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Online Recorded Video Lectures: Effects on Grade 7 Learners' Achievement and Retention Levels in Algebra

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Abstract
This experimental study investigates whether learners in Grade 7 achieve higher levels of achievement and retention through online recorded video lectures or online lectures during a pandemic COVID 19 time.A pretest-posttest-retention test control-experimental group design was used to two (2) groups of Grade 7 learners in algebra. T-tests were used to determine whether there was a significant difference of groups means scores at 0.05 level of significance.The t-test for achievement level revealed a significant difference in the mean scores between the control and experimental groups. However, although the control group had higher mean gain score than the experimental group, on the average both groups revealed a no significant difference in terms of gain scores. Furthermore, results revealed that there was no significant difference between the control and experimental groups in terms of retention levels. This indicates that both Online Lectures and Online Recorded Video Lecture contributed almost the same amount of information retained. However, learner's perception from Math Journals and Interview results showed that learners exposed to Online Recorded Video Lectures appreciated the teaching strategy for giving them equal opportunity to learn. Therefore, Online Recorded Video Lectures is recommended to learners who do not have stable internet connection.
Keywords: Achievement Level, Online Lectures, Online Recorded Video Lectures and Retention Level
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1. Introduction

A paradigm shift has taken place in education and great deal of attention is paid towards the use of technology and video captured lectures are of no exceptions. The video captured lectures have been considered an effective means for delivering course content and infusing teaching presence in the virtual environment.

According to Bagutakayo as cited by Salazar (2016), video recorded lectures means recording classroom-based activities in a digital format that learners can watch over the web, on a computer or mobile device. It offers a flexible education tailored for increasing academic success since the difficult course are recorded enabling anywhere, anytime access at any pace, time and place. However, the impact on achievement and retention level is not clear. As acknowledged by Jochems (2018), most studies are limited to the overall opinions and perceptions of learners and lecturers about the usefulness of the recorded lectures.

Integration of technology in education has been the urgent response in continuing education amidst the COVID-19 pandemic. However, studies have revealed that slow internet connection has always been a gap in fully maximizing technology, hence, as an alternative recorded video lectures paved the way. As to the teacher facilitating learning gleaned towards practicability and convenience since continuous discussions are presented without interruption, on the other side, learners are given the autonomy and control on his learning style at his own pace. Thus, this study furthers the research literature on the effects of online recorded video lectures on academic achievement and retention level. Online recorded video lectures can be helpful if a teacher is teaching the same topic in the same grade level, the teacher would not bother repeating herself/himself in the other class because she/he just wants to play the recorded video that she took in the previous class. And also not all learners are eligible to enroll in online classes due to a variety of factors. The researcher posts the online recorded video lectures to their Facebook closed page and allows learners to view them whenever they are available. Retention in knowledge is important in learning a subject, we want to measure if online video recorded lectures can help student retain more information than in online lecture.

A recent study conducted by Salazar (2016) involving Video Captured Lectures revealed a significant difference within and between groups (control and experimental) on the learner scores in the Achievement test. Although, the result revealed a failure mark on the pretest but a significant increase of the gain scores was achieved in the posttest. Specifically, an average increase was gained by the control group and a high increase was gained in the experimental group, credited to the actual video captured lectures. It is therefore possible to improve the learner achievement level in Differential Calculus using the video captured lectures with Salazar's Method of Grouping. Moreover, qualitative assessments showed that Salazar's Method of Grouping creates and develops self-confidence, encourages effective communication and facilitates exchange of ideas towards a common goal.

In this research, the researcher will replicate the Video Captured Lectures in a new normal setting, where the

researcher will record an online class with the controlled group and upload the online recorded video lectures to the experimental group via Facebook closed page. In addition, a factor for retention has been added by a recent researcher to see which group retains more conceptual knowledge. Salazar's method is only effective in a class size of at most twenty learners (Salazar. 2014).

This paper affords the current researcher the opportunity to explore the impact of online recorded video lectures on the achievement and retention level among the learners.

2. Research Design and Methodology

This study contains the discussion of the research method used in the conduct of this study. It describes and expounds the research design, research subject, research instrument, and data analysis.

