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Research Article

Enriching the Discussion of Convergent Plate Boundary by Utilizing the Video Instructional Support: An Action Research

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Abstract

In our technologically advanced generation, using video as instructional support is the modern way to give high-quality instruction. Numerous studies have looked at how video education affects students' academic ability, but none have particularly looked at the scientific idea of the Convergent Plate Boundary. This study evaluates how well the video instruction enriched the Convergent Plate Boundary discussion. The study used a mixed method to triangulate the quantitative and qualitative information collected from the respondents who were Grade 10 students at Balao National High School in Balao, Barili, Cebu, Philippines. The t-test was used to analyze the data for the 30 students in the experimental and control groups. The controlled group has a p-value of 0.014 and the experimental group has a p-value of 0.00072. The findings showed a significant difference between the pretest and posttest of both the controlled and experimental groups. Three themes that describe the students' interactions with instructional videos were developed from their real-world experiences: perceived usability, usefulness of instructional videos, and enjoyment. With this, video instruction is a strategy driven by technology that can change the behavior of the students and improve their academic performance as well. This study recommends that: (1) schools should begin using instructional videos to teach and master various disciplines, especially science; (2) schools should use instructional videos to improve students' attitudes toward science and other subjects; (3) teachers should receive training on how to design, develop, and use instructional videos to foster learning; and (4) the benefits of using instructional videos in teaching.

Keywords: Video Instruction, Real-world Experiences, Quality Instruction, Convergent Plate Boundary

Introduction

A well-defined learning procedure with distinct objectives would undoubtedly improve the standard of student learning. In this instance, in order to effectively deliver the lessons many teachers are increasingly using instructional videos into their classes. It has been mentioned in literature that a video can be a powerful and effective tool in teaching. However, although using video in teaching becomes popular, there are still questions and concerns regarding the effective ways in the utilization of video instruction.

A video instructional support becomes a new approach that is included into the Philippine Science Curriculum. It is used by teachers as their tool in teaching Science, and is frequently utilized by the learners as the final upshot of their educational process. According to Mayer et al. (2020), students learn better when video will be used as instructional support in teaching because this will surely make the entire learning process very engaging and interesting as well. In this digital age, several institutions have already adopted to the advanced ways of delivering a lesson. In the context of teaching Science, instructional videos become more popular. Moreover, students learn more effectively in this Science instructional videos because it gives them more insights in understanding the concepts and theories (Kulgemeyer, 2022). These instructional videos can also give the students an opportunity to easily familiarize the lessons in Science. When used properly, videos can become excellent teaching tool that keep students' attention while also acting as a strong learning motivator (Mokhtar et al., 2022). With the help and aid of these various instructional videos, knowledge can be shared easily with the students. In these interactions, the videos provide feedback in response to the pupils' cognitive involvement (Castro-Alonso & Fiorella, 2019).

These days, a lot of teachers use video instruction since they find it to be interesting and it promotes active engagement of students (Cesare & Hashey, 2021). However, there are still concerns regarding the efficiency of using videos specially in teaching Science. In integrating video, teachers should ensure that they achieved the desired learning outcomes and promote students active learning. Teachers can experience success if the video instruction's components for cognitive load, student engagement, and active learning are well-made and systematically prepared (Afify, 2020). Instructional videos are tools commonly used in the

delivery of a lesson. These tools can give the student the opportunity to review or revisit the lesson, and allow them for immense or a ton of active learning. According to the study of Mayer et al. (2020), integrating videos in teaching will enable more effective processing and memory recall. Everyone who are involved benefits from video-assisted instruction, including teachers, learners, the schools with which they are affiliated, and the entire educational system (Noetel et al., 2021). Integration of video is beneficial especially when it is properly utilized or employed by teachers, it can promote an active engagement of students and will surely result to higher understanding of the lesson.

In this study, the purpose of instructional video is to assess the students learning. This study wants to emphasized the effective use and integration of instructional video in teaching Convergent Plate Boundary. This study is vital in determining the efficiency of the integration and utilization of video instruction in teaching Convergent Plate Boundary among Grade 10 Students. Knowing these will provide us with the compelling reasons to evaluate the utilization of video as instructional support in teaching Science.

