YouTube Videos as Supplementary Materials to Enhance Computer Troubleshooting and Repair Techniques for Senior High School Students in the Philippines

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ABSTRACT

This study aimed to improve learners' academic performance in Computer Troubleshooting and Repair Techniques at Lal-lo National High School by using YouTube videos with teacher-made learning activity sheets as supplementary materials. The study employed a quasi-experimental design, particularly a one-group pretest and post-test design, in which the intervention was administered to the same participants. The result proved that the learners gained a higher mean on their post-test result than their pretest, indicating a significant difference between the pretest and post-test scores. Moreover, the intervention greatly affected the student's academic performance, particularly on the competency in Computer Troubleshooting and Repair Techniques. YouTube videos can help visual learners and students better understand a subject. These videos can catch students' imagination, especially when face-to-face learning is discouraged owing to the epidemic. The intervention material may be adapted by ICT, TLE teachers, and other disciplines.

Keywords:

Multimedia Learning; YouTube Videos; Computer Troubleshooting; Repair Techniques; Computer Systems Servicing.

ABSTRAK

Penelitian ini bertujuan untuk meningkatkan prestasi akademik peserta didik dalam Teknik Pemecahan Masalah dan Perbaikan Komputer di SMA Negeri Lal-lo dengan menggunakan video youtube dengan materi pelengkap berupa lembar kegiatan pembelajaran buatan guru. Penelitian ini menggunakan desain kuasi-eksperimental, khususnya desain pretest dan posttest satu kelompok, di mana intervensi diberikan kepada peserta yang sama. Hasilnya

membuktikan bahwa peserta didik memperoleh rata-rata hasil posttest yang lebih tinggi daripada pretest mereka, menunjukkan perbedaan yang signifikan antara nilai pretest dan posttest. Apalagi intervensi tersebut sangat mempengaruhi prestasi akademik siswa, khususnya pada kompetensi Teknik Pemecahan Masalah dan Perbaikan Komputer. Video YouTube dapat membantu pelajar visual, dan siswa lebih memahami suatu subjek. Video-video ini dapat menangkap imajinasi siswa, terutama ketika pembelajaran tatap muka tidak dianjurkan karena epidemi. Materi intervensi dapat diadaptasi oleh TIK, guru TLE, dan disiplin ilmu lainnya.

1. Introduction

Technology plays a significant role in societies. It can provide learners with a wealth of online resources, such as learning websites, that are an incredible source of information in an educational setting. Utilizing these technological advancements assists teachers and learners in achieving their objectives by providing access to additional facets of knowledge.

Ebied, Kahouf, and Abdel Rahman (2016) studied YouTube as an essential tool in teaching computer education skills. According to their study, YouTube video tutorials are considered highly effective tools in learning skills in general and computer skills. The content is employed and integrated into a multimedia application that reflects applying skills and renderings, leading to deeper understanding.

According to Insorio and Macandog (2022), video lessons assist students in comprehending ideas when used in conjunction with module lessons. Students appreciated watching YouTube videos because they could observe the teacher demonstrate the subject. Students frequently requested their teacher provide videos with more examples and explanations in a strong and clear voice.

Incorporating YouTube Videos into the learning environment can expand students' creative freedom and encourage them to work harder and engage more. Teachers integrate YouTube videos into their classrooms to engage students and support their educational development. Thus, YouTube is shaping and influencing how students learn and interact today.

Computer Systems Servicing is an introductory topic in the Senior High School Technical-Vocational-Livelihood Track, as defined by Republic Act No. 10533. Computers have altered the way we teach and learn in the modern day. The COVID-19 outbreak, according to DepED Order No. 12s, 2020, poses educational obstacles. Due to the administration's limitation of face-to-face interaction, the DepED will implement its blended learning strategy using online and print media. Teachers can use this time to assist learners who are having difficulty. Also, the DepED's contingency preparations are an excellent implementation of Article XIV, Section 1 of the 1987 Philippine

Constitution, which mandates that the state shall defend and promote all citizens' right to high-quality education and take appropriate measures to ensure fair access.

