

Effectiveness of YouTube as a Supplementary Material to Enhance the Students' Learning Achievement in Geography

ABSTRACT

This study aimed to investigate the effectiveness of YouTube as supplementary material to enhance students' learning achievement in Geography. The study also examined the students' perception of using YouTube as supplementary material in learning, their attitude towards its use, its benefits, and the challenges posed by YouTube in learning. The study was conducted at one of the school under Thimphu Dzongkhag with an over three-week intervention program. Participants consisted of 57 class VIII students, 32 males and 25 females. The data was gathered through the Geography learning achievement test, survey questionnaire and semi-structured interview. A quasi-experimental design consisting of pre-test and post-test measure was employed. The pre-test and post-test were administered before and after the intervention to ascertain the change in participants' performance in learning Geography for the experimental group in comparison to those who were exposed to conventional approach of teaching. The independent sample t-test and paired sample t-test were conducted to analyze the results of pre-test and post-test scores. The results in both the cases statistically showed that there was a significant difference ($p < .05$) in the post-test scores between the two groups. The descriptive analysis of the study also indicated that students have positive perception and attitude towards the use of YouTube as supplementary material in learning. Further, the finding suggested that YouTube is beneficial, yet poses some challenges in learning Geography. It is concluded that YouTube as supplementary material had a substantial influence on improvement in students' learning achievement in and their attitude towards Geography. Therefore, the study recommends teachers and students to use YouTube as supplementary material while teaching and learning Geography.

Key words: YouTube, supplementary material, enhance, learning achievement, geography, attitude, perception, benefits, challenges.

1. Introduction

Geography is a subject that provides students with knowledge of the physical and social aspects of the earth's surface. In recent years, the integration of technology in teaching and learning has become increasingly important. YouTube is one of the most popular social media platforms that has been used as a supplementary material for teaching geography. According to [5], YouTube plays a key role in the teaching and learning field, and has become more popular with people, particularly among youths. YouTube provides students with videos and authentic situations that may help improve their understanding and learning achievement in Geography. Therefore, the effectiveness of YouTube as a supplementary material to enhance students' learning achievement in Geography is worth exploring. This paper aims to investigate how YouTube is used as a supplementary material in learning Geography and its effectiveness in enhancing students' learning achievement.

1.1 Problem Statement

The use of technology in education has become increasingly popular in recent years. One specific technology that has gained attention is YouTube, as it offers learners access to a wide variety of online materials and incredible sources of information. In the context of Geography education, students show a

lack of enthusiasm and motivation when it comes to learning Geography with traditional approach. However, students exhibit higher levels of enthusiasm and enhanced learning outcomes when technology, specifically platforms like YouTube, is integrated into the learning process [10,54]. Although there are many studies on the use of YouTube as a learning approach and its implications on education in other parts of the world, its effectiveness as supplementary material in learning in Geography specifically in the area this paper refers to has not yet been studied. Currently, there is a lack of knowledge about the use of YouTube for learning in the Bhutanese Education System. Moreover, there is an absence of technology in classrooms for a generation of students who are exposed to and live in the digital age [35]. Furthermore, no study has been conducted to explore the use of YouTube as supplementary material in the learning of Geography. Thus, there is a need to explore the effectiveness of using YouTube as a supplementary material to enhance students' learning achievement.

Therefore, this study aims to investigate the effectiveness and potential use of YouTube as supplementary material to enhance students' learning achievement in learning Geography. Further, it discusses the perceptions, attitudes toward YouTube, benefits and challenges of using YouTube as supplementary material in learning Geography.

1.2 Research Questions

Overarching Question: How effective is YouTube as supplementary material in enhancing the learning achievement of Class VIII students in Geography?

Sub Questions:

1. Is there statistically significant difference in students' learning achievement in class VIII Geography between YouTube users and non-users?
2. What are students' perceptions towards the use of YouTube as a supplementary material in the learning of class VIII Geography?
3. What are the students' attitudes towards the use of YouTube as supplementary material in the learning of class VIII Geography?
4. What are the benefits and challenges of using YouTube as supplementary learning material for class VIII Geography?

2. LITERATURE REVIEW

2.1 Overview

Geography is a subject that deals with the study of the earth's surface and the various phenomena occurring on it. It is a complex subject that requires students to have a good understanding of geographical concepts and spatial relationships. One way to enhance students' learning achievement is by providing them with supplementary materials. YouTube is one such platform that has gained popularity as a supplementary material for educational purposes. The purpose of this literature review is to examine the effectiveness of YouTube as a supplementary material to enhance students' learning achievement in Geography.

2.2 Overview of YouTube

YouTube is a video-sharing platform founded in 2005 by three former PayPal employees. It allows users to upload, share, and watch videos on a wide range of themes, including entertainment, education, politics, and more. It has become one of the most popular social media platforms in the world, with over 2.6 billion monthly active users, providing users with a strong means to share and watch video content [39].

YouTube is a video-sharing platform that provides access to educational content from experts in various fields including lectures, tutorials, and expert insights. It provides learners with the flexibility to access content at their own pace and on their own schedule, as well as opportunities for interaction and collaboration. However, it is important to use critical thinking skills and evaluate the source of the content before relying on it as a learning resource.

2.3 YouTube in Education

YouTube has become a popular tool for educators to enhance classroom learning experiences. According to [9], YouTube has a vast collection of educational videos that can be used to supplement traditional teaching methods. Additionally, using YouTube in the classroom can help engage students who are visual learners and can provide opportunities for self-directed learning [44,10,41].

2.3.1 The Effectiveness of YouTube as a Supplementary Material

YouTube is a video-sharing platform that allows users to upload and share videos on various topics. It has become a popular platform for educational purposes, with many educators using it to provide supplementary materials to their students. Several studies have examined the effectiveness of YouTube as a supplementary material for enhancing students' learning achievement, which could be applied to the domain of Geography in the region studied in this paper.

The study conducted by [6] investigated the effectiveness of YouTube videos as a supplementary material in teaching Geography. The study involved 70 high school students in Saudi Arabia were divided into a control group and an experimental group. The experimental group was given access to YouTube videos as a supplementary material, while the control group was not. The results of the study revealed that the experimental group had significantly higher scores on the Geography achievement test than the control group, indicating that the use of YouTube videos as a supplementary material was effective in enhancing students' learning achievement.

