

# Development and Validation of Off-line Web Quest for Grade 7 Mathematics Students

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**Abstract**— Use of valid and appropriate instructional material contributes in the attainment of quality learning. Facilitators in the teaching-learning process must consider variety of teaching tools to cater the different needs of the students. Nowadays, this could be easily done through the integration of modern technology. This study aimed to develop and validate off-line Web Quest to determine the effects on the cognitive and affective skills of Grade 7 students in Gatbo National High School, Division of Sorsogon City for the SY 2022-2023. This study utilized the descriptive – developmental research method as the general research design. The observational and survey research and mixed method approach (sequential explanatory design) were also employed. The data collected were analyzed and treated using statistical tools such as weighted mean, t-test and Cohen’s d. Findings revealed that the 7 Mathematics education experts have agreed that the developed off-line web quest is a valid instructional tool for teaching the fundamental operations on integers. It was also revealed that the use of the developed off-line web quest is effective on both cognitive skill and intrinsic motivation of the students.

**Keywords**— cognitive, development, intrinsic motivation, off-line web quest, validation.

## INTRODUCTION

A quality education is vital in establishing the future of the society. Educators must ensure that the day-to-day learning of the students caters their needs not just for the present but most especially for the coming years. With the recent development and innovations happening in the society, teachers nowadays are required to develop strategies which the students can use as vehicle in their journey to the modern world. Driscoll (2022) emphasized that a 21st century education is about giving students the skills they need to succeed in this new world, and helping them grow the confidence to practice those skills. Thus, teacher’s innovative mind, as she shapes the mind of the students, is of great help in encouraging more innovations in the future.

The modern world has offered various development in the society. These include the rise of modern devices and software applications. Another challenge knocks on the door of a teacher – that is “millennials” live their lives with gadgets and students are more interested to click than to open a book in the library. Mobile phones and laptops are now part of daily routine of many individuals. Simple tasks like checking the time, computing expenses, talking to a friend and even watching current events are now easily done in just a click. According to Wentzel, et al. (2005), Information and communication technology (ICT) continues to expand the boundaries of higher education into “anytime/anywhere” experience. Wireless networks and mobile communications coupled with personal

computing devices present new means for students to access classroom information and communicate with peers and teachers, and for faculty members to alter the concept of the classroom. Prensky (2001) also called these students “digital natives”. According to him, today’s undergraduate students is often characterized as preferring teamwork, experiential activities and the use of technology.

As a respond to the call of the rapid modernization of the society, the researcher thought of an educational innovation that would aid the teachers in teaching young minds – an Off-line Web Quest. Integrating technology in the learning process thru off-line web quest can also be considered as teacher’s means of accomplishing the second on the list of her duties and responsibilities. As mentioned in the DEPED’s Result-Based Performance Management System (RPMS), a proficient teacher facilitates learning using appropriate and innovative teaching strategies and classroom management practices.

In a news article published by CNN on December 3, 2019, Philippines, it was reported that the country ranked second lowest during the conducted 2018 Programme for International Student Assessment (PISA) among 600,000 15-year old students in 79 countries worldwide. PISA revealed that the Philippines scored 353 in Mathematics which is below average. After knowing the PISA result, DepEd vowed to improve quality education. In the statement of Secretary

Leonor Briones, DepEd calls the entire nation to take active involvement, cooperation and collaboration in advancing the quality of basic education in the country. Hence, the innovation in this study is a step towards that call.

The Off-line web quest focused on developing the skills of the students in performing fundamental operations on integers. With researcher's experience as a Grade 7 Mathematics teacher, she has observed that students hardly master this concept, considering that this is a basic concept. Based on the reported list of least learned competencies in Sorsogon City Division for SY 2020-2021, performing operations on integers is one of the least learned competencies in Grade 7 Mathematics. In addition to that, students study habits have degraded because their attentions are diverted to watching televisions, playing on-line or mobile games and using social media such as Facebook and Youtube.

Based on the latest NAT result for Grade 10 which was conducted last school year 2016-2017, Gatbo National High School got an MPS of 36.43 in Mathematics. The result of the NAT shows poor performance of the students in Mathematics. Worse than that, Gatbo National High School students' academic performance have continuously declined for the past two years because of the pandemic. Based on result of the Numeracy Assessment conducted by Gatbo National High School mathematics teachers last June, 2022, students got an MPS of 30.3 %, interpreted as "poor". The Numeracy assessment result is a proof that the two-year modular distant learning during the peak of pandemic period have not contributed enough to the improvement of students' learning. It was obvious that there are backlogs in which educators should not neglect especially when aiming to introduce new learnings as learning goes back to the face-to-face modality this new school year because some of these backlogs could be pre-requisite skills for the next competencies given that the K-12 education is a spiral curriculum. Thus, an intervention is needed which must primarily focus on the fundamentals of secondary mathematical concepts.

To win back the attention of the students, the researcher has designed this innovation in a way that relates to their interest. The Off-line Web Quest have allowed the students to play on the computer and at the same time learned to perform the fundamental operations on integers. Game-based learning enhances learning and performance outcomes through affective, cognitive and behavioral mechanisms (Koivisto and Hamari, 2019;

Sailer and Homner, 2019). Furthermore, this step is a realization of the aim of DepEd computerization program - to provide public schools with appropriate technologies that would enhance the teaching-learning process and meet the challenges of the 21st century.