Research Design

This study employed pretest-posttest-retention test control-experimental group design. It is a quantitative and qualitative research method that attempts to collect quantifiable information or data from one segmented population. It establishes the significant relationship of variables involve. It aims to draw concrete conclusions from the participants through the math journal with follow up interviews.

Research Subject

As recommended by the School Principal of a Community High School, in Lanao del Norte, during the school year 2020-2021, the researcher was given two sections of the Grade 7 learners as respondents. The total numbers of learners in each section is forty-one (41), however, upon asking permissions and viability of the learners in terms of technology, only 33 learners of each sections were the actual number of respondents as shown in Table 1.

Table 1. Matrix of the Respondents

	Section Laurel	Section Quirino	Actual No of Respondents
Online Class	6	27	33
Online Recorded Video Lecture	27	6	33
No Gadget/ Module Only	8	8	
Total			**66**

Research Instruments

Qualitative and quantitative data were gathered using the following instruments:

Achievement Test in Algebra. A validated Achievement test (teacher-made test) was used in this study. An item in the test represents a topic covered. It consists of (i) translating English phrases to mathematical phrases and English sentences to mathematics sentences, and vice versa (ii) Illustrates and differentiates related terms in algebra: (a). an where is a positive integer (b.) constants and variables (c.) literal coefficients and numerical coefficients (d.) algebraic expressions, terms and polynomials (e.) number of terms, degree of the term and degree of the polynomial (iii) evaluates algebraic expressions for given values of the variables (iv) adds and subtracts polynomials. (v) derives the laws of exponent (vi) multiplies and divides polynomials. (vii) uses models and algebraic methods to find the: (a) product of two binomials; (b) product of the sum and difference of two terms; (c) square of a binomial; (d) cube of a binomial; (e) product of a binomial and a trinomial. The test consisted of forty (40) items, one (1) mark each with forty (40) as the highest possible score. Achievement tests are used during pretest (before the intervention), shuffled-multiple choice items on the posttest (given after the intervention) and shuffled-multiple choice items from the posttest on the retention test (given 2weeks after the intervention). Math Journal with follow up phone call interview is given during and after the intervention.

Data Analysis

Achievement Level

The tables below were used to interpret the data gathered in the study. It served as basis to determine the classification of the respondents' achievement and retention levels in Algebra. In the tables, there are score range and description of the intervals they belong to.

Table 2. Achievement Test Scores Range

Score Scale	Percentage Scores	TRANSMUTED GRADE	Achievement Level Interpretation
32 – 40	78.848 - 100	90% - 100%	Advance (A)
28 – 31	69.233 – 78.847	85%-89%	Proficient (P)
24 – 27	59.618 – 69.232	80%-84%	Approaching Proficiency (AP)
20 – 23	50.000 – 59.617	75%-79%	Developing (D)
0 – 19	Below 50.000	74%-0%	Beginning (B)

Source: https://www.ciit.edu.ph/k-to-12-grading-system/ with modified suited to the present study Community High School grading system used in Mathematics

This gain score description is from the study of Salazar (2014) about the enhanced Moore grouping method. The gain score was obtained by subtracting the pretest scores from the posttest scores. This table was used in the study to determine the gain score of the respondents after taking the pretest and posttest in the achievement test for both control and experimental group.

Table 3. Gain Scores Range

Gain Scores	Achievement Level Increase Descriptions
33 – 40	Very High Increase
25 – 32	High Increase
17 – 24	Average Increase
9 – 16	Low Increase
1 – 8	Very Low Increase
0 and below	No gain Score

**Adapted from Salazar with Modifications*

Retention Level

The researcher personally checked the answers of the respondents, the tabulated retention scores

Table 4. Retention Level Interpretation

Score Scale	Equivalent Retention Level	Qualitative Equivalence
32 – 40	Outstanding Retention	Outstanding
28 – 31	Very Good Retention	Very Satisfactory
24 – 27	Good Retention	Satisfactory
20 – 23	Poor Retention	Fairly Satisfactory
0 – 19	Very Poor Retention	Did not meet Expectations

****DepEd Retention Level With Modification***

3. Results and Discussion

This study presents the data gathered, its analysis and interpretation. The data were presented according to the specific problems of the study.