Literature Review

Videos can supplement classroom instruction. These could include lectures, tutorials, quick knowledge snippets, and other educational materials. These following articles would wrap up the importance and effects of instructional videos in teaching. These literatures would provide important information about the efficiency of utilizing or integrating instructional videos in Science.

To be able to train and improve pupils' intelligence and mastery in Science, teachers must be able to create video instruction (Amrullah et al., 2022). Since video actively involves learners in social learning, it may possibly improve their educational experience (Liza et al., 2021). Video instruction was crucial in illustrating several ideas that could aid students in pique their interest in the upcoming lecture and encourage their full participation (Haryudin & Imanullah, 2021).

According to different studies, teachers have increasingly employed instructional videos as a teaching tool in the classroom over the years (Lowethal & Cavey, 2021). Due to the science video's accessibility to learners, its popularity has greatly expanded (Slemmons et al., 2018). These videos allow us get learners interest through the educational content they produced (Marone & Rodrigues, 2019). The optimal use of video technology enables learning, increase attention and had enhanced focus (Green et al., 2019). Engage in the content and helps students' motivation in the lesson through the use of video (Luo & Kalman et al., 2018). The utilization of videos in classroom for teachers and learners improve quality of education and enhances the standard of instruction in the students' learning processes (Lubis et al., 2021).

Teachers are obligated to deliver high-quality instruction in the classroom (Cox et al., 2021). That is why many teachers are integrating technology-assisted instruction and video-based learning to successfully raise student performance. According to Park et al. (2019), this video instruction can be utilized by teachers through online or offline platforms. Technology-assisted instruction and video instructional support can aid students even the students with disabilities, and teachers by providing high-quality of instruction in the learning environment (Wynkoop et al.,2018).

The integration of educational videos in education has been increasing utilized (Fyfield et al., 2019). Making use of interesting video-assisted learning has specific and also practical teaching benefits (Lacey & Wall, 2021). Suitable instructional videos have been proven and demonstrated to increase student interest and literacy (Oechsler et al., 2020). Availability of videos can be access via YouTube Channel (Nasution, 2019). The use of videos greatly help student in teaching and learning. Stimulating high quality videos and animations boost interest of students in the subjects (Willis et al., 2021; Olleras et al., 2022). Though video their eagerness to learn leads to become competent students (Mazin et al., 2019).

The advancement of video technology the wide use of portable device has been accelerated in education due to its positive effects (Sablic et al., 2020; Bahinting et al., 2022). Teachers relies online learning videos as their teaching aides to support students learning (Kisa & Cooker, 2018). Integrating advanced ways in teaching method provides various techniques and innovation to cater learning goal (Guerero et al., 2020). Moreover, this enhances the teachers in their professional development.

Video integration in science education would be preferable to current methods (Bohloko et al., 2019). Videos help teachers in remote areas with no inter connection in their school. Some institutions that have poor laboratory materials can use Youtube videos to

optimize learning (Yee et al., 2020). Instructional videos are indeed very essential in different learning areas (Meinawati et al., 2020).

In recent studies, video-assisted instruction gained positive feedbacks from students (Salvador, 2022). The study found that students' academic performance and activities were positively impacted by watching instructional films or videos (Ali, 2019; Riconalla et al., 2022). The use video sharing program in teaching a lesson enhances learning (Mischel, 2019). As the learning increases, furthermore teachers will also determine whether they understood its content (Zhang et al., 2022). That is why teacher as creator of video content strives to improve learning effectiveness in the age of information explosion by attracting students' attention to instructional videos (Chen et al., 2022). Many teachers nowadays used videos in disseminating instructions in order to garner greater more attention (Yu & Zhang, 2022).

Despite of the classification of disparities, it has been found that classrooms that employ videos in the discussions encourage high levels of student learning. Integration and utilization of video clips in the teaching process is thought to benefit the teachers since they show real-world examples and offer lasting learning. Appropriate education material such as instructional video is important to reinforce learning and promotes better understanding of the lesson.

Theoretical Underpinning

The Cognitive Theory of Multimedia Learning by Mayer (2005) and Meaningful Learning by Smith and Reagan (1999) serve as the foundation for this study. The cognitive theory of multimedia learning explains how students create mental models of video content. According to the hypothesis, students learn more profoundly when using a combination of words and visuals rather than the conventional method. According to theory, learning through multimedia, particularly video, is more effective. The notion suggests that in order to successfully enhance effective learning, good video design must be taken into consideration.