This study aimed to develop and validate Off-line Web Quest to determine the effects on the cognitive and intrinsic motivation of Grade 7 students in Gatbo National High School. The Web Quest is an innovation designed by the researcher in which she believes helped the students improve their mastery in performing fundamental operations on integers, one of the MELCS (Most Essential Learning Competencies) in Grade 7 Mathematics. Performing fundamental operations on integers is a pre-requisite skills to other topics in higher mathematics, thus mastery of this skill is a must. Furthermore, the innovation of this off-line Web Quest may be an armour of the teacher in facing the challenges brought by the rapid change of the modern world.

## II. FRAMEWORK

The researcher adopted the ADDIE (Analysis, Design, Development, Implement, and Evaluate) Model in developing and validating Off-line Web Quest in the study conducted by Torrefranca (2017), as shown in Figure 1.

### *Phase 1 – Planning Phase*

The researcher utilized a 20-item teacher made-test which involves the four fundamental operations on integers. A frequency of 5 items for each operation. Series of dry run was conducted. Item analysis was employed, and the internal consistency of the test was determined through a reliability test. The test was administered to Grade 7 students of Gatbo National High School after the final test items were validated. Procures such as choosing of the respondents, seeking permission from the superintendent, principal and concerned subject teachers are part of this phase. Estimating the cost and allocating the budget for the development of off-line web quest were also considered in this phase.

The researcher determined the flow of the topic in the off-line web quest to ensure a systematic instruction which are as follows: (a) addition of integers, (b) subtraction of integers, (c) multiplication of integers and (d) subtraction of integers. The skills and process required in developing web quest were benchmarked from the previously developed web quest available from the internet.

**Phase 2 – Designing/Developing Phase**

In this phase, it includes preparing off-line web quest. In the process, outlined procedures were adopted to achieve the purpose of this study. Suitable references and resources were sought. A 20-item teacher-made pre-test and post-test were prepared.

**Phase 3 – Validation and Try-out Phase**

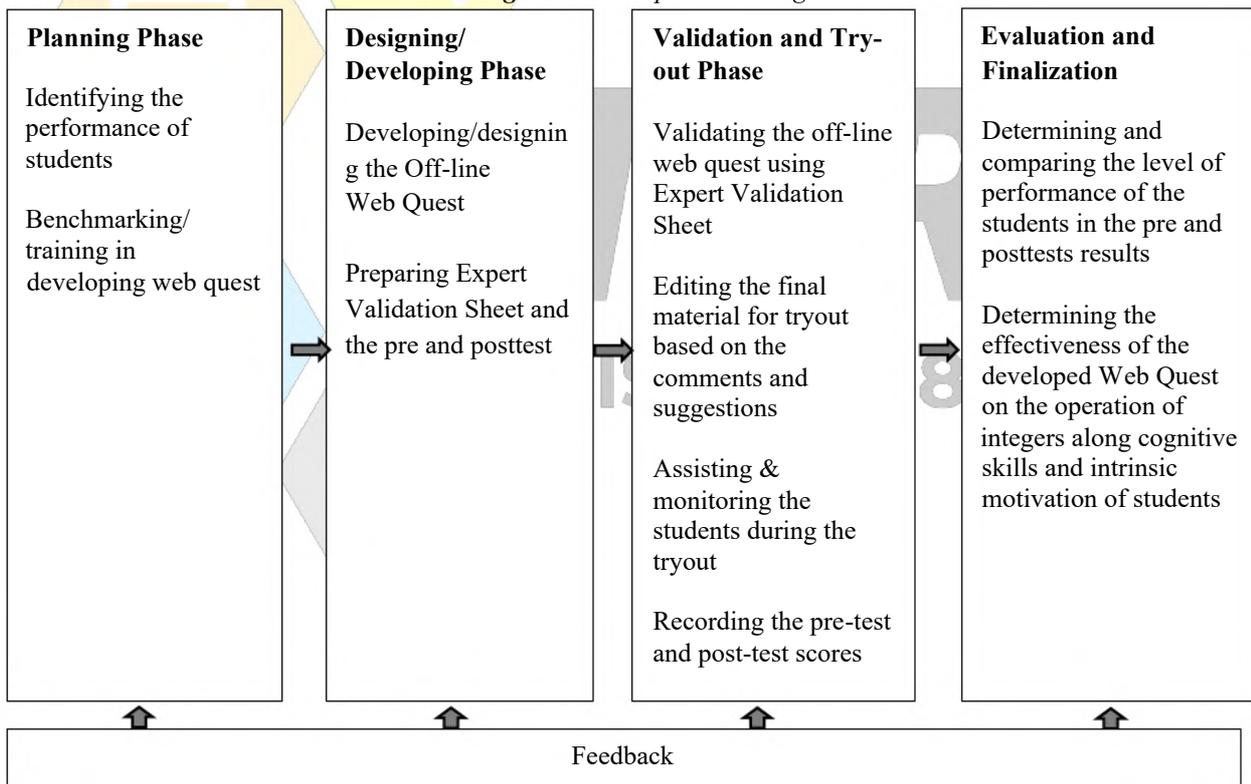
Expert’s judgment was sought by the researcher to gather evidence that will support the adequacy of the off-line web quest to its intended users. In doing this, the initial draft of the off-line web quest were presented by the researcher to her adviser and to other mathematics teachers. The Expert’s Evaluation Sheet adopted from DepEd LRMDs was used. The expert’s comments and suggestions regarding the acceptability and relevance of the off-line web quest were considered. They examined the material based on the four indicators which include: (1) content quality, (2) instructional quality, (3)

technical quality, and (4) accuracy. The developed off-line web quest was tested and validated.