Achievement Level in Algebra

Table 5 below that control and experimental group are comparable at the very start of the study as shown in the pretest mean score of 12.42 with corresponding description as Beginning. This data has further supported the results from test of normality as shown in Table 5 in which 93-97% is equivalent in terms with achievement level.

Table 5. Learners' Achievement Levels in Pretest-Posttest

Score Range	CONTROL GROUP				EXPERIMENTAL GROUP				
	PRETEST		POSTTEST		PRETEST		POSTTEST		ITP
	F	%	F	%	f	%	f	%	
32 – 40 (90% - 100%)									
28 – 31 (85% - 89%)									
24 – 27 (80% - 84%)			3	9.09	1	3.03	4	12.12	**AP**
20 – 23 (75% - 79%)	1	3.03	9	27.27	2	6.061	4	12.12	**D**
0 – 19 (74% - 0%)	32	96.97	21	63.64	30	90.91	25	75.76	**B**
TOTAL	33	100	33	100	33	100	33	100	
MEAN	12.42		17.76		12.42		16.88		

Legend: **ITP** – Interpretation; **AP** – Approaching Proficiency; **D** – Developing; **B** - Beginning

Posttest results in control group revealed that 21 out of 33 (63.64%) has a corresponding achievement level of Beginning while 9 out of 33 (27.27%) are considered Developing and 3 out of 33 (9.09%) has a corresponding achievement level as Approaching Proficiency. On the other hand, in the experimental group 25 out of 33 (75.767%) has a corresponding achievement level of Beginning while 4 out 33 (12.12%) are considered Developing and 4 out 33 (12.12%) has a corresponding achievement level as Approaching Proficiency. However, no learner from both groups has a corresponding achievement level of Proficient and Advance.

Table 6. Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
pretest.exp	.118	33	.200*	.951	33	.139
pretest.cont	.135	33	.132	.975	33	.635

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Overall, Table 6 represents the tabular presentation of learners' assessment on achievement level in Algebra. This result indicates that both online recorded video lectures and online class are viable strategy in distance learning. This claimed was further supported by Anderson (2014) whom enunciated that learning via live virtual and recorded live virtual provides flexibility in time and space which is attractive to secondary learners.

Table 7. Two-Sample t Test for the Difference in the Achievement Level between Control and Experimental Group

GROUP		Pre test	Post test	df	Computed t	p-value	Remark
Control (n=33)	Mean	12.42	17.76	32	7.16	<0.001	Significant
	SD	3.85	5.82				
Experimental (n=33)	Mean	12.42	16.88	32	5.20	<0.001	Significant
	SD	4.73	5.90				

**Significant at p<0.05 level of significance*

Subjecting the data on mean scores of the learners using t-test is shown in Table 8. It revealed that there is significant differences on the learners' mean scores in their achievement test within groups. That is, both groups posted significantly better scores after the exposure to online learning and online recorded video lectures, since the p-values are less than 0.05.

This was supported Posey et. al (2015) posits the unique advantage of live virtual classroom is that they provide for two-way interaction between the instructor and the learners on the other hand argued that an important advantage in using recorded live virtual classroom is that learners can exercise "control" over the programming by using the stop, rewind, replay, and fast forward features to proceed at their own pace. Hence, a "not statistically significant" finding indicates that both elements are equivalent. In the case of this study, the results indicate that both teaching strategies are equivalent in terms of the resulting learner achievement levels. This suggests that

virtual live methods of instruction and offline videos both lead to equivalent levels of learner achievement in mathematics.

Achievement Gain Scores

Subtracting learner's pretest scale score from the posttest scale score obtained a gain-score result. The gain-score result is compared to an expected gain to determine if adequate academic growth has been made. In this study, gain score results determined the growth in achievement test conducted in Algebra among Grade 7 learners.