Similarly, another study conducted by [49] examined the effectiveness of YouTube videos in teaching Geography to secondary school students in Malaysia. The study involved 80 students who were divided into two groups: an experimental group and a control group. The experimental group was given access to YouTube videos as a supplementary material, while the control group was not. The results of the study showed that the experimental group had significantly higher scores on the Geography achievement test than the control group, indicating that the use of YouTube videos as a supplementary material was effective in enhancing students' learning achievement.

Furthermore, a study conducted by [3] examined the use of YouTube as a supplementary material for teaching physical Geography to university students in the United Kingdom. The study involved 55 students who were given access to YouTube videos as a supplementary material. The results of the study showed that the use of YouTube videos as a supplementary material was effective in enhancing students' learning achievement, as evidenced by the significant improvement in their examination scores.

Overall, the literature suggests that YouTube is an effective supplementary material for enhancing students' learning achievement in Geography. The use of YouTube videos as a supplementary material has been shown to improve students' understanding of geographical concepts and increase their engagement with the subject. Therefore, it is recommended that educators consider using YouTube as a supplementary material in their teaching of Geography.

2.3.2 YouTube in Teaching Geography

YouTube has become an increasingly popular tool for teachers to use in their classrooms. According to a study by the Pew Research Center, 73% of teachers in the United States use YouTube in their classrooms [42]. One way that teachers use YouTube is by incorporating educational videos into their lessons. These videos can be used to introduce new concepts, reinforce learning, or provide additional

explanations for students who may be struggling with a particular topic [20,4,46,37]. Additionally, YouTube can be used to facilitate discussions and debates in the classroom. For example, teachers can assign students to watch a video and then have them discuss the content in small groups or as a whole class [10,28,2].

Overall, the use of YouTube in the classroom can be an effective way to engage students and enhance their learning experiences.

2.3.3 YouTube in Learning Geography

YouTube has been increasingly used, around the world, in the learning Geography, providing students with access to a range of multimedia resources that can supplement traditional classroom teaching [53]. YouTube can provide students with visual and auditory learning experiences that are engaging and can help to illustrate complex geographical concepts [6,7]. Furthermore, YouTube can provide students with access to real-world examples of geographical phenomena, helping them to see the relevance of the subject to their lives [48].

Research has shown that the use of YouTube in the learning of Geography can enhance students' learning achievement. For example, a study by [6] found that the use of YouTube videos as a supplementary material was effective in enhancing high school students' learning achievement in Geography. Similarly, [48] found that the use of YouTube videos as supplementary material was effective in enhancing secondary school students' learning achievement in Geography. Additionally, a study by [53] found that the use of YouTube videos as supplementary material was effective in enhancing college students' learning achievement in Geography.

Overall, the use of YouTube in the learning of Geography has been shown to have a positive impact on students' learning achievement. As such, educators should consider incorporating YouTube into their teaching practices as a way of supplementing traditional classroom instruction.

2.4 Benefits of YouTube

There are numerous benefits of using YouTube in learning. Some of the relevant benefits are highlighted as presented in the sub-sub-sections below.

2.4.1 Helps in Student Engagement

YouTube can be an effective tool for student engagement in the classroom. Research has shown that incorporating YouTube videos into instruction can improve student motivation, participation, and understanding of course material [10,26]. A study by [50] found that using YouTube in the classroom increased student engagement and improved their perception of the quality of instruction. Students reported that they were more motivated and interested in the learning material when videos were incorporated into the lessons. Moreover, YouTube videos can provide students with a different perspective on a topic or subject. Students can watch videos created by experts in their field, which can help them better understand complex concepts and see real-world applications of course material [9]. Additionally, YouTube can be used as a tool for collaboration and peer-to-peer learning. Students can create and share videos as part of group projects or assignments, which can promote teamwork, creativity, and critical thinking skills [56].

Thus, incorporating YouTube videos into instruction can improve student engagement, motivation, and understanding of learning material. YouTube videos can provide a different perspective on topics and promote collaboration and peer-to-peer learning.

2.4.2 YouTube Increase the Learners' Interest and Self-Learning Opportunities

YouTube can increase learners' interest and self-learning opportunities in various ways. One way is by providing access to high-quality instructional videos that learners can watch and learn from at their own

pace and time [20]. YouTube's vast library of educational content can be a valuable resource for learners seeking to acquire new knowledge or skills. Moreover, YouTube can increase learners' interest by offering engaging and visually appealing content that captures their attention and encourages them to explore further. Videos with dynamic visuals, animation, and storytelling can be particularly effective in engaging learners and promoting active learning [19,9].

YouTube can also facilitate self-directed learning by allowing learners to search for and select videos that align with their interests and learning goals. This approach can be empowering, as it puts learners in control of their own learning and allows them to tailor their learning experience to their specific needs and preferences [29]. Furthermore, YouTube can provide learners with access to experts and professionals in various fields, who share their knowledge and experience through videos. This can increase learners' motivation and engagement by offering them real-world examples of the practical applications of what they are learning [55].

Hence, YouTube can increase learners' interest and self-learning opportunities by providing access to high-quality educational content, engaging visuals and storytelling, and allowing learners to select and tailor their learning experience to their needs and interests.

2.4.3 YouTube Helps in Enhancing Learning Achievement

There is evidence to suggest that the use of YouTube in education can enhance learning achievement. A study by [38] found that the use of YouTube in a Physics class improved students' academic achievement and attitudes toward learning. One way in which YouTube can enhance learning achievement is by providing visual and multimedia representations of the learning material. Research has shown that visual aids can enhance learning and retention of information [31]. YouTube videos can offer visual and multimedia representations of complex concepts, which can improve learners' understanding and retention of the material.