**Phase 4 – Evaluation and Finalization Phase**

After the off-line web quest were developed, the respondents utilized it in the school’s computer laboratory. Teacher’s supervision and assistance were provided to the students while using the tool. In the evaluation phase, the researcher validated its effectiveness. The main purpose is to know if the students’ performance has improved based on the result of the pre-test and post-test. All throughout the course of development and validation of off-line web quest, the suggestions and recommendations of experts and students were necessary. Their feedbacks served as guide to the researchers in identifying the strength and weakness of the developed tool and ensuring its suitability for the students.

*Figure 1. Conceptual Paradigm*



**III. OBJECTIVES OF THE STUDY**

This study aimed to develop and validate off-line Web Quest to determine the effects on the cognitive and intrinsic motivation of Grade 7 students in Gatbo National High School, Division of Sorsogon City for the SY 2022-2023. Specifically, it answered the following question: (1) what Off-line Web Quest can be developed

along operations on integers, (2) what is the validity of the developed off-line Web Quest based on the DepEd’s Learning Resource Management and Development System (LRMDS) in terms of the content quality, instructional quality, technical quality, and accuracy, (3) how effective is the developed off-line Web Quests on the operation of integers on the cognitive skill, and (4)

what is the level of effectiveness of using Off-line Web quest on the student's Intrinsic Motivation along interest/enjoyment, perceived competence, effort/importance, pressure/tension, perceived choice and value/usefulness?

#### **IV. MATERIALS AND METHODS**

##### ***Research Design***

This study aimed to develop and validate off-line web quest for Grade 7 Mathematics students. In general, the descriptive –developmental research method was employed in this study. This study also utilized observational and survey research to collect data from the experts and students through Experts' Evaluation Checklists and Intrinsic Motivation Inventory (IMI). Meanwhile, mixed method approach was utilized to explain the development and validation of the off-line web quest. Specifically, this study used Sequential Explanatory Design which is characterized by the collection of quantitative data followed by the qualitative data, where the latter supports the findings and explanations of the former. To determine if utilization of the developed tool is effective, the experimental method design was used. Specifically, among its three types, this study used the Independent type of experimental design or between-groups design wherein different participants are used in each condition of the independent variable. Furthermore, frequency count, mean and percentage and t-test for correlated and independent data were used in the data analysis and interpretation of the result of this study.

##### ***Research Site***

This study was conducted in Gatbo National High School located in Gatbo, Bacon District, Sorsogon City. The said school is considered as a medium secondary school in the Bacon Cluster – Sorsogon City Division.

##### ***Participation***

The respondents of this study were 29 students and 7 experts. Students are the officially enrolled grade 7 students of Gatbo National High school belonging to the first section for school year 2022-2023 under K-12 curriculum. On the other hand, experts came from different schools in Sorsogon City Division-Bacon cluster who are Master Teacher or teachers teaching in Mathematics for five years and above.

##### ***Instrumentation***

This study utilized three various instruments. The first instrument which was used during the development and

validation of off-line web quest is the Evaluation Rating Sheet for Non-print Materials adapted from DepEd LRMS. This evaluation rating sheet consisting four factors was used to gather responses from the experts. The second is the 20-item teacher made test which was utilized as the pre-and posttest to measure the cognitive skill of the students. The third instrument is the Intrinsic Motivation Inventory (IMI) which was adopted from study of Funa, Gabay and Ricafort (2021). It was used to determine the level of Intrinsic Motivation of the students while using the developed off-line web quest.

##### ***Validation of Instrument***

The instrument of this study was a teacher-made test. Before the instrument was administered, it underwent through series of dry runs to test its reliability and validity. Initially, the researcher has prepared 40-item test which was administered to Grade 10 students of Gatbo National High School during the first dry run. Based on the result of the first dry run, an item analysis was done to identify valid test items. The test was then reduced to a 20-item. To test its reliability, during the second dry run, the final draft of the test was administered to Grade 12 students of Gatbo National High School. Using the result of the second dry run, the instrument obtained a reliability coefficient of 87% which was considered as a good reliability coefficient.

##### ***Collection of Data***

The researcher first sought the permission from the concerned school officials and principal of Gatbo National High School to conduct the study inside their institution as part of the ethical procedure of research. The data gathering of the study was conducted during the first quarter of school year 2022-2023. The data collection from the experts using the DepEd LRMS Evaluation Rating Sheet was conducted on the first week of September, 2022. The pre-test was administered on September 21, 2022 to assess the students' prior knowledge on fundamental operations on integers. On the next day, the researcher have divided the first section of Grade 7 into two groups. On the third day, the students who were assigned in the experimental group went to the school's computer laboratory and independently explored the developed off-line web quest in the computer after a brief instruction from the researcher. While the control group went on with the traditional method of learning. After exploring the off-line web quest, learners in the experimental group accomplished the Intrinsic Motivation Inventory and also mentioned their feedbacks and experiences through

their journal. After the experiment, both the experimental and control group took the post-test to assess what they have learned about performing fundamental operations on integers. According to Berwick (2019), tests can be especially beneficial if they are given frequently and provide immediate feedback to help students improve. The researcher was able to spend 4 actual learning hours (equivalent to 1 week) in the execution of the experiment since the competency on performing fundamental operations on integers was only allotted with 1 week based on DepEd Most Essential Learning Competencies (MELCS). The feedbacks from both the experts and students towards utilization of the off-line web quest were considered in the study. Based on the data obtained quantitatively and qualitatively, the researcher was able to produce the final version of the off-line web quest.

