the researcher. Finally, the table shows the pre-test numeracy performance of the Grade students before the utilization of digital learning activities during remedial classes that the weighted mean is 13.25 which is interpreted as very good. This means that the Grade 10 students have reach the mastery level based on their scores. On the other hand, an intervention activity will still be provided to them for enhancement and discussion on how the students answer each item considering the solutions used to solve. Further discussion, constant practice and understanding of each problem is needed to arrive at desired goal which is to improve the numeracy level of the students.

Table 2
Post-Test Numeracy Performance of Grade 10 Students

Score Range	Description	POST-TEST	
		Frequency	%
17-20	Excellent	22	100
13-16	Very Good	0	0
9-12	Good	0	0
5-8	Fair	0	0
0-4	Poor	0	0
Total		33	100
Weighted Mean		19.09	Excellent

Table 2 presents the post-test numeracy performance of the Grade 10 students after the utilization of digital learning activities using tablets. It was revealed on the table that among the Grade 10 students, 22 or 100% of them got a score of 17-20 which is interpreted as excellent. This means that after the utilization of digital learning activities, the performance of the identified non-numerates had increased. This implies that the digital learning activities provided to the students are effective and that it addresses their needs. This implies further that the materials and activities used in the remedial classes have helped them learn the concepts on numeracy well and that they were able to master the skills with accuracy and perfection.

Finally, it was revealed on the table that the post-test performance of the Grade 10 identified non-numerates has an average weighted mean of 19.09 which is interpreted as excellent after utilizing the digital learning activities using the tablet. This means that learning activities have somehow affected the numeracy performance of Grade 10 students. This implies that the activities and instructions given during remedial classes are significant to pupils' need to improve

their numeracy performance. Moreover, the activities presented using the tablet are another factor which helped in improving the numeracy level of the students. This somehow motivates the students to work independently. As cited by Ancheta (2008), for effective learning to take place, learners should be provided with varied activities. It is apparent that the teacher's role is to be creative and resourceful to be able to tailor instructional materials and instructional activities to the needs and capacities of the learners. What the learners learn depends largely on the skill and ability of the teacher to prepare and use such materials to capture the learners' attention, spark their interest and develop skills.

Table 3
Test of Difference Between the Scores in the Pre-Test and Post-Test Numeracy Performance of Grade 10 Students

Aspects	Test Scores		Computed T	Critical T	Decision	Interpretation
Grade 6 Pupils	Pre	13.25	2.642	0.554	Reject Ho	Significant
	Post	19.09				

Table 3 presents the test of difference between the scores in the pre-test and post-test level of numeracy performance of the Grade 10 identified non-numerates before and after the utilization of digital learning activities using tablets. It was revealed on the table that the computed value or t of 2.642 is greater than the critical value of t of 0.554, so null hypothesis is rejected. This means that there is significant difference in the pre-test and post-test level of numeracy performance of the Grade 10 identified non-numerates before and after the utilization of digital learning activities using tablets. The mean of the pre-test numeracy performance of 13.25 has increased to 19.09 in the post-test after the utilization of digital learning activities using tablets. This implies that digital learning activities provided to the Grade 10 students have helped the students improve their performance. A remedial class is always an impressive way to solve this common problem. Using tablets also has increased the desire and eagerness of the pupils to answer the activities correctly. A catalyst for this study was the work undertaken by Lowrie (2005) where he worked with eight-year-old students using the Pokemon environment. In this work, Lowrie found that the children worked well beyond the experiences being provided in the standard school curriculum in terms of spatial representation and visualization. This work highlighted the possibilities of the digital games environment for enhancing mathematical learning and understandings that were beyond the realms of standard pencil-and-paper representations.

IV. Conclusion

The study revealed a significant difference in the pre-test and post-test numeracy performances of the identified Grade 10 non-numerate students before and after the utilization of digital learning activities using tablets. Provision of additional learning support materials and activities using tablets with applications during remedial classes is effective in improving the numeracy performance of the identified non-numerate students.

V. Recommendations

1. The proposed improvement plan formulated should be utilized by the teachers to further test whether the intervention is effective to improve the level of numeracy of the students.
2. Teachers should produce digital learning activities to address the needs of the students for the improvement of their numeracy performance.
3. Teachers should implement remedial instructions using digital learning activities to be accomplished using tablets to the students in need to address their learning gaps.
4. Teachers should provide alternative learning support materials to help them understand the concept correctly and be able to apply the knowledge gained.
5. Teachers must attend training or LAC sessions on the production and crafting of digital learning resource materials for the remedial lessons to be conducted to the students' using tablets.
6. Teachers must attend training on teaching strategies and methods in teaching numeracy.
7. Teachers should revisit the guidelines and tools in assessing the numeracy performance of the students.
8. School Heads should allocate the budget for the procurement of IT equipment to be used in the formulation of digital learning activities and resources.
9. School Heads should spearhead in the crafting of training design and LAC plan for trainings and LAC sessions for the improvement of teaching-learning process of teachers most especially in the improvement of learning resource materials to be used during remedial classes.
10. School Heads should have a database of students needing remedial instructions and provide appropriate plans to address their learning gaps.
11. School Heads should provide technical assistance to teachers in terms of teaching numeracy skills.

12. School heads should monitor the conduct of remedial instructions and provide technical assistance for the improvement of its implementation.
13. School Heads should regularly monitor the teaching-learning process of teachers.
14. School Heads should maximize the time in providing appropriate technical assistance based on the needs of the teachers in teaching beginning reading.
15. School Heads should submit the crafted learning resource materials using tablets for remedial instructions for quality assurance.
16. School Heads should encourage and provide technical assistance for the crafting of innovations and research based on the intervention provided to improve the performance of the pupils; and
17. Future researchers should replicate this study to include different locales and include different variables aside from the mentioned in this study.

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AUTHOR'S PROFILE



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She was hired in the DepEd in the year 2016 and is currently teaching as math 10 teacher at Kananga National High School-Kawayan Annex. She also attended a series of webinars/seminars and trainings to increase her professional growth as a teacher and continue to work on herself for personal development.