Moreover, YouTube can enhance learning achievement by providing access to additional resources and materials that can support and supplement classroom instruction. Learners can watch instructional videos, access study guides, and participate in online discussions to further their understanding of the material. Another way in which YouTube can enhance learning achievement is by promoting active learning. Learners can create and share videos, participate in online discussions, and collaborate with peers to develop their understanding of the material. Active learning has been shown to improve academic achievement by promoting engagement, motivation, and critical thinking skills [22].

Overall, YouTube can enhance learning achievement by providing visual and multimedia representations of learning material, offering access to additional resources and materials, and promoting active learning.

2.5 Challenges of YouTube

Notwithstanding its many benefits, YouTube, as an educational resource, does have some challenges. Some of the challenges include:

Limited control over content: YouTube has a vast collection of videos, and not all of them are appropriate or relevant for classroom use. Educators may struggle to find high-quality educational videos that align with their curriculum and teaching goals [25]. Additionally, YouTube content can be updated or removed at any time, which can disrupt instructional plans [57].

Distractions: YouTube contains a wide range of non-educational content, such as advertisements and unrelated videos, which can distract students from their learning goals [51,21,45]. Students may also be tempted to watch YouTube videos that are not related to their assignments during class time, leading to a loss of focus and attention.

Technological challenges: Not all schools or classrooms have access to high-speed internet or the necessary hardware to view YouTube videos. Additionally, technical difficulties such as slow buffering or videos that fail to load can disrupt the flow of the classroom and decrease the effectiveness of instruction [36,57].

Copyright and fair use issues: YouTube videos may be subject to copyright or intellectual property laws, and educators must ensure that they have the necessary permissions to use and share the content in their classrooms [34,33]. Additionally, the fair use of copyrighted material can be a complex legal issue that requires careful consideration.

To address these challenges, educators can take steps such as carefully evaluating the quality and relevance of YouTube content, setting clear expectations for student behavior during class time, and ensuring that they have the necessary technical infrastructure to support the use of YouTube in the classroom.

Theoretical Underpinning

Mayer and Moreno's Cognitive Theory of Multimedia

The cognitive theory of multimedia was introduced by Mayer and Moreno. [30] asserted the theory that students learn better or more profoundly when they are given both pictures and words than with words alone. Multimedia is defined as a combination of text and pictures or visuals and sounds or any combination of visual and auditory cues. According to the theory, one of the main aims of teaching and learning using multimedia is to encourage and enable the student to build a coherent mental representation from the material presented. The student has to make sense of the material presented as an active participant, which leads to the construction of new knowledge [32].

3. Methodology

The methodology is a crucial element in any research study, as it lays the theoretical foundation for determining the strategies that can be utilized in a specific situation [17]. This section discusses the research paradigm, the design, the sampling approach, data collection tools and procedures, data analysis methods, research validity and reliability, and ethical considerations.

3.1 Research Paradigm

This study adopted a pragmatic worldview. Pragmatism provides a philosophical foundation for mixed-methods research by expressing a worldview derived from practical activities, contextual conditions, and consequential approaches targeted at addressing problems through real-world applications and solutions [16]. Considering the research objective of identifying the effectiveness of YouTube as supplementary material to enhance learning achievement in Geography, the most appropriate approach for gaining comprehensive insights within a pragmatic framework would be through the utilization of mixed methods, specifically employing an explanatory sequential design. Thus, this study was guided by the pragmatic worldview, as the study engages with the explanatory sequential mixed-method design.

3.2 Research Approach

The study has adopted the mixed methods approach. A mixed methods research approach involves collecting, analyzing, and "mixing" both quantitative and qualitative research and methods in a single study to understand a research problem [16]. A mixed methods approach was adopted because of its strength of drawing on both qualitative and quantitative research and minimizing the limitations of both approaches. More specifically, the study has adopted the explanatory sequential design.

3.3 Research Design

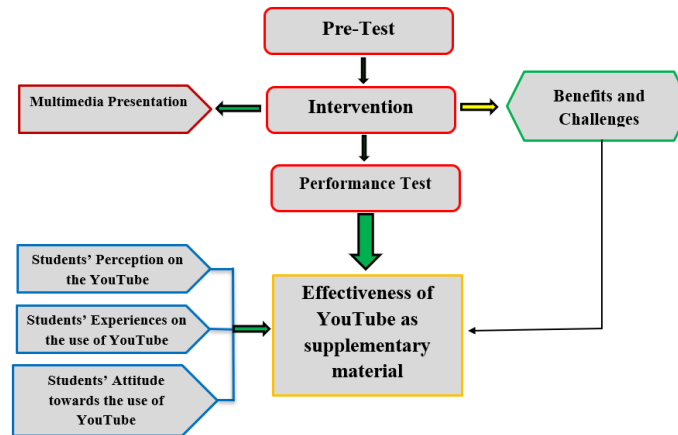
Research design is a plan and structure of research. [16] stated that research design is a specific procedure involved in the research process, such as data collection, data analysis, and report writing. The quasi-experimental design was employed as it enables the researchers to understand the prevalence of attributes for a sample of the population at one point in time.

Specifically, the pretest-posttest control group design is utilized. In this design, the experimental group takes part in some type of treatment or intervention, which can consist of single or multiple intervention classes. The design also includes a pretest and a posttest, in which both the experimental and control

groups participate. The purpose of the pretest is to ensure the comparability of the two groups prior to the treatment, whereas the posttest allows the researchers to determine the immediate effects of the treatment on the outcome variables [43].

3.4 Conceptual Framework

Figure 1 Conceptual Framework in Reference to Cognitive Theory of Multimedia



The figure 1 presents a conceptual framework that is based on the cognitive theory of multimedia and aims to investigate the effectiveness of using YouTube as supplementary material in enhancing students' learning achievement. The theory suggests that students learn better when they can make meaningful connections between words and pictures. The study identifies different variables that contribute to the effectiveness of using YouTube in teaching and learning. By using multimedia, students are able to make logical connections between words and pictures, leading to a deeper understanding of the content. YouTube, being a multimedia platform, provides both visual and auditory cues, enabling students to gain new knowledge and make sense of the content presented. Overall, the study highlights the potential of using YouTube as a tool for enhancing student learning achievement.