### Data Analysis

The gathered data were treated statistically. These are discussed systematically by order of the study's statement of the problem. The off-line web quest developed in this study was validated by Mathematics experts along quality, instructional quality, and technical quality using the following rating adopted from DepEd LRMDs:

Numerical Rating (NR)	Descriptive Rating (DR)
3.50 – 4.00	- Very Satisfactory (VS)
2.50 – 3.49	-Satisfactory (S)
1.50 – 2.49	- Poor
1.00 – 1.49	- Not Satisfactory

Likewise, accuracy was validated by the experts using the same instrument with the scale, to wit:

Numerical Rating (NR) – Descriptive Rating (DR)
3.50-4.00 – Not present
2.50-3.49 – Present but very minor & must be fixed
1.50-2.4 – Present & requires major redevelopment
1.00-1.49 – Poor/ Do not evaluate further

To determine the level of performance of the respondents, the results of the pre-test and post-test were analyzed using the scale adopted in DepEd Memorandum No. 160 s, 2012.

Mean Percentage Score – Descriptive Equivalent
96% - 100% – Mastered

86% - 95% – Closely Approximating Mastered
66% - 85% – Moving Towards Mastery
35% - 65% – Average
15% - 34% – Low
5% - 14% – Very Low
0% - 4% – Absolutely No Mastery

To test whether there is a significant difference between the levels of performance in the pre-test and post-test of the control and experimental group, t-test for correlated sample was made. And to test whether there is a significant difference between the levels of performance in the post test of the two groups of respondents, t-test for independent sample was employed.

To determine the effect size of t-test's result comparing pretest and posttest, this study utilized Cohen's d. The interpretation of Cohen's d result are as follows: very small ( $\leq 0.01$ ), small (0.02-0.20), moderate or medium (0.21-0.50), large (0.51-0.80), very large (0.81-1.20), and huge (1.21-2.00). On the other hand, weighted mean was used to analyze the students' response in the IMI tool which was utilized during the post-experimental assessment of intrinsic motivation. The computed weighted mean was described using the following scale with its corresponding interpretation which refers to the level of effectiveness on the intrinsic motivation:

Weighted Mean	Description	Interpretation
6.6 – 7.0	Very True	Very Effective
5.6 – 6.5	True	Effective
4.6 – 5.5	Slightly True	Slightly Effective
3.6 – 4.5	Somewhat True	Somewhat Effective
2.6 – 3.5	Slightly Not True	Slightly Not Effective
1.6 – 2.5	Not True	Not Effective
1.0 – 1.5	Not at all True	Not at all Effective

## V. RESULTS AND DISCUSSION

### A. The Developed Off-line Web Quest

The developed off-line web quest was anchored on the MELC- performing fundamental operations on integers with a code M7NSIf-1. It includes the four fundamental operations – 1) addition, 2) subtraction, 3) multiplication and 4) division of integers. It was entitled "Integer Quest" since students will be exploring in a quest to learn about integer and its operations.

### B. Validity of the Developed Off-line Web Quest Based on DEPED LRMDs

*Table 1. Experts' rating on the content quality*

Indicators	WM	DR
1. Content is consistent with topics/skills found in the DepEd Learning Competencies for the subject and grade/year level it was intended.	4.00	VS
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	4.00	VS
3. Content is accurate.	4.00	VS
4. Content is up-to-date	4.00	VS
5. Content is logically developed and organized.	4.00	VS
6. Content is free from cultural, gender, racial, or ethnic bias.	4.00	VS
7. Content stimulates and promote critical thinking.	4.00	VS
8. Content is relevant to real-life situations.	3.71	VS
9. Language (including vocabulary is appropriate to the target user level.	4.00	VS
10. Content promotes positive values that support formative growth.	4.00	VS
<b>Overall Weighted Mean</b>	3.97	VS

Legend: WM–Weighted Mean DR–Descriptive Rating VS – Very Satisfactory

In table 1, all 9 items got a weighted mean of 4.0 while only one item gained a weighted mean of 3.71, all are described as very satisfactory. This means that the tool lacks application of real-life context in the content. Experts are suggesting to include more problems from the real-life settings that will provide the students the kind of learning that they really need. Thus, the researcher have added illustrative examples and problems which involves practical application of the discussed concepts. The overall weighted of 3.97 which is described as very satisfactory implies that the content

of the developed off-line web quest was able to satisfy the set standard and may stimulates up-to-date learning. According to (Lacasse, 2020), math coordinators and teachers should be asking two things from the content: 1) it needs to really help the students learn the topic, and 2) it needs to provide teachers insight so that they can focus their time on what students really need. Thus, right instructional content is necessary to create a powerful learning experiences for the students whether in the classroom or remotely.