Table 8. Gain Score of Control and Experimental Group

Gain Scores Range	Control Group		Experimental Group		Interpretation
	F	**%**	**f**	**%**	
33 - 40					
25 - 32					
17 - 24					
9 - 16	9	27.27	7	21.21	Low Increase
1 - 8	19	57.58	21	63.64	Very Low Increase
0 and below	5	15.15	5	15.15	No gain Score
Total	33	100	33	100	
(Mean)	5.33		4.45		Very Low Increase

Table 8 shows the gain scores in both experimental and control group in the achievement test, it can be gleaned from the tabular presentation that for the control group with online class, 26 out of 33 (78.79%) of the learners got a very low increase, 5 out of 33 (15.15%) of the learners got low increase and only 2 out of 33 (6.06%) of the learners got an average increase. On the other hand, for the experimental group with online recorded video lectures, 23 out of 33 (69.70%) of the learners got a very low increase and 10 out of 33 (30.30%) of the learners got low increase. However, it is important to note that for both groups no learner got a high and very high increase. Hence, it can be inferred that both strategies have somehow made a little impact on learners on achievement level. This result may be attributed to the fact that each learner is unique in terms of acquiring knowledge in learning. In terms of results, learner performance may be poor, not necessarily because they do not have the skills, but more to the fact that they have not been able to optimize their skills (Coreg, 2017).

Table 9. Independent Sample T-Test for the Difference in the Gain Scores between Control and Experimental Groups

GROUP		Gain Scores	df	Computed t	p-value	Remark
Control (n=33)						
	Mean	5.33				
	SD	4.28	64	-0.77	0.45	Not Significant
Experimental (n=33)						
	Mean	4.45				
	SD	4.92				

**significant at 0.05 level of significance*

Table 9 shows that the control group has higher mean difference in the achievement level than the experimental group, which yielded a test statistic of -0.77. The resulting p-value of 0.45, means that in terms of the gain scores, there was no significant difference in gain scores between the control and experimental groups. This implies that although the control group had higher mean difference than the experimental group, on the average both groups significantly had equal difference between their scores in the posttest and pretest.

This result was further explained by Collis et.al (2016) and postulated outlined of which elaborated the four equally compelling advantages of having an online class in an instructional context. First, online class increases motivation for distance learners to keep up with their peers. Secondly, it creates a telepresence real time interaction which fosters development of group cohesion and a sense of community. Then, it provides quick feedback and support consensus and decision-making in group activities. Lastly, it encourages discipline in learning and help learners prioritize their studies. Hence, with online class an instructor can assess learners' levels of knowledge and tailor the course material appropriately. In addition, the inclusion of a scheduled time adds the perception (or reality) that the instructor and classmates are providing external motivation and are encouraging learners' participation, which can result in higher retention and completion rates.

Retention Level in Algebra

Retention of knowledge is vital for future applications of concepts especially in Mathematics, hence, as we go forward with distance learning, the researcher believed that it is important to determine whether the teaching strategies implemented may be able to retain information and skills.

Values in Table 10 indicates a less varied results from both the control and experimental groups in terms with retention level. It can be inferred that in the control group 21 out of 33 (63.64%) of the learners has a very poor retention, hence did not meet expectations as to the qualitative equivalence of retention level set forth by DepEd grading system. 7 out of 33 (21.21%) of the learners got poor retention and with qualitative description as fairly satisfactory. 3 out 33 (9.09%) of the learners got good retention with satisfactory retention level. Lastly, 2 out 33 (6.06%) of the learners got very good retention and retention level is very satisfactory.