Various online resources, such as YouTube videos, can be incorporated into Computer Systems Servicing classes on computer troubleshooting and repair techniques. YouTube is often regarded as one of the most powerful internet information sources. It can help students comprehend computer troubleshooting and repair skills by providing them with everyday films and authentic situations.

According to Moreno and Mayer's Cognitive Theory of Multimedia, students learn more effectively when they pay attention to important material in the lesson, mentally organize it into a coherent mental evaluation, and mentally integrate it with prior knowledge. According to the theory, one of the goals of multimedia instruction is to assist students in constructing a cohesive mental image from the material supplied. The student's role was to make sense of the given content as an active participant, acquiring new knowledge.

In conclusion, studying YouTube video tutorials as supplementary material on the subject was very timely. One of the most critical competencies of Computer Systems Servicing was the theoretical concept of Computer Troubleshooting and Repair Techniques. The teacher-researcher performed an item analysis on the second summative test results of the learners. It was noted that Computer Troubleshooting and Repair Techniques were the least mastered competency of the learners. It was also investigated that their academic performance and quizzes in the second quarter were relatively low. Likewise, online monitoring based on student feedback was undertaken. The teacher-researcher discovered that students struggle with the subject, particularly computer troubleshooting and repair techniques. With these baseline data, it was expected that the teacher-researcher would give more attention to this learning competency to enhance the learners' academic performance in this lesson.

1.1. Statement of the Problem

Generally, this research aimed to improve the competency of Grade 11 Technical-Vocational-Livelihood (TVL) learners in Computer Troubleshooting and Repair Techniques under the Computer Systems Servicing (CSS) subject using YouTube Videos with teacher-made learning activity sheets as supplementary materials. Specifically, it sought to answer the following questions:

1. What are the pretest and post-test mean scores of the participants?

2. Is there a significant difference between the pretest and post-test scores of the participants?

3. What is the effect size of the intervention in improving the competency of Grade 11 TVL – CSS learners in Computer Systems Servicing?

2. Methods

2.1. Research Design

In this research, the researcher employed the quasi-experimental design, particularly the One-Group Pretest-Posttest design, to determine the intervention's effectiveness in improving the

participants' academic performance in troubleshooting and repair techniques. The One-Group Pretest-Posttest design was considered since it requires fewer resources than other experimental research designs and has a smaller sample size. The One-Group Pretest-Posttest design is a quasi-experiment in which the outcome of interest is measured before and after an intervention or treatment is administered to a non-random group. Individuals are measured before and following intervention or treatment (McKay-Nesbitt & Bhatnagar, 2017).

One-Group Pretest–Posttest designs are frequent in action research studies. This technique evaluates a program or intervention on a sample. According to Allen (2017), this study's design is two-fold. First, there's a single group where all participants are in a single condition and are evaluated and treated equally. Second, a linear ordering, or pretest-posttest design, entails measuring a dependent variable before and after the intervention.

2.2. Research Procedure

The materials used were simplified and directly related to the learning topic. Comments and suggestions from the Master Teacher and school ICT Coordinator were encouraged for the validation of the materials. Based on the Learner Enrolment and Survey Form (LESF), students have their smartphones and internet connection capable for online learning. With that, students were provided with video materials via an online and offline platform. The videos were shared with the class's Facebook Group Chat and Google Classroom to facilitate access and unlimited viewing of the online platform. During module distribution, the video materials were also shared offline via Bluetooth and ShareIt. The video materials were distributed to participants' parents via their smartphones. Participants watched the video associated with their modules after receiving or accessing it online. They may replay the video as often as necessary to achieve mastery.

Ethically, a letter of intent to conduct the research was sent to the proper school authorities. After which, a letter of consent was sent to the parents of the target participants of the study. Only those who wanted to join or were allowed by their respective parents or guardians were included in the study. Besides, the identities of the learners were not revealed to protect their anonymity. Also, participants' scores were reported and presented to them confidentially. A letter of permission via e-mail has been sent to the uploader of the YouTube videos asking for his consent to use the said video for the study and whatever purpose it may serve for this action research in the future.