Meaningful learning is preceded by a cognitive process, according to Smith and Reagan (1999) and cited by Agra et al. (2019). The learner needs to be actively involved in knowledge structures for it to happen. Additionally, required is the selection of pertinent information, meaningful information organization, and integration of the content with learner's prior knowledge. The video instructional learning is designed using the principles derived from these theories.

The theory holds that human action is always preceded by an intention to do action. It has been demonstrated that one's personal beliefs, social expectations, and impression of their level of behavioral control are three factors that affect intentions (Akinbadewa & Sofowora 2020). According to this study's application of the theory, perceived utility and usability correspond to users' perceptions that the video instructional learning will improve their learning performance and be simple to use. Therefore, a reinforced belief encourages a positive attitude toward video assisted learning. The overall assessment that determined a user's propensity to adopt the technology could determine their attitude about using that technology. Therefore, students may embrace its use if they believe that doing so will improve their performance and knowledge of a certain subject. As a result, student dedication to its use may also be examined.

Methodology

Research Design

A mixed method, specifically a dynamic research design, was applied in this study. There is no set order in which the quantitative and qualitative data are collected in dynamic research. The qualitative data was presented using a Heideggerian research design, while the quantitative data on the other hand was based on a quasi-experimental design. This dynamic study design is helpful in understanding how the Convergent Plate Boundary is taught via video instructional support and how this influences students' ability to learn science.

Sampling Technique

Purposive sampling was utilized in this study. Using this technique, the researchers are able to carefully review the eligibility requirements for study participants. There were 60 responses in the sample, with 30 students placed in the experimental and control groups, respectively. The number of people that were interviewed was determined by the saturation of the data, in which case the final key informant provided all responses. Nine people were interviewed to provide examples of their experiences with the approach.

Participants

In this study, there were 60 respondents. All of these students are in Grade 10 at Balao National High School in Balao, Barili, Cebu, Philippines. Within a class of 200 students, the respondents to this survey were ranked. The best 30% of the class which is 60 were split into two groups. The participants who were (1) enrolled in the academic year of 2022–2023, (2) attending the Grade 10 Science Class, and (3) willingly accepted the offer to participate in the study after and between the pretest and posttest.

Instrument

In the quantitative data, the instrument used was a pretest and posttest questionnaire designed and developed by the researchers. This instrument went through the process of validation by Colton & Covert (2007) as mentioned by Cabello & Bonotan (2021). There were 25 items in both pretest and posttest.

To elicit the participant experiences from the qualitative data, a semi-interview guide questionnaire was created. As advised by Smith (2019), the semi-interview guide questionnaire is best used in this study with the intention of generating follow-up questions from the responses of the participants. The questionnaire underwent content validation to ensure that it complied with the use of video-assisted instruction and was accepted by the experts.

Data Gathering

In order to obtain permission from the appropriate authority to collect the data, a letter was developed and authorized. The researchers wrote a letter to ask permission to collect data for their project. The researcher-teachers started their observation after receiving the head of school's consent and continued for seven days. In order to hear the informants' voices and responses, the researcher used emails, smartphones, and computers. The mean, standard deviation, and t-test of significant difference were utilized to precisely code, compute, and assess this data since the ratings from the pre-and post-tests were taken into account.

Data Analysis

The level of performance of the experimental and control groups, as well as the classification of the students, were established through the quantitative data analysis using the mean and standard deviation, and the T-test was used to establish whether there was a significant difference between the mean scores of the pre- and post-tests of each group.

In this study, qualitative data were analyzed using the Interpretative Phenomenological Analysis (IPA), which was popularized by Moustakas (1994) and revised by Van Kaam.