Table 10. Learner's Retention Level

Score Range	Control Group				Experimental Group				Equivalent Retention Level	Qualitative Equivalence of the Retention Level
	POST TEST		RETENTION TEST		POST TEST		RETENTION TEST			
	f	%	f	%	f	%	f	%		
32 – 40			1	3.03			2	6.06	Outstanding Retention	Outstanding
28 – 31			2	6.06			1	3.03	Very Good Retention	Very Satisfactory
24 – 27	3	9.09	4	12.12	4	12.12	2	6.06	Good Retention	Satisfactory
20 – 23	9	27.27	2	6.06	4	12.12	7	21.21	Poor Retention	Fairly Satisfactory
0 – 19	21	63.64	24	72.73	25	75.76	21	63.64	Very Poor Retention	Did not meet Expectations
Total	33	100	33	100	33	100	33	100		
Mean	17.76		17.24		16.88		18.52			

Values in Table 10 indicate less varied results for both the control and experimental groups in terms of retention levels. Results showed that in the control group 24 out of 33 (72.73%) of the learners have very poor retention, hence did not meet expectations as to the qualitative equivalence of retention levels set forth by DepEd grading system; two out of 33 (6.06%) of the learners got poor retention and with qualitative description as fairly satisfactory. Four out 33 (12.12%) of the learners got good retention with qualitative equivalence of satisfactory retention level. Two out 33 (6.06%) of the learners got very good retention, with qualitative equivalence retention level of very satisfactory. Lastly, one out of 33 (3.03%) of the learners got Outstanding Retention and with qualitative description as Outstanding.

On the other hand, values in Table 10 also indicates that for experimental group, 21 out of 33 (63.64%) of the learners got very poor retention and did not meet expectations as to the retention level. Seven out of 33 (21.21%) of the learners got poor retention with qualitative equivalence of fairly satisfactory retention level. Two out 33 (6.06%) of the learners got good retention and has satisfactory retention level. Only one of the learners got very good retention and has qualitative equivalence of very satisfactory retention level. Lastly, two out of 33 (6.06%) of the learners got Outstanding Retention with qualitative description as outstanding. It can be deduced that both online learning and online recorded video lectures as distance education strategies, have the same impact as to the amount of information retained by the learners.

Jones (2016) posits that study skills, motivation, practice and inclination of students fairly affect the retention level for learning mathematics. This claimed was further supported by Arthur (2017) postulates that learning environment does not necessarily affects the retention level of students. He argued that from a social point of view it may seem that technology makes learning easy. Educational materials may have improved as teachers offer technological options for use of the students. However, he found that technology used to simply focus on content was not the solution for students having trouble grasping the mathematical concepts which may affect the retention level among students.

Table 11. Independent Sample T-Test for the Retention Level between Control and Experimental Groups

GROUP		Retention Test	df	Computed t	p-value	Remark
Control (n=33)	Mean	17.24	64	0.86	0.39	Not Significant
	SD	6.11				
Experimental (n=33)	Mean	18.52				
	SD	5.86				

The statistic t-test was used to compare the retention levels of the two groups. Table 11 shows that the experimental group had larger mean scores than the control group in the retention test, which yielded a test statistic of 0.86. The resulting p-value of 0.39, means that, in terms of the mean scores in the retention test, there was no significant difference in mean scores between control and experimental group in the retention level. This implies that although the experimental group has higher mean scores than the control group, on the average the two groups significantly had equal performance in the retention test. It can be further deduced that both teaching strategies, online learning and online recorded video lectures, contributed the same amount of information retained and can be considered viable in learning Mathematics at a distance.

This was further supported by Bakie et. al (2015) that strongest factors that had positive relationship to Mathematics retention level are academic-related skills, academic self-confidence, and academic goals. Academic related skills include study skills, time management skills, and study habits. Self-confidence is defined as the belief in one's ability to perform well in school. Study skills are defined as the extent to which you believe you know how to assess an academic problem, organize a solution, and successfully complete academic assignments.
Analysis and interpretation on the results on retention level is quantitatively and qualitatively still on process.