3.5 Population Description and Sample Description

A target population is a group of individuals or organizations from the population with some common defining characteristics that the researcher can identify and study [16]. The target population is the source of primary data to answer the research questions. Therefore, the target population for this study comprises class VIII A and B students from one of the school under Thimphu Dzongkhag. The study was conducted at this school because the researcher believes that students in this area appear to have good ICT facilities.

3.6 Sampling Technique

The purposive sampling technique was executed for this study. It involves the researcher to use their expertise to select a sample that is most useful to the purposes of the research. The sample size will be decided in such a manner to include relevant persons, even though not all will be expected as part of the sample [17]. All the class eight students were referred to as population while students in section A and B was termed as a sample. By the virtue of researcher's research design, the classroom defines the sample. For the quantitative phase of the study, purposive sampling was used, which encompasses two groups of students: the CG (n=29) and the EG (n=28). Subsequently, six students from the experimental group were selected as interview participants.

3.7 Data Collection Tools and Procedures

3.7.1 Geography Learning Achievement Test (GLAT)

Two types of GLAT tests were used in this study and these were the pre-test and the post-test. The purpose of the pre-test and the post-test in this study was to determine the effectiveness of the use of YouTube as supplementary material on the students' learning achievement. The pre-test and the post-test questions were drawn by the researcher from chapter four (River) of VIII. These were administered to both CG and EG. The questions were of a reasonable level of difficulty and their solutions would demand a variety of strategies. The pre-test was administered at the beginning of the intervention period while the post-test was administered at the end of the intervention to the students in both groups.

3.7.2 Survey Questionnaire

A questionnaire is a research instrument that allows the researcher to collect data specific to their study and gain insights that would otherwise be unavailable [49]. As a result, a survey questionnaire was employed to collect quantitative data. The questionnaire used a 5- point Likert-type scale (strongly disagree, disagree, not sure, agree, strongly agree). The sets of survey questionnaires were designed by the researcher and adapted from [9]. The first set of survey questionnaires was used to collect the respondents' perception of using YouTube as supplementary material in learning, the second focuses on the opinions of the use of YouTube in learning, the third on the students' attitudes towards the use of YouTube in learning, and the fourth on the benefits and challenges students faced in the learning of Geography using YouTube as supplementary material.

3.7.3 Interview for Students

An interview is a qualitative data gathering tool that allows researchers to gain a thorough grasp of a particular concept. In this study, semi-structured interviews were used to collect qualitative data. Semi-structured interviews provide the interviewer with combination of control and freedom, allowing them to dive deeply into the interviewee's emotions and thoughts. These interviews allow for the exploration and elaboration of the interviewee's responses, moving from specific topics to negotiation, discussion, and expansion of their viewpoints [24]. The interview questions were adapted from [54].

3.8 Data Analysis

Data analysis in a mixed-method design entails collecting and analyzing both quantitative and qualitative data, using the appropriate procedures for each type of data gathered [14]. The quantitative data was processed, cleansed, coded, and entered into the IBM SPSS Version 23.0 for analysis. The quantitative data was summarized in the form of descriptive statistics and inferential statistics. The data from GLAT were utilized for the independent-sample t-test and paired sample t-tests were used for comparative analysis between groups and within groups. Likewise, descriptive statistics such as mean and standard deviation were used to interpret the statistically collected data. The results were categorized according to a mean interpretation scale adapted from [40] as shown in Table 3.

[13] was used to find the effect size between the groups for the post-test. An effect size is a measure that describes the magnitude of the difference between groups. Cohen's d is represented by the ratio of an estimate of the difference between two means expressed in standard deviation units. [13] proposed a rule of thumb for interpreting effect sizes as shown in Table 4.

Likewise, the raw data gathered from semi-structured interviews were organized, transcribed, coded, and categorized into various themes during the transcription process. The 6-step method formulated by [11] was used for thematic analysis. Therefore, the qualitative data underwent thematic analysis, while the quantitative data were analyzed using IBM SPSS Statistics Version 23.0.

Table 1 Interpretation of Level of Rating

Level of Rating	Mean Range	Interpretation	Further Interpretation
Strongly Disagree	1.00-1.80	Very Poor	Negative
Disagree	1.81-2.60	Poor	
Not sure	2.61- 3.40	Moderate	Moderate

Agree	3.41- 4.20	Good	Positive
Strongly Agree	4.21-5.00	Very Good	

*Adapted from Orlanda-Ventayen&Ventayen (2017).

Table 2 *The Rule of Thumb for Interpreting Cohen's d*

Cohen's d	Effect Size
Below 0.20	Small
Between 0.20 and 0.80	Medium
Above 0.80	Large

*Adapted from Cohen's d (1992)

3.9 Reliability and Validity

Reliability and validity are criteria used to assess the quality of research, demonstrating how well a method or approach measures what it is supposed to measure. Reliability refers to the consistency of a measure, while validity pertains to the accuracy of a measure [15].

To maximize reliability and validity, Cronbach alpha of the items was run to check the reliability of the questionnaire using SPSS software version 23. Additionally, this study employed multiple strategies including Item Objective Congruence (IOC) triangulation, pilot tests, and member checks. The average IOC for the conceptual test was 0.91 for the pre-test and 0.97 for the post-test, which indicated that items were appropriate for the study.

3.9.1 Data Triangulation

Triangulation is a qualitative research strategy that involves comparing and contrasting data from multiple sources [18]. The use of a mixed methods approach involving both quantitative and qualitative techniques contributed to methodological triangulation coupled with the evidence collected from multiple sources using a survey questionnaire, interviews, and GLAT for data triangulation.

3.9.2 Pilot Test

Pilot testing is a common practice in research methodology. It involves conducting a preliminary version of the study with a small sample size to identify any potential issues or limitations in the research design, instruments, or procedures. This allows researchers to make necessary adjustments and refinements before conducting the main study. The pilot test was carried out to assess the validity of questionnaires in order to make the required changes in the actual study.

Cronbach alpha of the items was run to check the reliability of the questionnaire using SPSS software version 23. The Cronbach Alpha coefficient value was found to be 0.87 for the survey questionnaire which was good and suggests that the instrument was highly reliable to use (see Table 5).

