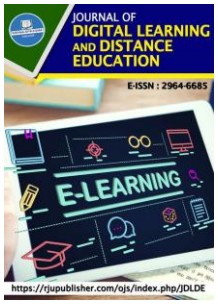

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Video Lesson Tutorial: An Innovative Strategy in Improving Students' Learning Skills in General Chemistry

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Abstract

This study addresses the need for pedagogical innovation by evaluating the effectiveness of teacher-made video lessons combined with learners' activity sheets (LAS) on the performance of STEM students. The background of this research is rooted in the challenge of mastering difficult learning competencies, necessitating the development of an enhancement plan based on targeted interventions. The primary objective was to determine whether the integration of these digital and printed resources significantly improves student learning outcomes in complex subject matter. The researcher employed a quasi-experimental research design to gather data. The methodology involved identifying the least learned competencies and developing localized video lessons to address them. Data were collected from STEM respondents through the administration of pretests and posttests, alongside the distribution of learners' activity sheets to facilitate interactive learning. The results, as reflected in the statistical analysis, revealed a substantial increase in student performance. The pretest mean score of 2.90 rose significantly to a posttest mean score of 12.30 following the intervention. Statistical testing yielded a calculated t-value of -28.85 and a p-value of .000, which is well below the 0.05 significance level. This indicates a statistically significant difference, leading to the rejection of the null hypothesis. The negative t-value further confirms that posttest scores were significantly higher than pretest scores. In conclusion, the integration of teacher-made video lessons and activity sheets is highly effective in improving STEM students' academic performance, suggesting that learners respond positively to diverse, modern techniques when tackling challenging topics.

Keywords: Video-lesson tutorial, chemistry, innovative strategy

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Introduction

Learning is important for learners to build a foundation of knowledge that they can utilize in their future careers. Learning through videos is considered an effective tool for many learners. A video lesson tutorial is defined as a video that presents educational material for a topic to be learned. The format may vary; it might be a video of a teacher speaking to the camera, photographs, and text about the topic, or some mixture of these. Based on the study by (Martínez-Martínez et al., 2024) students performed better when videos were included in the mid-session of the lecture. (Greeves & Oz, 2024) also found out that students found the videos and clips to be the most useful and efficient teaching tool to improve learning. (Navarrete et al., 2025) found out that videos and clips designed to support tutoring have a significant result. In addition, (De La Flor López et al., 2016) indicated that about 94% of the students might improve their understanding of the learning materials by watching videos.

According to Zolkwer et al. (2023), in her thorough research on learning effectiveness through videos, she found that video-based learning brought benefits in understanding, motivation in learning, improved study habits, and better grades. In a nutshell, the inclusion of videos and clips in learning has positive learning outcomes. Based on my experience as a chemistry teacher, learners find video lesson tutorials as a tool to make their learning easier, engaging, and easily grasp the information (Ribosa & Duran, 2022). Some learners also have poor performance because they have difficulty understanding the lesson at the same time cannot comprehend well because of the complex lesson (Godsk & Møller, 2025). Teachers cannot interact with them one by one to guide and teach them a lesson (Menno & Prodjosantoso, 2025). The best means to connect to the learners is through technology (Balalle, 2024). As a conclusion, the researcher thought of conducting research regarding the effectiveness of teacher-made video lesson tutorials accompanied by learners' activity sheets on the performance of the Grade 11 STEM learners in General Chemistry (Pandita & Kiran, 2023).

Learners in this era are more indulged and interested in using gadgets and the internet rather than paying attention to educational books, writing activities, and reading materials, which may cause difficulty in learning chemistry. Hence, this study was conducted to evaluate whether there is a positive effect of video lesson tutorials on the performance of Grade 11 STEM learners in General Chemistry. This study was conducted to evaluate the effectiveness of teacher-made video lesson tutorials on the performance of the Grade 11 STEM learners in General Chemistry 1. The findings of the study will be the basis for the proposed Enhancement Plan. This study aimed to evaluate the effectiveness of teacher-made video Lesson Tutorials in Improving Students' Learning Skills in General Chemistry among the Grade 11 STEM learners of Pontevedra National High School, School Year 2024-2025.

Specifically, it sought to answer the following questions: What is the pre-test performance of the Grade 11 STEM learners before the utilization of the Video Lesson Tutorial? ;What is the post-test performance of the Grade 11 STEM learners after the integration of the Video Lessons Tutorial? ; Is there a significant difference between the pre-test and post-test performances of the Grade 11 STEM learners in their utilization of the Video Lesson Tutorial?; What enhancement plan can be proposed on the findings of the study?