Ethical Considerations

Bryman and Bell (2007) ten ethical considerations principles were used in this study. The following significant ethical guidelines were followed upon conducting the study: (1) it was clear that there had been no compromise of or injury to the research subjects in any way; (2) the importance of upholding the participants' dignity was demonstrated and made clear; (3) permission from the participants was obtained without using coercion or threats; (4) there was no invasion of participants' privacy; (5) the information and data obtained from the participants were cherished and handled with the utmost confidentiality; (6) participants and organizations were kept anonymous; (7) it was clear that the study's goals and objectives had not been attained through deception or any other sort of exaggeration; (8) this manuscript brazenly specified the disclosure of any partisanship from diverse sources and financial involvement, if applicable; (9) in this research project, honesty, integrity, and transparency were qualities used in speaking with, connecting with, and contacting participants in order to get relevant data; and finally, (10) the way the specifics of this study were presented lacked any prejudice or neutrality.

Results and Discussion

With discussion and support from the several peer-reviewed studies, this part responded to the research's open-ended questions.

Table 1. *Results of the Two Groups' Pretests*

Respondents	*Pretest (Controlled Group)*	*Pretest (Experimental Group)*
1	6	6
2	7	7
3	11	12
4	6	4
5	5	6
6	5	4
7	3	4
8	10	6
9	9	9
10	10	6
11	9	10
12	8	8
13	10	8
14	6	11
15	16	11
16	8	8
17	5	6
18	9	6
19	10	4
20	7	9
21	7	5
22	6	8
23	4	7
24	8	8
25	15	7
26	9	11
27	6	6
28	8	10
29	11	8
30	10	5
Mean	8.13	7. 33
SD	2.91	2.29

The results for the control and experimental groups are shown in Table 1. According to the results, the control group's highest score was 16, while the lowest was 3, with an overall average of 8.13 and a standard deviation of 0.76. The experimental group, on the other hand, had a mean score of 7.33 and a standard deviation of 2.29, with 12 being the highest score earned and 4 being the lowest. Based on the findings of the two groups, it can be concluded that the students lack knowledge of the convergent plate boundary. Science is difficult to study, as is discovered over the school year.

The Philippines underperformed other nations in the advancement of international science research (Magsambol, 2020). Science instruction and learning are challenging in the current typical time for both teachers and students (Eldian & Banguis, 2022). Because learning can be difficult and frustrating, especially in these trying times, learner performance is still at moderate level (Agayon et al., 2022). These pupils only possessed a fundamental comprehension of the concept of convergent plate boundary, according to the results for the two groups.

The type of intervention the researchers should take to close the gap can be evaluated using this database. It is critical to employ a number of teaching approaches and strategies in order to adequately elucidate on the subject. Students are better able to understand and internalize challenging concepts in this way, which might help them to concretize their subject-matter knowledge.

Table 2. *Results of the Two Groups' Posttests*

Respondents	*Posttest (Controlled Group)*	*Posttest (Experimental Group)*
1	12	8
2	11	12
3	15	8
4	11	9
5	16	3
6	10	12
7	9	6
8	7	11
9	10	10
10	11	8
11	10	10
12	7	8
13	8	14
14	7	7
15	4	7
16	8	14
17	8	6
18	8	8
19	12	6
20	9	12
21	20	10
22	5	10
23	10	21
24	10	9
25	14	19
26	5	13
27	9	18
28	17	13
29	15	12
30	11	7
Mean	10.3	10.4
SD	3.68	4.05

Information on the test results for the experimental and control groups using the traditional method of learning and the use of instructional films is provided in Table
2. The results show that the control group's biggest and lowest scores range from 20 to 4, and that its mean is 10.3, standard deviation is 3.68. The experimental group's statistics, on the other hand, showed that their maximum score was 21 and their lowest score was 3, with a mean of 10.4 and a standard deviation of 4.05, respectively. As a result, it can be seen that the experimental group showed improvement in their academic performance when films were used as an instructive method during the discussion.

The experimental group improved their results in comparison to the control group, which led to the conclusion that instructional movies can greatly increase comprehension and learning. With this in mind, it is asserted that the student's academic performance and attitude toward learning can be improved by the level of comprehension they can gain from the new technique being used, which is video instructional support. Students' academic performance, interpersonal skills, and working mindset are all improved by video-assisted instruction (Nwaokolo et al., 2022). It can be inferred that using the new technique or intervention differed slightly from using the traditional method of instruction. Video-based learning may be a more effective approach for teachers to use in order to raise student performance (Bawa et al., 2020; Abucejo et al., 2022).