Furthermore, the research findings will be disseminated through face-to-face or online platforms during School Learning Action Cell (LAC) sessions, Division Action Research Conferences, and other opportunities. The research outcomes were also shared with the owner of the YouTube video and the learners. Other ethical issues prescribed in the Research Management Guidelines under DepEd Order No. 16, s. 2017 was followed.

Since full school closures still impact students due to the COVID-19 pandemic, the pretest and post-test were administered via a written test. A 20- item teacher-made test was used as the medium for the pretest and post-test. The tests and materials were validated by a school Master Teacher and proofread by an English teacher. The data collection period lasted two weeks, including pretest

administration, intervention implementation, and post-test. On the first day, the learners took the pretest. Scores were recorded and tabulated. Then, the intervention was implemented. YouTube videos regarding computer troubleshooting and repair techniques were used to supplement the lesson. After which, the students were given relevant activities and assignments to answer. The final day was used to administer the learners' post-test. After tabulating and analyzing the scores, the study's results, discussion, and conclusions were written.

2.3. Sampling, Participants, and Locale of the Study

The participants of the study were the Grade 11, TVL – CSS section of the Senior High School learners of secondary public school in Cagayan, Philippines, with a total of 39 learners composed of 19 males and 20 females enrolled in Computer Systems Servicing subject with a class schedule of Monday to Friday 8:00-9:00 in the Third Quarter of the school year 2020-2021. This study used total enumeration in data collection, where all population members were measured. Besides, the pretest and post-test scores were the data source in this study.

2.4. Data Analysis

IBM SPSS Statistics 28 was utilized to analyze the effectiveness of YouTube Videos as supplementary materials in improving the competency of Grade 11 TVL – CSS learners in Computer Troubleshooting and Repair Techniques. The following statistical tests have been used:

1. *Mean and standard deviation* to analyze the pretest and post-test scores administered before and after the use of YouTube Videos as supplementary materials to improve the competency in Computer Troubleshooting and Repair Techniques;

2. *Wilcoxon Signed-rank Test* to determine if there is a significant difference between the mean pretest and post-test scores of the learners; and

3. *Cohen's d* to analyze the effect of YouTube videos in improving computer troubleshooting and repair techniques.

Table 1. Cohen's d values

Effect Size Estimate	Descriptive Interpretation
0.20 and below	Small Effect
0.21 to 0.79	Moderate Effect
0.80 and above	Large Effect

3. Results and Discussion

To evaluate the pretest and post-test mean scores of students

Table 2. Result of Pretest and Posttest

Dataset	N	Mean	SD
Pretest	39	9.308	3.246
Posttest	39	11.718	4.622

As shown in Table 2, the mean of the pretest is 9.308, and the post-test is 11.718. Therefore, post-test scores have a greater mean than the mean of the pretest scores, suggesting that the Grade 11 TVL CSS learners' academic performance had improved after using the YouTube videos as supplementary material to enhance Computer Troubleshooting and Repair Techniques.

Further, the standard deviation of the pretest is 3.246, while the post-test is 4.622. This indicates that the post-test has a higher standard deviation than the pretest. It implies that learners' scores in the post-test are widely spread from the mean because of the intervention.

Further, this coincides with the study of Ebied et al. (2016) that YouTube videos enable active learning and achieve more considerable learning outcomes. YouTube is a highly effective tool for teaching computer skills and academic success. It was confirmed that using YouTube as a medium of instruction aided and advanced students' acquisition of computer knowledge and their use in education.

Additionally, it was stated in the study of Sakkir et al. (2020) that YouTube can be a valuable, innovative, and authentic teaching tool if used appropriately. The use of YouTube in the classroom has captured the attention of students.

To assess the significant difference between the pretest and post-test scores of the participants

Table 3. Shapiro-Wilk Test on the Test of Normality of the Pretest and Posttest Scores of the Respondents

Dataset	Statistic	df	Prob. Value	Interpretation
Pretest	.963	39	.222	**Normally Distributed**
Posttest	.941	39	.042	**Not Normally Distributed**

As revealed in Table 3, upon testing of normality of the data sets, it was found that the pretest scores are normally distributed with a p-value of .222, whereas the post-test scores are not normally distributed with a p-value of .042. This implies that the most appropriate statistical treatment to be used is a non-parametric test called the Wilcoxon Signed-rank Test rather than Paired T-test, a parametric test.