Methodology

This study utilized the quasi-experimental research design to determine the effectiveness of video lesson tutorial accompanied by the learners' activity sheets (LASs) on the performance of the Grade 11 STEM learners in General Chemistry. In the quasi-experimental research design, the researcher prepared a video that will focus on the least learned learning competency, as well as facilitating the giving of pretest and posttest to the identified respondents to gather necessary data. Along with the giving of video lesson tutorials, the researcher also distributed the learners' activity

sheets while watching the video lesson tutorials to be used as a guide in learning. Pontevedra National High School is the main locale of the study. The forty (40) Grade 11 STEM learners are the main respondents of the study, and the data is based on the students' performance ratings, such as the pretest and posttest performances of the Grade 11 STEM learners utilized. This research is mainly focused on gathering data on the effectiveness of video lesson tutorials on the performance of the Grade 11 STEM learners on General Chemistry and a proposed Enhancement Plan based on the findings of the study.

Results and Discussion

Table 1. Pretest Performance of Respondents

Score Range	Description	Pretest Scores	
		Frequency	%
13-15	Excellent	0	0
10-12	Very Good	0	0
7-9	Good	0	0
4-6	Fair	7	18
1-3	Poor	33	82
Total		40	100

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Table 4 above presents the pretest performance of the STEM students. This result was based on the assessment given by the teacher/researcher based on the knowledge and skills gained by them before the intervention was made. Based on the results given, it was found out that among the groups of scores set as results by the statistical treatment based on the raw data or test scores performance of the STEM students. It was shown that among the 5 groups of scores, there were 33 total respondents said to be the greatest number of respondents who belong to the poor level of performance which has a score ranging from 1 to 3 scores while the remaining respondents who took the pretest assessment are only 7 respondents which were said to be the least number of respondents having a fair level which has a score ranging from 4-6 scores among the 40 overall total number involved in the study. In the `13 to 15 group of scores, which is said to be in the excellent performance level, it was found out that none of the respondents belong to this highest level of performance. This result is based only on the idea of the STEM students on the different learning styles introduced by the teacher to them, which means that the knowledge they have gained is based only on the things that they have grasped during the delivery of the learning competency. Based on the result in Table 4, which focuses on the pretest score performances of the STEM students before the integration or utilization of the teacher-made video lesson and learners' activity sheets in the delivery of the most essential learning competency, implied that considering the difficulties of the topic for the learners (Gunawardena et al., 2024). If this scenario is always experienced by the learners, there are tendencies that the learners could experience below expected performance or have the remarks of did not meet expectations, which means that some of the students could have less than 75 percent. Moreover, the learners need an intervention that could motivate them to learn the subject, considering that STEM students need to be motivated since this level or key stage needs special attention.

Table 5. Posttest Performance of Respondents

Score Range	Description	Post-test scores	
		Frequency	%
13-15	Excellent	21	53
10-12	Very Good	15	37
7-9	Good	4	10

4-6	Fair	0	0
1-3	Poor	0	0
Total		40	100

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Table 5 above presents the posttest performance of the STEM students in General Chemistry, specifically in balancing chemical equations. This result was based on the assessment given by the teacher/researcher based on the knowledge and skills gained by them after the intervention was conducted, the researcher is referring to the utilization of the teacher-made video lesson and learners' activity sheets. Based on the results given, it was found that among the groups of scores set as results by the statistical treatment based on the raw data or test scores performance of the STEM students, there were 21 total respondents said to be the most number of respondents who belong to the excellent level of performance which has a score ranging from 13 to 15 scores while the remaining respondents who took the posttest assessment 15 respondents which was said to be the next number of respondents among the 40 overall total number involved in the study which is in the very good level of performances which has a score that ranging from 10-12. In the `7 to 9' group of scores, which is said to be in the good level of performance, it was found out that 4 of the respondents belong to this average level of performance. In the fair level of performance (4-6) as well as in the poor level of performance, which has a score ranging from 1-3, none of the respondents. This result is based only from the idea of the STEM students who have experienced gaining knowledge though the use of teacher-made video lesson and learners activity sheets introduced by the teacher about the balancing chemical equations which means that the knowledge they have gained is based only on the new things or experiences they acquire during the time allotted for them to the new intervention (Lovin & Savu, 2025). Based on the result in table 5, which fucoses on the posttest score performances of the STEM students after the integration or utilization of the teacher-made video lesson and learners' activity sheets in the delivery of the most essential learning competency implied that considering the new strategies introduced by the teacher which also based on their type of environment they are in as well as their capacity to handle level of skills in delivering the balancing chemical equations (Tuononen et al., 2022). If this scenario is always experienced by the learners (Fromm et al., 2025), there is a tendency that the learners could improve their learning skills or performance (Martinez, 2022). Moreover, the learners adopted the intervention given to them and were motivated to learn the subject, considering that STEM students need attention in learning the topics (Zamiri & Esmaeili, 2024).