*Table 2. Expert's rating on the instructional quality*

Indicators	WM	DR
1. Purpose of the material is well-defined.	4.00	VS
2. Material achieves its defined purpose.	4.00	VS
3. Learning objectives are clearly stated and measurable.	3.86	VS
4. Level of difficulty is appropriate for the intended target user.	4.00	VS
5. Graphics/colors/sounds are used for appropriate instructional reasons.	4.00	VS
6. Material is enjoyable, stimulating, challenging and engaging.	4.00	VS
7. Material effectively stimulates creativity of target user.	4.00	VS
8. Feedback on target user's responses is effectively employed.	4.00	VS
9. Target user can control the rate and sequence of presentation and review.	4.00	VS
10. Instruction is integrated with target user's previous experience.	4.00	VS
<b>Overall Weighted Mean</b>	3.99	VS

Legend: WM–Weighted Mean DR–Descriptive Rating VS – Very Satisfactory

Along instructional quality shown in table 2, all items got a score of 4 except item 3 which only obtained a score of 3.86. However, it was indicated that all the indicators along instructional quality are described as very satisfactory. This implies that the quality of instruction of the developed off-line web quest have also met the set standard very satisfactorily. This means that

the material may serve its purpose when utilized by the learners in the learning process. Furthermore, the material was found stimulating and engaging because of the proper use of graphics and animations. Pallud (2017) study revealed that when users perceive the interaction with technology as being intuitive and interactive, they experience higher levels of cognitive engagement.

*Table 3. Experts' rating on the technical quality*

Indicators	WM	DR
1. Audio enhance understanding of the concept.	4.00	VS
2. Speech and narration (correct pacing, intonation, and pronunciation) is clear and can be easily understood.	3.86	VS
3. There is complete synchronization of audio with visuals, if any.	4.00	VS
4. Music and sound effects are appropriate and effective for instructional purposes.	4.00	VS
5. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	4.00	VS
6. Visual presentations (non-text) are clear and easy to interpret.	4.00	VS
7. Visual sustain interest and do not distract user's attention.	4.00	VS
8. Visuals provide accurate representation of the concept discussed.	4.00	VS
9. The user support materials (if any) are effective.	4.00	VS
10. The design allows the target user to navigate freely through the material.	4.00	VS
11. The material can easily and independently be used.	4.00	VS
12. The material will run using minimum system requirements.	3.86	VS
13. The program is free from technical problems.	3.71	VS
<b>Overall Weighted Mean</b>	3.96	VS

Legend: WM–Weighted Mean DR–Descriptive Rating VS – Very Satisfactory

In table 3, it was presented that there are 10 indicators which obtained a perfect score but items 2, 12 and 13 only got 3.86, 3.86 and 3.71 respectively. Considering the scores, all the indicators along technical quality were described as very satisfactory. The result implies that the visual and audio of the material met the set standard satisfactorily. However, the three items which did not get a perfect score indicate that the user must be guided and instructed accordingly by the teacher in running the material. To improve the material, specifically its sound quality, the audio/volume set-up was fixed and students

were required to use headset while running the material. This further means that sound is one of the factors need to be considered in creating an off-line web quest. Instructional aides have no value in the learning process if they cannot be seen or heard. Tapes of speeches and sounds should be confirmed for correct volume and quality in the actual environment in which they will be used (Shabiralyani, et. al, 2015). Thus, assessment of the technical quality of the material suggests that the visuals and sounds must be clear enough in order to successfully transmit the learning to the learners.

*Table 4. Experts' rating on accuracy*

Indicators	WM	DR
1. Conceptual errors.	4.00	NP
2. Factual errors.	4.00	NP
3. Grammatical and/or typographical errors.	4.00	NP
4. Other errors (i.e.,computational errors, obsolete information, errors in the visuals, etc.)	3.86	NP
<b>Overall Weighted Mean</b>	3.96	NP

Legend: WM–Weighted Mean DR–Descriptive Rating NP – Not Present

For accuracy, it appears in table 4 that the items pertaining to conceptual errors, factual errors, and grammatical and/or typographical errors are not present in the tool. All these 3 indicators obtained a perfect score of 4, described as not present.

This means that all concepts, facts, grammars and spelling in the material were correct. However, the item pertaining to other errors (i.e., computational errors,

obsolete information, errors in the visuals, etc.) gained a weighted mean of 3.86 and with a description of not present. This means that errors in visual were observed.

The experts have observed an error on the correct use of grouping symbols to isolate integers and operations. The researcher has noted this finding and has included grouping symbols, such as parenthesis, in isolating integers to fix this error.

**Table 5. Summary of Experts' Rating**

Criteria	Required Points	Points Earned	Remarks
1. Content Quality	30 – 40	39.17	Passed
2. Instructional Quality	30 – 40	39.86	Passed
3. Technical Quality	39 – 52	51.43	Passed
4. Accuracy	12 – 16	15.71	Passed

Table 5 shows the summary of the experts' validation of the developed off-line web quest. With the given points and comments necessary for the improvement of the developed off-line web quest, content quality gained a total point of 39.17. Based on the LRMDS Guidelines for assessment and evaluation, the resource must have a score of at least 30 points out of a maximum of 40 points to pass the criterion on content quality. Consequently, the material was rated passed along content quality. In a likely manner, the instructional quality obtained a total point of 39.86. With the same required points, this means that the off-line web quest also passed the criterion on instructional quality based on the experts' validation.