Table 5 *Reliability Statistics for 5 Themes*

Theme	No. of Items	Cronbach's Alpha
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1. Student's Perception on the Use of YouTube	10	.82
2. Students' Attitude towards the Use of YouTube	10	.91
3. Benefits of Using YouTube	10	.92
4. Challenges of Using YouTube	11	.84
Overall Cronbach Alpha	41	.87

4. Result

This section presents the findings of both quantitative and qualitative data, which consist of six distinct themes highlighting the key patterns and trends identified in the data.

4.1 Statistical Test for Geography Learning Achievement Test (GLAT) Analysis

4.1.1 Comparison of Pre-test and Post-test Between Groups

Table 6 Inferential Analysis on Independent Sample T-test for Pretest and Post-test

GLAT	CG		EG		$t(28)$	p	Cohen's d
	M	SD	M	SD			
Pretest	4.34	1.67	4.02	1.24	-.836	.196	0.23
Post-test	5.72	1.35	7.45	1.45	5.170	.000	0.53

An independent sample t-test at a 95% confidence interval was conducted to determine if there was the difference between CG and EG on YouTube as supplementary material in learning Geography. Students in CG ($n = 29$) scored, on average, 4.34 ($SD = 1.67$) in the pretest, while students in EG ($n = 28$) scored, on average 4.02 ($SD = 1.24$) in the pretest. This difference between CG and EG was not statistically significant, $t(28) = -.836$, $p = .196$, Cohen's $d = 0.23$. Thus, the test failed to reject the null hypothesis. The effect size was calculated using Eta squared and it was found 0.23 which translates to low magnitude according to Cohen 1992.

On the other hand, students in CG scored an average of 5.72 ($SD = 1.35$), while EG scored an average of 7.45 ($SD = 1.45$). There was a statistically significant difference in the post-test, $t(28) = 5.170$, $p = .000$, Cohen's $d = 0.53$. Hence, the null hypothesis is rejected. The observed effect size of 0.53 indicates a medium level of magnitude.

Table 7 Inferential Analysis on Paired Sample T-test for Pretest and Post-test

GLAT	CG		EG		$t(28)$	p	Cohen's d
	M	SD	M	SD			
Pretest	4.34	1.67	4.02	1.24	3.61	.001	0.23
Post-test	5.72	1.35	7.45	1.88	14.75	.000	0.53

The paired sample t-test at a 95% confidence interval was conducted to compare the pretest and post-test within the groups to determine if students in CG ($n = 29$) and EG ($n = 28$) in Geography class improved or declined from pretest to post-test. The test for CG revealed that students statistically improved in their test

performance from the pretest ($M = 4.34$, $SD = 1.67$) to the post-test ($M = 5.72$, $SD = 1.35$), $t(27) = 3.61$, $p < .001$, Cohen's $d = 0.23$.

Similarly, the test for EG has shown that students statistically enhance their test performance from the pretest ($M = 4.02$, $SD = 1.24$) to the post-test ($M = 7.45$, $SD = 1.88$), $t(27) = 14.75$, $p < .000$, Cohen's $d = 0.53$.

4.2 Students' Perception of the Use of YouTube

The overall average mean ($M = 4.27$, $SD = 0.46$) of 10 items has been rated at very good. This shows that the majority of the respondents strongly agree that YouTube as supplementary in learning helped enhance the learning achievement of Geography.

The qualitative results also indicate that students have a positive perception towards the use of YouTube as supplementary material in learning. For instance, STD1 said, "I enjoy learning when YouTube is used." While STD4 shared, "Learning is fun when YouTube is used." Moreover, all the participants articulated that they use YouTube for learning. For instance, participant STD1 said, "I use YouTube whenever I have access to gadgets and the internet for learning." Both quantitative and qualitative results also indicate that students perceive YouTube as an important learning resource. For instance, STD3 and STD1 pointed out that YouTube is a nice learning material and is helpful in the learning of Geography. Furthermore, students aspire to have more YouTube-integrated lessons in the learning of Geography.

Table 3 Rating of Students' Perception of the Use of YouTube

	Statements	Mean	SD	Level of opinion
1	I use YouTube daily for learning.	3.79	.63	Good
2	YouTube is useful in learning new concepts in geography.	4.39	.50	Very Good
3	YouTube provides me with the required Geography content.	4.04	.33	Good
4	I enjoy learning Geography lessons using YouTube.	4.29	.46	Very Good
5	I have gained Geography knowledge from YouTube.	4.07	.26	Good
6	YouTube is a user-friendly learning platform.	4.36	.49	Very Good
7	I support the use of YouTube as a learning material in Geography classes.	4.50	.51	Very Good
8	I like to have more YouTube incorporated into our Geography lessons.	4.57	.50	Very Good
9	YouTube is valuable learning material.	4.21	.42	Very Good
10	I like to use YouTube for learning Geography in the future.	4.43	.50	Very Good
	Overall mean	4.27	.46	Very Good

4.3 Students' Attitude Toward the Use of YouTube

The overall average mean ($M = 4.40$, $SD = 0.49$) of 10 items under the theme of students' attitudes towards the use of YouTube as supplementary material in learning was rated as very good. This indicates that the majority of the respondents strongly agree that they have a positive attitude towards the use of YouTube as supplementary in learning Geography.

The qualitative results also reveal that students have a positive attitude toward the use of YouTube as supplementary material in the learning. For instance, STD1,2,3 shared, "I feel motivated and excited when Geography lessons are taught using YouTube because I understand more. I enjoy the class more."

Further, all the participants articulated that YouTube attracts their attention and they could concentrate more. For instance, STD4 opined that its features such as audiovisual caught my attention towards the lesson and increased my interest in the subject.