Table 6 presents the test of the difference between the scores in the pretest performance and the posttest performance of the STEM students before and after the delivery of the topic based on the most essential learning competency, integrating the teacher-made video lesson and learners' activity sheets. Based on the findings of the study as reflected in Table 6, it was revealed that the pretest performance of the STEM students has a mean equal to 2.90 and with a standard deviation of .90, this score was treated based on the raw scores given by the STEM students before the teacher/researcher was introduced a new intervention which means that own knowledge and skills from the learners were being emphasized (Kwangmuang et al., 2021). It was further revealed that the pretest performance is lower than the posttest performance gained by the STEM students after the integration of the new intervention which is the teacher-made video lesson and learners' activity sheets in the delivery of the most essential learning competency on the specific topic presented by the teacher which have the mean of 12.3 and standard deviation of 1.98. Based on the results of the pretest and posttest, it resulted in a computed t-value of -28.85 and a p-value of .000 resulted, which is far below the 0.05 level of significance. This indicates a statistically significant difference between the pretest and posttest scores. The negative t-value reflects that the posttest scores were significantly higher than the pretest scores that leads to the decision of the hypothesis rejected based on the statement that "there is no significant difference between the test scores of the pretest and posttest performances of the STEM students before and after the integration of the teacher-made video lessons and learners' activity sheets" (Ansari & Naseer, 2024). The result of this study regarding the integration of the

teacher-made video lesson and utilization of learners' activity sheets implied that indicating the aforementioned intervention to the topic being delivered by the teacher-researcher in STEM students is significantly effective in improving their performance (Hattie & O'Leary, 2025). This means that the majority of the learners love the idea of being given new techniques for learning the topic, especially those learning competencies that are difficult to comprehend or understand (Vanguri et al., 2025).

Table 6. Test Difference between Pretest and Posttest Scores

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	2.9000	40	.90014	.14233
	Posttest	12.3000	40	1.97679	.31256

Table. Paired samples correlations

		N	Correlation	Sig.
Pair 1	PRETEST & POSTTEST	40	.1333	.415

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair1	PRETEST & POSTTEST	40	.1333	.415	-10.05902	-8.74098	-28.851	39	.000

Conclusion

The integration of digital educational technology has become a transformative necessity in modern STEM education. This study was driven by the challenge of mastering complex learning competencies, aiming to evaluate the effectiveness of teacher-made video lessons combined with learners' activity sheets (LAS) in improving student performance. The findings demonstrate a significant improvement in academic outcomes, as evidenced by the increase in mean scores from a pretest of 2.90 to a posttest of 12.30. Statistical analysis confirmed a significant difference with a t-value of -28.85 and a p-value of .000, leading to the rejection of the null hypothesis. It is concluded that the synergy between visual digital content and structured activity sheets is highly effective in helping students understand difficult concepts. These results imply that pedagogical shifts toward interactive, technology-driven methods are essential for fostering student engagement and autonomy. It is recommended that educators receive specialized training to develop localized digital materials that address specific learning gaps. This study was limited by its focus on a specific STEM topic and a localized group of respondents. Furthermore, infrastructure challenges such as equitable digital access remain a barrier to wider implementation. Future research should explore the long-term retention of knowledge gained through these interventions and investigate the application of AI-driven adaptive learning tools across diverse academic disciplines to ensure more inclusive and sustainable educational progress.

Conflicts of Interest

The authors declare no conflict of interest

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Author contribution

Rodel A. Azares was responsible for the conception and design of the study, as well as the drafting of the manuscript. contributed to the analysis and interpretation of the data and revised the manuscript critically for important intellectual content. Both authors reviewed and approved the final version of the manuscript to be published. Both authors agree to be accountable for all aspects of the work.

Declaration of generative AI in scientific writing

During the preparation of this work, the author(s) used Google translate in order to improve English grammar and readability, or help in structuring the manuscript.

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