When the normality assumptions of the Paired T-test are violated, the Wilcoxon Signed-rank Test may be utilized in place of the paired t-test (Van Doorn et al., 2020). It is used to compare individuals' scores. This could happen when comparing scores over time or when individuals are exposed to multiple situations. The Wilcoxon Signed-rank Test and the Paired T-test vary primarily in that the Paired T-test compares the means of the groups, whereas the Wilcoxon Signed-rank Test determines the order in which the groups should be ranked.

Table 4 show the z-value of the learners' pretest and post-test scores is -3.270 with a p-value of .001 at a 0.05 level of significance. The data clearly shows that there is a significant difference between the pretest and post-test scores of the learners. Thus, it can be concluded that YouTube videos effectively increased learners' academic performance in Computer Troubleshooting and Repair Techniques. This result is congruent with prior studies. According to Orús et al. (2016), many students

rely on YouTube to help them solve academic challenges and get answers to any questions they might have. YouTube is used for informational purposes and educational pursuits by students. Habes et al. (2021) argued that YouTube learners could create, use, and share educational videos, contributing to the overall effectiveness and success of education and learning. Additionally, they stated that watching YouTube videos enhances children's creativity while studying.

Table 4. Wilcoxon signed-rank test on the comparison between the Pretest and Posttest *Scores of the Respondents*

	Rank		Mean Rank	Sum Rank	Z Value	Prob. Value	Interpretation
Posttest-Pretest	Negative Ranks	10[a]	9.80	98.00			
	Positive Ranks	23[b]	20.13	463.00	-3.270[b]	.001	**Significant**
	Ties	6[c]					
	Total	39					

a. *Posttest < Pretest*   *tested at 0.05 level of significance*
b. *Posttest > Pretest*
c. *Posttest = Pretest*

Meanwhile, according to Boholano and Cajes (2021), social media like YouTube is utilized for enjoyment and instruction. As a teaching tool, it increases pupils' social interaction and intellectual accomplishment. The accessibility of the platform makes it a helpful tool for students and teachers. Since it is used to disseminate notes, tutorials, and presentations, it is helpful during the COVID-19 pandemic. According to another study, implementing ICT platforms like YouTube in distance learning for successful planning, teaching, and learning is vital for the education sector. (Ahmad, 2022). Students like viewing YouTube videos, enhancing their comprehension of complex topics and listening skills. On the other hand, teachers may spend more time focusing on students' learning capacity than on teaching complex concepts and subjects.

YouTube is no longer solely a platform for entertainment. It has evolved into a tool for education. YouTube videos are an incredibly effective educational tool because they add a dynamic element to the subject, aid in knowledge transfer, demonstrate complex procedures, and explain complicated concepts. Iftikhar, Riaz, and Yousaf (2019) suggest that students can increase their technical knowledge and proficiency by viewing YouTube tutorials. Moreover, their study implies that students who intend to improve their academic performance may benefit from viewing video lectures.

YouTube videos have the potential to be quite interesting, and the learner may watch them as frequently as they choose. Consequently, the website for sharing videos known as YouTube offers infinite opportunities to expand upon the topic at hand by making use of an infinite number of readily available films, enabling users to accomplish their educational aims and objectives. The only criteria are that the videos should be related to the topic knowledge and correspond to the intended learning objectives.

In their study, Abbas and Qaissim (2020) reported that YouTube video is necessary for the classroom because it captures students' attention and helps them develop their mentality and creative thinking. YouTube instills a sense of fun into classes, which caters to students' interests. These findings substantially impact learning, as students perceive a more inspiring and exciting educational environment. Furthermore, Almobarraz (2018) mentioned that students' engagement is influenced by the presence of YouTube in the classroom. Students understand that video-sharing websites are beneficial in assisting them with their educational activities and broadening their school knowledge.

According to Listiani et al. (2021), Oddone (2011), and Tadbier and Shoufan (2021), YouTube can help students improve fundamental skills such as their ability to listen, their ability to increase their vocabulary, their ability to satisfy learning outcomes, and their ability to improve themselves. The students' two senses, sight and hearing, were stimulated while watching YouTube videos, which introduced them to real-world objects.