Concurrently, technical quality gained a total point of 51.43. The resource must have a score of at least 39 points out of a maximum of 52 points to pass the criterion on technical quality. Therefore, the material has also passed this criterion. Meanwhile, a total of 15.71 points was obtained by the material along accuracy. The resource must have a score of at least 12 points out of a maximum of 16 points to pass the criterion on accuracy. The result of experts' validation gave the material a total point of 15.71, thus it passed the last factor which is the accuracy. At the end of the validation procedure, all the experts have recommended

the approval of the material for possible use in public schools, with provision that the corrections/revisions included are made. Hence, the off-line web quest had been modified based on the suggestions and feedbacks from the experts. In general, the experts have appreciated the developed learning resource and have considered it a potential innovative tool which can help improve students' affective and cognitive facet.

### C. Effectiveness of the developed off-line web quest on the operation of integers along cognitive skills

Educational innovations are designed to provide new learning opportunities to the students with the goal of improving the quality of education. Thus, this study aims to measure the effect of the developed off-line web quest as an innovative tool along the cognitive skill. The major goal of developing an off-line web quest is to improve students' academic performance in mathematics, specifically in performing fundamental operations on integers. This is intended for grade 7 students who are to learn the fundamental operations on integers. Considering that it is a basic concept in secondary mathematics, mastery of this skill is a must. Thus, using off-line web quest may help them cope with the instruction and consequently increase their level of performance.

**Table 6. Level of Performance in the Pre Tests of the Two Groups of Respondents**

Skill	No. of Items	Control Group		Experimental Group	
		Pre Test MPL (%)	Desc	Pre Test MPL (%)	Desc
Addition	5	20.00	Low	29.33	Low
Subtraction	5	21.43	Low	20.00	Low
Multiplication	5	52.86	Average	42.67	Average
Division	5	42.86	Average	37.33	Average
Overall MPL	20	34.29	Low	32.33	Low

Legend: – class mean score MPL – Mean Performance Level Desc – Descriptive Equivalent

It can be gleaned from table 6 the pretest performances of the control and experimental groups. In addition, the control group got a MPL of 20% while the experimental group got 29.33% which are both described as Low. Same in subtraction, the MPLs of both groups are both

described as Low with a MPL of 21.43% and 20.00% respectively. However, the performances of control and experimental group in multiplication are both in Average level with the MPLs of 52.86% and 42.67% respectively. Division pretest performances of the two

groups are also both described as Average wherein control group obtained a MPL of 42.86% while experimental group got 37.33%. Considering the overall

pretest performance of the two groups, the control has MPL of 34.29% while experimental has 32.33% which are both described as Low.

**Table 7.** Level of Performance in the Post Tests of the Two Groups of Respondents

Skill	No. of Items	Control Group		Experimental Group	
		Post Test MPL (%)	Desc	Post Test MPL (%)	Desc
<b>Addition</b>	5	38.57	Average	36.00	Average
<b>Subtraction</b>	5	40.00	Average	33.33	Low
<b>Multiplication</b>	5	50.00	Average	66.67	Moving towards mastery
<b>Division</b>	5	44.29	Average	70.67	Moving towards mastery
<b>Overall MPL</b>	20	43.21	Average	51.67	Average

Legend:  $\bar{x}$  – class mean score MPL – Mean Performance Level Desc – Descriptive Equivalent

Looking at the posttest performances of the control and experimental groups in table 7, it can be observed that the two groups' performances in addition are both described as Average wherein control got a MPL of 38.57% while experimental group got a MPL of 36.00%. In subtraction, control group obtained 40.00% which is described as Average but experimental group only obtained 33.33% which is described as Low. The MPLs of the two groups in multiplication are 50.00% (Average) and 66.67% (Moving towards Mastery) respectively while the MPLs in division are 44.29% (Average) and 70.67% (Moving towards Mastery) respectively. Considering the overall posttest performances of the two groups, control group has MPL of 43.21% while experimental group has MPL of 51.67% which are both described as Average.

Based from the presented data, both performances of the control and experimental group have improved from Low to Average. The over-all mean performance level of control group in pretest and posttest are 34.29%

and 43.21%, respectively. While the experimental group's MPL in pretest and posttest are 32.33% and 51.67%, respectively. It is also reflected in the posttest result that the experimental group has higher level of performance in multiplication and division of integers but not in addition and subtraction. The higher performance of the control group in addition and subtraction may be due to the student's opportunity to raise clarifications from the teacher after discussion while most of the students in experimental group have skipped the review part in the web quest. However, considering the over-all MPL, students in the experimental group performed better than students in the control group. This shows that students' performance in performing fundamental operations on integers was improved after utilizing off-line web quest as learning aid. This implies that the use of off-line web quest in enhancing the students' performance may have been effective. Furthermore, this finding may be attributed due to the increase in students' engagement after exploring the off-line web quest.

**Table 8.** Effectiveness of the Developed Off-line Web Quest on the Operation of Integers along Cognitive Skill

Statistical Bases	Statistical Analysis		
	Control Group Pretest & Posttest	Experimental Group Pretest & Posttest	Control & Experimental Groups Posttests
<b>Level of Significance</b>	0.05	0.05	0.05
<b>Degrees of Freedom</b>	13	14	27
<b>Critical Value</b>	0.255	0.003	0.39
<b>Computed Value</b>	1.19	3.59	0.87
<b>Decision of H0</b>	Reject	Reject	Reject
<b>Cohen's d value</b>	0.39	1.06	0.33
<b>Conclusion</b>	Significant	Significant	Significant

Table 8 shows the difference between the performance of the control and experimental groups. To know if there is an existing significant difference between the posttest results of the control and experimental group, an independent sample t-test was employed in this study. At 0.05 level of significance and 27 degrees of freedom, the computed t-value 0.87 is greater than the critical value 0.39. Hence, the null hypothesis is rejected. This means that there is significant difference between the performance of the control and experimental group in the posttest. The computed effect size was 0.33 which means that there is a moderate effect based on the posttest performances of the two groups.