Table 4 Rating of Students' Attitude towards the Use of YouTube

	Statements	Mean	SD	Level of opinion
1	I like Geography class when my teacher uses YouTube.	4.43	.50	Very Good
2	Learning is enjoyable when YouTube is used for teaching Geography.	4.43	.50	Very Good
3	YouTube makes Geography lessons fun.	4.39	.49	Very Good
4	Geography lesson becomes interesting when YouTube is used in teaching.	4.46	.51	Very Good
5	Learning Geography using YouTube is entertaining.	4.43	.50	Very Good
6	YouTube motivates me to study Geography more.	4.36	.49	Very Good
7	Visual elements displayed on YouTube attract my attention.	4.43	.50	Very Good
8	YouTube is an attractive learning material that helps me in learning Geography.	4.39	.49	Very Good
9	The use of YouTube in the classroom creates a more exciting learning environment.	4.43	.50	Very Good
10	I feel good about using YouTube for learning.	4.29	.46	Very Good
	Overall mean	4.40	.49	Very Good

4.4 Benefits of Using YouTube

The overall average mean ($M = 4.37$, $SD = 0.47$) of 10 items under the theme benefits of YouTube in learning Geography using YouTube was rated as very good. This shows that respondents strongly agree that YouTube is beneficial as supplementary material in learning Geography.

The qualitative results also indicate that YouTube as supplementary material has benefits in learning Geography. For instance, STD1 said, "Since YouTube is free and easily accessible we get more knowledge on different topics in Geography and complete our homework, assignments, and project work on time." Further, the qualitative findings revealed that YouTube helps students to engage meaningfully in the learning of Geography. Similarly, STD2 shared that,

YouTube has helped me to engage in learning Geography meaningfully by making me motivated and I can also build my interest through YouTube learning since it is audiovisual material. I like to learn more when there are pictures and audio along with the lesson.

Moreover, YouTube as supplementary material helped students to work collaboratively during group work. For instance, YouTube has helped develop collaboration and provided space for building teamwork (STD3, STD4). The interview participants believe that YouTube is a wonderful platform for self-learning and has sufficient materials for self-learning. For instance, all the participants shared that there are wonderful materials for self-study as well. Besides, the majority of the participants revealed that YouTube enhances a better understanding of the subject. Likewise, STD2 articulated, "YouTube helps in simplifying difficult concepts and its audiovisual features lead to a better understanding of Geographical concepts." All the participants also believe that the use of YouTube has enhanced their content knowledge of Geography. The participants also agreed that YouTube provides real-life situation lessons which make learning fruitful and effective.

Table 5 Rating on Benefits of Using YouTube

	Statements	Mean	SD	Level of opinion
1	YouTube is beneficial in doing project work.	4.43	.53	Very Good
2	YouTube is useful in getting information for homework.	4.50	.51	Very Good
3	Important contents on Geography are available on YouTube.	4.21	.42	Very Good
4	YouTube has sufficient materials for self-learning.	4.32	.48	Very Good
5	YouTube has helped me boost my learning achievement in Geography.	4.25	.44	Very Good
6	YouTube is easily accessible through my device.	4.61	.50	Very Good
7	YouTube provides real-life situation lessons.	4.29	.46	Very Good
8	I have access to a wide range of entertainment such as movies, MTV, and music on YouTube.	4.61	.50	Very Good
9	YouTube helps to improve my comprehension of Geography knowledge.	4.21	.42	Very Good
10	YouTube allows me to engage meaningfully in the learning of Geography.	4.29	.46	Very Good
	Overall mean	4.37	.47	Very Good

4.5 Challenges of Using YouTube

The overall average mean ($M = 2.66$, $SD = 0.58$) of eleven items under the theme challenges of YouTube in learning Geography using YouTube was rated at a moderate level. This indicates that respondents agree that YouTube has some challenges as supplementary in learning Geography.

The qualitative results also show that YouTube as supplementary material has some challenges in the learning of Geography. For instance, all the participants articulated that YouTube also cause distraction in learning as they can access other unsuitable content.

Similarly, STD4 shared that,

The problems I faced while using YouTube in learning Geography are that we are getting distracted by other unnecessary videos and advertisements. Most of the time my attention is drawn to MTVs and online games which frequently pop up while watching YouTube lessons on Geography.

The participants also believe that all YouTube videos are not reliable for learning. STD1 opined, “Some contents are not reliable for learning of Geography. Anybody can upload any content since YouTube is free and accessible.” Moreover, some videos also lack quality which is just garbage online material. Further, there is a lack of content on Bhutan Geography on YouTube. STD3 pointed out that there is not much information about Bhutan Geography on YouTube and some relevant materials are not for free which hampers my learning.”

All the participants articulated that they have limited ICT facilities in the school as well as at home. For instance, STD3 mentioned, “There are limited desktops and internet facilities in the school and the school internet is not strong when it is used by all students at once.” Likewise, STD2 added that,

There are insufficient ICT facilities in the school and we are given opportunities to existing facilities during ICT classes only. The internet is slow to browse YouTube during class hours and the internet is so expensive when I access YouTube from home.

Table 6 Rating of Challenges of Using YouTube

	Statements	Mean	SD	Level of opinion
1	I have my device (Smartphone, desktop, laptop, etc.) to browse YouTube.	2.50	.88	Poor
2	My school has good ICT facilities in place that support YouTube.	2.14	.59	Poor
3	The internet connectivity at my school supports the YouTube platform.	3.43	.92	Good
4	All the YouTube videos are suitable for learning.	2.07	.54	Poor
5	The advertisements on YouTube distract my learning experiences.	4.46	.51	Very Good
6	I have access to online games through YouTube.	4.29	.46	Very Good
7	I have to stay up late at night to use YouTube as the internet tariffs are low.	3.71	.71	Good
8	The cost of the internet is cheap in our country.	1.50	.51	Very Poor
9	There are adequate learning materials on the Bhutanese context on YouTube.	1.25	.44	Very Poor
10	All the learning materials on YouTube are accessible to us.	2.04	.43	Poor
11	All the contents on YouTube are reliable to be used for learning purposes.	1.89	.42	Poor
Overall mean		2.66	.58	Moderate

5. Discussion

In this section, the significant findings of the study are discussed with relevant literature. The findings are discussed under six themes, such as the effectiveness of YouTube as supplementary material on learners' performance, students' perception of the use of YouTube as supplementary material in learning, students' attitude toward the use of YouTube as supplementary material in learning, benefits and challenges of using YouTube.