YouTube videos encourage a sense of fun in classes, which caters to students' interests. These findings substantially impact learning, as students perceive a more inspiring and exciting educational environment.

To gauge the intervention's effect size in improving the competency of Grade 11 TVL – CSS learners in Computer Systems Servicing?

Table 5. Cohen's d on the Effect Size of the YouTube videos as supplementary materials

Statistical Treatment	Value	Effect Size
Cohen's d	1.751	**Large Effect**

As shown in Table 5, the result of the statistical computation of the intervention's effect size using Cohen's d is 1.751. This reveals a large effect on the effectiveness of the intervention being used. The results support the study of Buzzetto-More (2015) that integrating YouTube into instruction improves students' experiences of learning efficacy and increases engagement. Likewise, Moghavvemi et al. (2018) reported that YouTube is used for various purposes, including information gathering and academic learning. Their study also stated that YouTube is an effective tool for enhancing the learning experience when the video is relevant to the topic. Instructors and teachers are encouraged to incorporate YouTube into their lessons to take advantage of the platform's inherent benefits for learning and teaching.

Moreover, in Balbay & Kilis's (2017) study, it was indicated that it is an undeniable truth that learners are already very familiar with YouTube. They watch videos for entertainment even when instructors do not require them for educational or self-development purposes. Learners benefitted greatly from the video clips because they inserted variety into the previously monotonous course material, which consisted entirely of the textbook or presentations. Additionally, students were prompted to classroom discussions by the videos on the YouTube channel. Motivation is a significant component of online video material, which is true in this study's context.

According to Karami (2019), Klein and Taylor (2017), and Pattier (2021), using YouTube videos in the classroom helps students better understand the material being taught, which in turn leads to improvements in the student's grades and overall academic performance. When used in the classroom, watching videos on YouTube helps students develop their digital literacy and communication skills, as well as their enthusiasm to study and their understanding of the connection between theory and practice.

Videos published on YouTube provide a number of benefits, one of which is their easy incorporation into a range of educational institutions, most notably online education. A trend involving the employment of instructional videos has lately gained favor in the education industry. This is because students now have access to an innovative and entertaining way to comprehend tough topics and subjects (Dimaculangan et al., 2022). YouTube has the potential to make education more accessible and enjoyable, which would be beneficial to students. Using videos as a teaching tool might be advantageous, especially for pupils who learn better visually. Videos are almost always an excellent choice when explaining the reasoning behind a complex topic. Videos have pictures and audio, making the content more engaging and straightforward to comprehend. Videos may be used to stimulate the mental processes of students.

Teachers can use YouTube videos to introduce a topic, motivate learners, explain an online activity, or simply make it an extension of the subject matter. It can enliven a student's academic experience and attract their interest.

4.   Conclusion

This study assessed YouTube videos with teacher-made learning activity sheets to improve students' computer troubleshooting and repair techniques. The researcher concluded the following:

1. Post-test scores have a greater mean compared to the mean of the pretest scores signifying that the academic performance of the Grade 11 TVL CSS learners had improved after the utilization of the intervention.

2. There was a significant difference between the pretest and post-test scores of the learners. The intervention material was undoubtedly influential in enhancing the learners' academic performance.

3. There was a large effect on the effectiveness of the intervention being used. The intervention is effective and robust enough to enhance the learners' academic performance.

4.1. Recommendations

After processing and interpreting the data, the researcher recommended the following:

1. It is highly recommended that YouTube videos as supplementary materials could be adapted by other ICT and TLE teachers and all other disciplines in the division.

2. Teachers should also be equipped with more strategies and approaches to dealing with the learners.

3. Teachers should provide links to videos for students to review as part of their assignments.

4. Teachers should also teach students media literacy to distinguish between different types of videos and develop the critical thinking skills necessary to recognize different kinds of videos and select those appropriate for them.

5. Learners should demonstrate a high level of self-discipline and time management to complete assignments.

6. Further, a performance test is also recommended for future researchers who adopt the study as face-to-face classes are allowed.

4.2. Acknowledgment

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