To know if there is significant difference between the pretest a paired sample t-test was employed. It was revealed that at 0.05 level significance and 13 degrees of freedom, the computed t-value 1.19 is beyond the critical value 0.255. Therefore, the null hypothesis was rejected. Hence, there is a significant difference between the performance in the pretest and posttest of the control group. This implies that traditional method may have been contributed in improving the performance of the students in operations on integers. The computed effect size was 0.39 which denotes that there is a medium effect on the cognitive skills of the students when the traditional method was employed. This means that there is a significant increase in the level of the performance of the students who were taught in traditional way.

#### D. Level of Effectiveness of Using Off-line Web Quest on the Student's Intrinsic Motivation

Table 9. Overall Result of Intrinsic Motivation Inventory

Items	Weighted Mean	Interpretation
1. Interest	6.40	Effective
2. Perceived Competence	5.30	Slightly Effective
3. Effort/Importance	6.13	Effective
4. Pressure/Tension	3.60	Somewhat Effective
5. Perceived Choice	6.27	Effective
6. Value/Usefulness	6.77	Very Effective
Average	5.75	Effective

Table 9 shows the result of the post-experimental assessment of students' intrinsic motivation in the experimental group. Item 9.1, 9.3, and 9.5 obtained the weighted mean of 6.40, 6.13 and 6.27 respectively which denotes that the utilization of off-line web quest is effective on students' intrinsic motivation along interest, effort/importance and perceived choice. Item 9.2 earned a weighted mean of 5.30 which means that

Paired sample t-test was also utilized to know if there is significant difference between the pre and posttests of the experimental group. With  $\alpha = 0.05$  and degrees of freedom = 14, the computed t-value 3.59 is beyond the critical value 0.003. Therefore, the null hypothesis was rejected and the alternative hypothesis then is accepted which states that there is a significant difference between the performance of the experimental group in the pretest and posttest. The result implies that utilization of off-line web quest may have been effective in improving the students' performance in operations on integers. The computed effect size was 1.06 which means that there is a very large effect on the cognitive skills of the students when the off-line web quest was utilized by the students. This means that there is a significant increase in the level of performance of those students in experimental group who utilized off-line web quest. The modest increase in their result may be attributed to the increased attention and retention of the students which made them to become more active and engaged learners. Based on the presented data, the experimental group performed significantly better than the control group. This implies that utilizing off-line Web Quest may be more effective than traditional method of teaching in improving the performance of students on operations on integers. The abovementioned results adhere to the study of Aydin (2016) which concluded that web quests use improves interaction, critical thinking, knowledge application, scaffolded learning, higher order thinking skills and problem-solving skills.

the learning material is slightly effective on students' intrinsic motivation along perceived competence. Item 9.4 has the lowest weighted mean of 3.60 which is interpreted that the developed material is somewhat effective on the students' intrinsic motivation along pressure/tension. While item 9.6 got the highest weighted mean of 6.77 which means that the off-line web quest is very effective on students' intrinsic motivation along value/usefulness. The overall IMI

result garnered an average score of 5.75 which is interpreted as effective. This signifies that the use of off-line web quest in instruction may have motivated grade 7 Mathematics students intrinsically. Intrinsic motivation occurs when an individual act without any obvious external rewards. They simply enjoy an activity or see it as an opportunity to explore, learn and actualize their potentials (Coon, et. al, 2022). The existence of interest/enjoyment, perceived competence, effort/importance, pressure/tension, perceived choice and value of usefulness in these learners may have contributed to the development of their intrinsic motivation thus they become well-engaged and willing to perform operations on integers through the off-line web quest. Without any monetary rewards, prizes, incentives or outside factors, the students were able to successfully accomplish their task. This result is parallel to the findings of the study of Aldalal et al. (2015) which showed that students using the web quest instruction performed better in achievement and motivation than students using the conventional instructions. Web quest instruction was found to help students with dependent cognitive style in achievement and motivation.

#### V. CONCLUSION

Conclusions were formulated based on the findings of the study. These are as follows: (1) the developed off-line web quest is composed of 3 parts namely; Game mechanics, Training field, and Wizard's Camp, (2) the developed off-line web quest is valid in terms of content quality, instructional quality, technical quality and accuracy, (3) the developed off-line web quest on the operation of integers is effective along cognitive skill of the students, and (4) using the developed off-line web quest is effective on the student's intrinsic motivation along interest/enjoyment, perceived competence, effort/importance, pressure/tension, perceived choice and value/usefulness.