5. Summary, Conclusions and Recommendations

Summary of Findings

After analyzing and interpreting some of the data gathered, the researcher of this experimental study formulated the following statements which were the findings of the results are presented below:

1. It can be inferred that the pretest data are normally distributed. So, it can be concluded that the groups were equivalent in terms of achievement levels prior to the teaching intervention. This is noteworthy because it eliminates the possibility of having one group consist of above-average achieving learners, which could bias the final results.
2. As to the difference in achievement level between both groups revealed "not statistically significant" finding indicates that both elements are equivalent. In the case of this study, the results indicate that both teaching strategies are equivalent in terms of the resulting learner achievement levels. This suggests that virtual live methods of instruction and offline videos both lead to equivalent levels of learner achievement in mathematics.
3. As to the difference in gain scores revealed "a significant difference" between control and experimental group in terms of the difference in the gain scores. This implies that on the average the two groups significantly had unequal differences between their scores in the posttest and pretest, which can be supported by the findings that the control group had bigger mean difference than the experimental group (in terms of magnitude)

Conclusion

The main purpose of this study was to analyze the effects of online recorded video lectures on the achievement and retention levels of learners. Based on the quantitative with qualitative research data analysis, results and findings, the following conclusion are supported and sustained:

It can be concluded that both strategies have somehow made a little impact on the learners' achievement levels. This result may be attributed to the fact that each learner is unique in terms of acquiring knowledge in learning

From a social point of view, it may seem that technology makes learning easy; however, it was not seen as a solution for learners having difficulty in understanding the mathematical concepts. It can be further deduced that both teaching strategies contributed the same amount of information retained, and can be considered viable strategies in teaching and learning algebra at a distance.

Lastly, it can be concluded that Online Recorded Video Lecture has more compelling reasons to achieve a significant difference from the pretest-posttest scores if learners would attentively persist in thoughtful and reflective viewing of the lectures. Accordingly, online recorded video lecture increases motivation for learners to keep up with their peers by sharing knowledge; and lastly, with online recorded video lectures, the learners will be easily guided in doing their homework because the learners can review their lessons during their free time,

rewinding and repeating them when necessary.

Recommendations

Given the forgoing conclusions, the following recommendations were presented:

1. In order to see the difference of both strategies, the researcher recommends including factors such as motivation levels of the learners.
2. Replicate the experiment in the Senior High school level specifically in Math subject in STEM academic strand;
3. Conduct the same experiment for a longer period of time, with more respondents, say four sections; with two groups for control and two groups for experimental.
4. Replicate the study; however, retention test should be given at least more than 2 – 3 weeks after the implementation of the study.
5. Learners should have good internet access so that the results will be more likely positive.

References

Anderson, A (2014). Teachers, schools, and academic achievement. Econometrica

Arthur, B. (2017). The effect of context-based video instruction on learning and motivation in online courses', *The American Journal of Distance Education*

Bakie, et. al (2015). Equations with technology: different tools, different views. *Mathematics Teaching*

Collis, et.al (Lecture capture: Making the most of face-to-face learning', *Engineering Education*

Coreg, D. (2017) A randomized assessment of online learning. American Economic Review: Papers & Proceedings

Davis, D. (2017). 'Student perceptions of the use of instructor-made videos in online and face-to-face classes', *Journal of Online Learning and Teaching*

Jochems, E. (2018). Instruction technology for teaching and learning. Upper Saddle River, NJ: Merrill

Jones, N. (2016). Student Perceptions of Collaborative Learning, Social Presence and Satisfaction in a Blended Learning Environment. Relationships and Critical Factors. Computers and Education

Kearlsy, K. (2016). Online education: Learning and teaching in cyberspace. Wadsworth Publishing Company

Morrison, M. and Guenther, G. (2012). . Distance learning technologies in K-12 schools: Past, present, and future practice

Posey, et. al (Effects of podcasting on college student achievement and attitude', *Journal of the Research Center for Educational Technology*

Saltsman, K. (2016). An Innovative Approach toward a Comprehensive Distance Education Framework for a Developing Country. American Journal of Distance Education

Salazar, Douglas (2016). Video Captured Lectures with Salazar's Method of Grouping: Effects on Learners' Achievement in Differential Calculus. Advances in Social Sciences Research Journal. 3. 126 – 138. 10.14738/assrj.35.2040. Retrieved February 4, 2020, from ISRES Publishing

Shelton, K. (2017). Comparing video styles and study strategies during video-recorded lectures: Effects on secondary school mathematics students' preference and learning', *Interactive Learning Environments*.

Simonson, L. (2012). Online distance education: Towards a research agenda. Athabasca University Press.