5.1 Effectiveness of YouTube as Supplementary Material on Learners' Performance

The findings revealed that there was no statistically significant difference in the average scores of the students in the CG and EG during the pre-test conducted before the treatment. However, there was a statistically significant difference in the average scores during the post-test for both groups. Specifically, the post-test average score of the EG was significantly higher than that of the CG. These results suggest that the students in the EG performed better than those in the CG. Thus, it can be inferred that incorporating YouTube as supplementary material in the learning of Geography has improved the students' performance and achievement in the subject.

YouTube has emerged as a popular and effective tool for enhancing learning achievement as supplementary material. Various studies have been conducted to explore the effectiveness of using YouTube as supplementary material in learning different subjects. The studies have shown positive results, indicating that YouTube can enhance students' understanding and performance.

[5] conducted a study on teaching the English language in classrooms as supplementary material for university students and found that YouTube is more effective than conventional methods in teaching language and helped students improve their understanding and performance. Similarly, [20] reported that learning through YouTube achieves better learning achievement of computer skills due to the availability of YouTube videos anytime and anywhere with high quality.

In addition, [47] found that the use of YouTube has been effective in teaching and learning Mathematics and Science. [38] conducted a study on university students in Physics and found that there is a significant influence of students' YouTube usage on their academic achievement in Physics. Likewise, [8] revealed that there was a statistically significant difference between the achievement and interest of students taught using YouTube audio-visual documentaries in History for senior secondary students.

These studies support each other and indicate the effectiveness of using YouTube as supplementary material in enhancing learning achievement. YouTube provides an interactive and engaging way of presenting information that can be accessed anytime and anywhere. This flexibility makes it easier for students to access the information they need to enhance their understanding of the subject.

Thus, the studies discussed above demonstrate the effectiveness of YouTube as supplementary material in enhancing learning achievement. YouTube has the potential to enhance students' understanding and performance in different subjects, including English, Computer skills, Mathematics, Science, History, and Physics. Therefore, educators should consider incorporating YouTube into their teaching methodologies as supplementary material to enhance the learning experience and improve students' academic achievements.

5.2 Students' Perception of the Use of YouTube as Supplementary Material in Learning

The overall average mean ($M = 4.26$, $SD = 0.46$) under the theme of students' perception of the use of YouTube in the learning of Geography has been rated very good. The finding suggests that students have a positive perception of the use of YouTube as supplementary material in learning. Similarly, the qualitative findings show that participants have a positive perception of the use of YouTube as supplementary material in learning.

[7] conducted a study on students' perceptions of using YouTube videos as supplementary material in a university course. The study found that students perceived YouTube videos as useful for enhancing their understanding of the subject matter and for increasing their engagement in the learning process. Moreover, students reported that using YouTube videos as supplementary material helped them to better prepare for examinations.

Similarly, [20] explored students' perceptions of using YouTube as supplementary material in learning computer programming. The study found that students perceived YouTube videos as a helpful resource for learning programming concepts and enhancing their coding skills. Moreover, students reported that using YouTube as supplementary material improved their motivation to learn and increased their engagement in the learning process.

In contrast, [52] found that students' perceptions of using YouTube as supplementary material in learning were mixed. The study investigated students' perceptions of using YouTube as supplementary material in an English listening course. While some students perceived YouTube videos as helpful for improving their listening skills, others reported that the videos were not challenging enough and did not provide enough opportunities for interaction.

Overall, students' perceptions of using YouTube as supplementary material in learning are mostly positive, with many respondents reporting that it enhances their understanding of the subject matter and improves their engagement in the learning process. However, there is a need for educators to carefully select and curate YouTube videos to ensure that they are relevant, challenging, and engaging for students.

5.3 Students' Attitude Toward the Use of YouTube as Supplementary Material in Learning

The results of the study show that the use of YouTube in teaching and learning in the classroom influence students' attitude towards learning Geography. The overall average mean ($M = 4.41$, $SD = 0.50$) under the theme of students' attitude towards the use of YouTube as supplementary material in learning was rated very good, indicating students' positive attitude toward the use of YouTube. Similarly, the qualitative findings revealed that YouTube integrated lessons increased students' interest and motivation toward the subject.

The attitude of students towards the use of YouTube as supplementary material in learning is a critical aspect to consider. Several studies have investigated students' attitudes towards using YouTube as supplementary material in learning, and the results have been mostly positive. In a study conducted by [1], which investigated Saudi Arabian college students' attitudes towards using YouTube videos in English language learning, it was found that the majority of students had a positive attitude towards using YouTube as supplementary material. The students reported that YouTube videos made learning more engaging, provided additional explanations and visual aids, and were helpful in preparing for exams.

Similarly, [27] conducted a study on Indonesian EFL students' attitudes toward using YouTube videos as supplementary material in learning grammar. The study found that the majority of students had a positive attitude towards using YouTube as supplementary material. The students reported that YouTube videos helped them understand grammar concepts better, increased their motivation to learn, and provided an interactive and engaging learning experience.

In contrast, [23] found that some Chinese EFL students had a negative attitude towards using YouTube as supplementary material. The study investigated the use of YouTube as supplementary material in learning English reading comprehension. The study found that some students perceived YouTube videos as distracting, irrelevant, and time-consuming.

Overall, the attitude of students towards the use of YouTube as supplementary material in learning has been mostly positive. Students perceive YouTube videos as a helpful resource that makes learning more engaging, provides additional explanations and visual aids, and helps them prepare for exams. However, there are some mixed perceptions about the effectiveness of YouTube as a supplementary material in

learning, and educators need to be careful in selecting and curating relevant and engaging YouTube videos to ensure they meet students' learning needs and preferences.

5.4 Benefits of Using YouTube

The results of the study show that there are various benefits of using YouTube as supplementary material in learning. The quantitative results, which revealed an average mean of $M = 4.37$, $SD = 0.47$, suggest that the respondents strongly agreed that YouTube is beneficial as supplementary material in learning Geography. Similarly, the qualitative findings revealed that YouTube helps students to engage meaningfully and has self-learning opportunities in the learning of Geography.