#### REFERENCES

- [1] Aldalal, O., Eyadat Y., & Ababneh Z. W. (2015). Effects of Webquest on the achievement and Motivation on Jordanian University Students of (Independent & Dependent) Cognitive Style. *World Journal on Educational Technology Current Issues* (2). doi: 10.18844/wjet.v7i2.44.
- [2] Aydin, Selami (2016). *WebQuets as Language-Learning tool*. Taylor Francis Online. Retrieved on October 14, 2022 from <https://scholar.google.com>
- [3] Berwick, C. (2019). What does the research say about testing?. Retrieved on December 27, 2022 from <https://www.edutopia.org/article/what-does-research-say-about-testing>
- [4] Chan C. H. (2014). Building an online library for interpretation training: explorations into an effective blended-learning mode. *Computer Assisted Language Learning*, 27(5), 454-479. Available from <https://doi.org/10.1080/09588221.2013.770034>
- [5] CNN Philippines (2019). Philippines rank low in reading, science, math, global survey shows. Available from [cnnphilippines.com.net](http://cnnphilippines.com.net) [Accessed: January 8, 2021]
- [6] Coon, D., Mitterer, J.O., & Martini, T.S. *The Basics of Motivation. Introduction to psychology: Gateways to Mind and Behavior*. 316-317. Retrieved on December 2, 2022 from [https://books.google.com.ph/books?id=6OUEAA-AQBAJ&printsec=fontcover&source=gbs\\_ge\\_summary\\_r&cad=0#v=onepage&q&f=false](https://books.google.com.ph/books?id=6OUEAA-AQBAJ&printsec=fontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false)
- [7] Dellosa, S. D. (2022). "Report on Result of Numeracy Assessment SY 2021-2022". Gatbo National High School- DepEd Sorsogon City
- [8] Department of Education. DO 78, S. 2010 – Guidelines On The Implementation Of The Deped Computerization Program (Dcp). Available from: [www.deped.gov.ph/2010/06/10/do-78-s-2010-guidelines-on-the-implementation-of-the-deped-computerization-program-dcp/](http://www.deped.gov.ph/2010/06/10/do-78-s-2010-guidelines-on-the-implementation-of-the-deped-computerization-program-dcp/) [Accessed: 12th of December, 2021]
- [9] Department of Education. About LR Portal. Retrieved on September 26, 2022 from [lrmds.deped.gov.ph/faq](http://lrmds.deped.gov.ph/faq)
- [10] Department of Education. Strengthening the Information Communication Technology ICT Governance of the Department of Education. Available at: [www.deped.gov.ph/2007/01/19/do-1-s-2007-strengthening-the-information-communication-technology-ict-governance-of-the-department-of-education-amended-by/](http://www.deped.gov.ph/2007/01/19/do-1-s-2007-strengthening-the-information-communication-technology-ict-governance-of-the-department-of-education-amended-by/) [Accessed: February 11, 2021]
- [11] Driscoll, M. (2022). The value of a 21st century education. Retrieved on December 29, 2022 from <https://thinkstrategicforschools.com/education-21st-century>
- [12] Egay, Lourdes C. (2018). School Report Card SY 2017-2018. Gatbo National High School, DepEd Sorsogon City
- [13] Funa, A. Gabay, R.A. & Ricafort, J. (2021). Gamification in Genetics: Effects of gamified instructional materials on the STEM student's

- intrinsic motivation. *Journal Pendidikan IPA Indonesia*. 10(4), 462-473.
- [14] Guidelines and Processes for LRMSD Assessment and Evaluation Version: Final Draft 1.0 Date: March, 2009. Retrieved on September 5, 2022 from <https://lrmsd.deped.gov.ph/docs/LRMSDFramework.pdf>
- [15] Hamari, J. and Koivisto, J. (2019). The rise of motivational information systems: A review of Gamification Research. *Int. J. Inf. Manag.* 45,191-210. Doi:10.1016/j.ijingomg.2018.10.1013
- [16] Hubilla, E. D. (2021). Least Learned Learning Competencies in Mathematics. Deped Sorsogon City Division
- [17] LaCasse, Peter (2020). Quality Content: Now More Important than Ever. Retrieved on October 4, 2022 from [https://www.carnegielearning.com/blog/quality-content/McGivney E. and Winthrop R. \(2016\). Skills for a changing world; advancing quality learning for vibrant societies](https://www.carnegielearning.com/blog/quality-content/McGivney-E-and-Winthrop-R-(2016)-Skills-for-a-changing-world-advancing-quality-learning-for-vibrant-societies). Retrieved on July 12, 2022 from [www.brookings.edu/research/skills-for-a-changing-world/](http://www.brookings.edu/research/skills-for-a-changing-world/)
- [18] Pallud, J. (2017). Impact of interactive technologies on stimulating learning experiences in the museum. *Elsevier* — B.V. 54(4), 465-478. doi.org/10.1016/j.im.2016.10.004
- [19] Prensky, M. (2001). "Digital Natives, Digital Immigrants", *On the Horizon*, Vol. 9, No. 5
- [20] Sailer, M. and Homner, L. (2019). The gamification of Learning: a Meta-Analysis. *Educ. Psychol. Rev.* 32, 77-112. Doi:10.1007/s10648-019-09498-w
- [21] Shabiralyani, G., Hasan, K. S., et. al (2015). Impact of Visual Aids in Enhancing the Learning Process Case Research: District Dera Ghazi Khan. *Journal of Education Practice*. Vol. 6, No. 19, 2015 retrieved on October 6, 2022 from <https://files.eric.ed.gov/fulltext/EJ1079541.pdf>
- [22] Torre Franca, E. (2017). Development and validation of instructional modules on rational expressions and variations. *The Normal Lights*, 11(1), 43-73. Retrieved September, 2022 from [po.pnuresearchportal.org](http://po.pnuresearchportal.org)
- [23] Wentzel, P., Iammeren R., Molendijk M. and de Bruin, S. (2005). Using mobile technology to enhance student's educational experience.

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