However, the difference is so negligible that learning was practically split evenly between the experimental and control groups. Teachers must always keep in mind that integrating an intriguing and engaging film into the process will ensure that learning is successfully delivered. This marks a huge leap forward in the students' learning with the interesting instructional support.

Table 3. *Pretest and Posttest Difference between Controlled Group and Experimental Group*

Group	*n*	*df*	*t-value*	*p-value*	*Alpha*	*Interpretation*	*Remarks*
Controlled Group	30	29	-2.5	0.014	0.05	Significant	Reject Null Hypothesis
Experimental Group	30	29	-3.57	0.00072	0.05	Significant	Reject Null Hypothesis

The primary differences between control and experimental groups are shown in Table 3. The table highlights the fact that the test results of the two groups are very different from one another, therefore both participants' evaluations from the two groups show a significant variation or difference.

Students' performance in science is significantly improved when videos are included in instruction (Akinbadewa & Sofowora 2020). Another explanation for this effect might be the enjoyable activities that students engaged in while interacting with the movies (Mukhtar & Putri, 2021). Additionally, it was discovered that students' attitudes about learning science improved as a result of seeing the movies (Oluwatimilehin et al., 2021). According to the study, there is strong evidence that students who watch instructional videos achieve higher levels of comprehension and retain information longer than students who use the chalk talk method (Mischel, 2019).

The table displays how the outcomes of the pretests and posttests for the two groups were significantly different. This suggests that test-takers who come prepared and possess the necessary information have acquired the same degree of understanding as test-takers who used both the old and new techniques. The table also suggested that both effectively described the subject in a way that the learner could understand.

Qualitative Analysis

The interaction, engagement, and attitude of the students in the experimental groups toward the instructional videos were evaluated by focus groups discussion. The report's data was collected using three constructs such as; (1) perceived usability, (2) usefulness of instructional videos and (3) enjoyment. The focus group discussion was done with the experimental group consists of 30 students. The summary of students' responses is shown in the table bale below.

Table 4. *Summary of Comments Collected from the Experimental Groups' Focus Group Discussion*

Theme	*Authentic Experiences*
Perceived Usability	Student 25: "*Pwede rasad namo matan-aw ang video sa youtube kung naa mey nalimtan. Nya kung masave ras among cellphone pwede ra namo sigehun ug tan-aw, kada lunch break ug inig uli sa balay. Pwede rasad nato mapause nya unya na nato tiwason ug tan-aw kung bakante na."* (We can watch the video on youtube once we forgot some of the points discussed by the teacher. Then, we can download the video and able to watch it frequently, especially during lunch break and at home. We can also pause the video and restart it during our free time.)
Usefulness of Instructional Videos	Student 23: "*Mas dali me makat-on kung mutan-aw meg video kay makita man jud namog klaro ang examples through pictures and it also allows us to watch again the videos kung naa mey free time.* (We effectively learn through watching video because we are able to see clearly the examples through visuals and pictures and we can also watch the video during our vacant time.)
Enjoyment	Student 2: "*Nindot gyud nga naay video ig-discuss sa lekyson kay dili me magduka kay naa may daghang pictures. Then, it also makes us enjoy and at the same time learn effectively. I like the video so much because it is very engaging kay pakit-on jud kag mga nindot nga examples".* (It's nice to use video during the discussion of the lesson because it can get our interest through its graphics and pictures. Then, it also makes us enjoy and at the same time learn effectively. I like the video so much because it is very engaging and it shows a very good sample pictures.)

As shown in table 4, many students found videos as useful tool in learning new concepts and ideas in Science. It has been found that video improves students understanding on scientific concepts because it allows them to revisit the lesson during their free time. To sum it up, as reflected in table 4 students have favorable and positive attitudes towards the educational videos in promoting effective learning.

Perceived Usability

Video instructional support is easy to use and accessible to both teachers and learners. They offer a convenient resource that is accessible from any location (Habes et al., 2022). On a variety of gadgets, such as laptops, tablets, and smartphones, you can watch videos. This makes it possible for students to view whenever they want and from any location (Nestares et al., 2022). All these are stated by the participants.