YouTube has emerged as a powerful tool for students to learn and acquire knowledge. It has revolutionized the traditional methods of learning, providing a range of opportunities for students to engage with educational content. The benefits of using YouTube in learning, including students' engagement, self-learning opportunities, and enhancement of academic learning achievement are present in the discussion in this paper.

Firstly, YouTube can significantly enhance students' engagement with educational content. Students find YouTube videos to be more visually appealing, interactive, and engaging as compared to traditional textbooks. A study conducted by [10] found that the use of YouTube videos improved students' engagement and motivation levels, resulting in increased retention of knowledge.

Moreover, YouTube provides a platform for self-learning opportunities. Students can access educational content at their own pace, place, and time, making it easier for them to learn and revise concepts. This flexibility also allows students to customize their learning experience according to their individual learning styles, preferences, and needs. In a study by [20], it was found that YouTube provided students with opportunities for self-paced learning, which helped them to develop a deeper understanding of the subject.

Lastly, YouTube has been shown to enhance academic learning achievement. Students who use YouTube as a learning tool have shown significant improvements in academic performance. A study conducted by [10] found that using YouTube as a supplementary tool improved students' academic performance and increased their conceptual understanding of complex topics.

Hence, YouTube has numerous benefits for students, including enhanced engagement with educational content, self-learning opportunities, and improvement in academic learning achievement. Educators are encouraged to explore the use of YouTube as a supplementary tool to enhance the learning experience and improve academic outcomes.

5.5 Challenges of Using YouTube

The eleven questions that made up the theme "Challenges of YouTube in learning Geography using YouTube" had an overall average mean ($M = 2.66$, $SD = 0.58$) that was rated moderate level, showing that some problems exist when using YouTube as supplementary material in learning Geography. Some of the major qualitative findings also indicated that distraction in learning, the quality of YouTube videos, and inadequate ICT facilities were challenges for YouTube in learning.

While the use of YouTube in learning has several benefits, it also comes with its own set of challenges. In this discussion, we will explore some of the key challenges associated with using YouTube as a learning tool, along with relevant literature.

One of the biggest challenges of using YouTube in learning is the credibility and quality of the content available. While there is a wealth of educational content on YouTube, there is also a lot of misinformation and poorly researched material that can be misleading and potentially harmful. In a study by [12], it was

found that students often struggled to evaluate the quality and accuracy of the content on YouTube, leading to confusion and misconceptions.

Another challenge of using YouTube in learning is the potential for distractions and lack of focus. YouTube is designed to be a highly engaging platform, with endless possibilities for exploration and entertainment. While this can be an advantage in some cases, it can also lead to students getting distracted and losing focus on their intended learning objectives. A study by [51] found that while YouTube was effective in motivating students, it also posed a risk of distracting them from their learning goals.

Lastly, other challenge of using YouTube in learning is the technological challenges. According to a study conducted by [36], it was discovered that some schools or classrooms lack the availability of high-speed internet or the required equipment to access and watch YouTube videos. Additionally, the effectiveness of instructional activities can be compromised due to technical challenges like slow buffering or videos that fail to load, leading to disruptions in the classroom environment [36,57].

The finding also indicated that there are inadequate learning materials on the Bhutanese context on YouTube. The qualitative findings of this study revealed that there are no adequate learning materials and lacks educational resources on the Bhutanese context on YouTube.

Overall, YouTube can be a valuable tool for learning, it also comes with its own set of challenges. These include issues related to the quality and credibility of the content, distractions, and the technological challenges. Similarly, there is a lack of sufficient educational resources and learning materials in the Bhutanese context on YouTube. Educators should be aware of these challenges and work to address them when using YouTube as a tool for learning.

6. Conclusion

This study aimed to investigate the effectiveness of using YouTube as supplementary material to enhance the learning achievement of Class VIII students in Geography. The EG was taught using YouTube, while the CG received a conventional approach. Both groups were assessed through pre-tests and post-tests to measure the significant difference in GLAT scores.

The findings revealed that the EG outperformed the CG, with a statistically significant difference in the mean GLAT scores between the two groups in the post-test, indicating that YouTube as a supplementary material was effective in enhancing students' learning achievement in Geography.

The descriptive analysis of the EG revealed that students had a positive perception and attitude towards the use of YouTube as supplementary material in their learning. The majority of respondents agreed that YouTube was helpful in learning Geography and expressed increased interest, motivation, and a desire for more YouTube-integrated lessons in Geography classes.

The study also found several benefits of using YouTube as supplementary material, including increased student engagement, enjoyment of Geography classes, and enhanced learning achievement. However, it also showed certain challenges associated with using YouTube in this context, although respondents moderately agreed on the presence of these challenges.

Overall, the study established that incorporating YouTube as a supplementary material in learning Geography has a significant positive effect on students' learning achievement. Students' positive perception and attitude towards YouTube as supplementary material further support the use of this approach, as it enhances interest, attention, and enjoyment of Geography classes.

7. Recommendations

The study revealed that incorporating YouTube as supplementary learning material enhanced learning achievement and foster favorable attitudes among students. Therefore, educators are recommended to employ YouTube as an instructional approach in various subject areas.

The study indicated a need for more Bhutanese educational resources on YouTube. To address this, it is recommended that schools, teachers, and students collaborate to create subject-specific educational channels on YouTube. These channels would contain videos explaining various topics and content, fostering better communication and enhancing the learning materials in the Bhutanese context.

The study examined on students' attitudes toward YouTube as a supplementary learning material, but did not delve into the factors that influence these attitudes. To gain a broader understanding, it is recommended to conduct an exclusive study specifically examining the factors that promote students' attitudes toward YouTube.

8. Significance of the Study

The use of YouTube as a tool to enhance student's learning.

Students will have the opportunity to relate knowledge acquired in the classroom and retain concepts easily which will in turn improve their learning achievements with the use of YouTube.

This study will be the first research conducted on the use of YouTube as teaching-learning material in the Bhutanese Education system. It will generate relevant findings to the literature.

This study will also contribute to the development of approaches to education on modern technology-driven teaching and learning.

It will provide provision for future researchers to conduct relevant research work in Education and fill in the gap generated by the present study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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