Participant #25 mentioned that,
"*Pwede rasad namo matan-aw ang video sa youtube kung naa mey nalimtan. Nya kung masave ras among cellphone pwede ra namo sigehun ug tan-aw, kada lunch break ug inig uli sa balay. Pwede rasad nato mapause nya unya na nato tiwason ug tan-aw kung bakante na."*

The ability to review the lesson whenever they want is provided by video instructional support, as mentioned by the participant #25. Notably, in addition to improved accessibility, the instructional videos provide simple lessons that put education at their fingertips. Students are therefore more inclined to use video-assisted learning through various online or offline platforms, which has other advantages (Ando et al., 2022).

This theme, perceived usability, allows learners to have an accessible video that can be viewed during their free time or even at home. Students get the option to learn the subject at their convenience in the most efficient way through video-based learning. Instructional videos also provide the learners the option to pause, rewind, or skip around the video to review specific sections. Likewise, video provides opportunities for students to go over difficult and challenging topics again. With these, learners can improve their academic performance because they have the access to videos. The ideal educational environment today is one where students learn when and where they feel most comfortable, based on their individual needs.

Usefulness of Instructional Videos

Videos become a useful tool in teaching and learning. Students can learn a subject in a completely new way by watching a video (Ritcher et al., 2022), which also aids in their understanding of the material they are working with. Compared to just using textual materials, videos generate a more interesting sensory experience. Students actually see and hear the subject being taught, allowing them to process it similarly to how they process daily encounters (Hsu et al., 2022). All these are mentioned by the participants.

Participant #23 stated that,
"*Mas dali me makat-on kung mutan-aw meg video kay makita man jud namog klaro ang examples through pictures and it also allows us to watch again the videos kung naa mey free time.*

Participant number 23 has a positive feedback to the video instructional support because they found instructional videos to be engaging. Through the pictures and examples projected in the video, they are able to learn things faster. Hence, students believe that watching instructional videos can help them perform better in class because of its beneficial platforms.

The theme exemplified that videos help students retain information because they may pause and replay them as often as necessary. Additionally, through the attracting graphics and detailed examples in the videos, they are able to understand the lesson effectively. Videos give the students clear picture of the certain lesson. With the help of videos, the students are able to inculcate the lessons faster than the conventional way of teaching. Contrary to reading books and engaging in listening exercises, videos offer powerful visual clues to the learners.

Enjoyment

Videos are now acknowledged as an effective teaching tool in classrooms. In order to make learning more enjoyable, fun, efficient, responsive, and fruitful, lectures are delivered utilizing video lessons (Adanir et al.,2022). This method of contextualization is incredibly helpful in translating the abstract theories into visuals since educational videos enable the creation of a visual picture of the real world (Khodjayeva 2022). The connection between the knowledge being imparted and its application in real-world situations can be made by the pupils (Shrestha et al., 2022). The participants' real-life experiences might be used as an example of this idea.

Participant # 2 said that,
"*Nindot gyud nga naay video ig-discuss sa lekyson kay dili me magduka kay naa may daghang pictures. Then, it also makes us enjoy and at the same time learn effectively. I like the video so much because it is very engaging kay pakit-on jud kag mga nindot nga examples".*

Participant number 2 has a favorable attitude towards the video instruction, because it enables them to learn effectively and at the same time they enjoyed watching it. Through the graphics and animations, the video was able to get the students interest. Additionally, the participant makes it very obvious how watching the film stimulates their interest and encourages flexible thinking.

The participants' experiences learning Convergent Plate Boundary using video instructional support and how the videos drive them to learn were best illustrated by this theme. Thus, the theme of enjoyment is sufficient for efficacy and effective in advancing the academic performance of learners specifically in Science.

Conclusion

The video instructional support and traditional ways of learning were utilized in discussing convergent plate boundary among Grade 10 learners. The study demonstrated that both the traditional method of learning and the use of video in instruction established notable disparities. As a result, educational videos are a fantastic resource for teaching about convergent plate boundaries. It can also be used to educate a variety of subjects. This study's goal was to evaluate the effectiveness of the video instructional support for explaining convergent plate boundaries.

The following recommendations are made in light of the study's findings which are: (1) schools should start using instructional videos to educate and master various disciplines, most especially science, (2) schools should use instructional videos to improve students' attitudes toward science and other subjects, (3) teachers should be trained on how to design, develop and use instructional video to foster learning and (4) the advantages of employing instructional videos in instructing their students should be explained to school authorities.

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