



Use of Edpuzzle Learning Videos for class 9 Biology and its impact on academic performance

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ABSTRACT

This study examined effectiveness of Edpuzzle Learning Videos in class 9 Biology. The study employed quasi-experimental design and study used purposive sampling consisting of 30 students in grade 9. The research participants consist of two groups, namely control (Lecture method) and experimental (Edpuzzle) consisting of 15 students in each group. To collect data pre-test and post-test were administered. Data collected were analysed employing descriptive statistics. A normality test determined the distribution of data. Further, test score analysis for pre-test indicated that students in the control group ($M=7.0667$) and experimental group ($M = 6.4667$) had a similar level of knowledge. However, analysis of post-test revealed that there were substantial differences between control group ($M = 8.2667$, $SD = 1.94447$) and experimental group ($M = 12.6000$, $SD = 1.24212$). The finding of the study revealed that employing educational technology such as Edpuzzle Learning Videos proved effective in learning Biology for Middle Secondary School. Moreover, academic score increased on the post-test as a result of the student's active participation and engagement in their studies. Additionally, students were involved in learning at their own pace resulting in enhancing cognitive skills. This study recommended that Science teachers to use educational technology such as Edpuzzle Learning Videos as an alternative to conventional methods.

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INTRODUCTION

Recently that various educational technologies were integrated into Bhutanese educational system. Due to advancement of science and technology, teaching and learning integrated with computer-related technologies and internet. With pandemic still persisting teachers have adopted online teaching and learning, however, teachers are still unconvinced that online teaching and learning lacks necessary interaction (Dorji, 2020). Technologies revolutionized conventional classrooms, transitioning from use of chalkboards to a use of smart interactive board. Therefore, teachers also use simulations, apps, and software to support students study challenging subjects. (Nidup, 2022). Educational technologies in particular provide students with avenues to perform hands-on exploration for instance students can perform virtual experiments using simulations in science subjects.

Mayer (2009) defined multimedia as a blend of words and visual information during demonstration or illustration in cognitive theory of multimedia education (CTML). Multimedia technology employs not just current and high-level IT developments such as advanced digital apparatus, also items that we use daily such as small video clips, text, PowerPoint presentations, graphics, and more (Rigzin & Chalermnirundorn, 2021). Additionally, Microsoft Encarta and Wikipedia are paramount references that can be easily evaluated for enhanced understanding (Nidup, 2018). Furthermore, content in class could be understood better by students using video clips and pictures. Subsequently, with integration of digital technologies in the school in Bhutan, teachers widely use different digital resources and multimedia.

There are several technologies for teaching and learning such as power point, you tube, recorded video clips, however, Edpuzzle Learning Videos could be convenient and it involves learners in the midst of the session. Edpuzzle Learning Videos aids video clips with information taught using web resources, additionally, teachers can choose videos from widespread locations for students (Mischel, 2019). There are several studies done on use of multimedia and digital technologies in academic learning in the global context. Particularly there are number of studies on the impact of Edpuzzle Learning Videos on academic scores. However, there are lack of studies conducted particularly for use of Edpuzzle Learning Videos in the classroom on students' scientific learning scores in Bhutan. Therefore, this study attempted to evaluate the effectiveness of Edpuzzle Learning Videos in the teaching of lessons in Class 9 Biology and to investigate its impact on students' academic achievement.

LITERATURE REVIEW

According to Amaliah (2020), digital learning is of paramount importance for preparing students in global context. Moreover, digital video materials are not just for entertainment, but also for providing knowledge and information, further digital technologies remain accessible (Roberti, 2018). Cesare et al. (2021) reported that recorded video clips support distant learning, flipped classrooms, and conventional face-to-face learning. However, they noted that recorded videos don't involve students. Therefore, it is important for learners to actively engage themselves while watching recorded videos. Hence Edpuzzle Learning Videos could engage learners in midst of recorded videos by embedding questions and instruction. Teachers can also add direction to video sessions due to features available in Edpuzzle Learning Videos. (McClesky et al., 2017). It is reasonable to assume that Edpuzzle Learning Videos could be used to create lessons that engage learners using recorded digital video.

Roberti (2018) observed that studying science using video clips had various advantages over lecture-based methods, and as a consequence, he offered following set of criteria: a video should address misconceptions. Subsequently, video should disseminate information in a simple manner, but should not oversimplify and therefore it should engage learners. Finally, video clips accelerate students to become active learners, proving it to be better than passive learning. Kiat et al. (2020), noted that students taught science using multimedia learning videos facilitated better learning scores than those taught using textbooks. Further, their study revealed it helped in better understanding of scientific concepts. Overall, there seems to be some evidence to indicate that multimedia such as video clips enhance academic performance of science subjects.

Digital tools and platforms like Edpuzzle Learning Videos lead to creation of collaborative video lessons from well-known sources like YouTube, Khan Academy, Crash Course, and TED-Ed (Amaliah, 2020; Hidayat & Praseno, 2021). Edpuzzle Learning Videos is an online video editing platform that helps to draw videos from diverse sources, people can use available videos, and can make cooperative video lessons embedding questions and instructions (Pulukuri & Abrams, 2020). Furthermore, Su and Chiu (2021) suggested that Edpuzzle Learning Videos involve students by transforming and integrating collaborative aspects into existing video clips. Teachers can improve an uploaded video by highlighting essential part of the lesson component (Mu & Paparas, 2016). Additionally, teachers may integrate and embed questions, both open-ended and multiple choice (Baker, 2016), modify and control video's pace and number of views by others (Kleftodimos & Evangelidis, 2016). Edpuzzle Learning Videos is suitable for students since the lessons in Edpuzzle can be studied anywhere using mobile devices, and further students may view the lesson several times, providing them prior knowledge. In sum, Edpuzzle Learning Videos multiple features make it easy to utilize during the teaching and learning process.

Edpuzzle Learning Videos had demonstrated to be more effective than traditional methods of teaching and learning. Features of Edpuzzle Learning Videos help students comprehend the material more readily, sharpen their analytical skills, and inspire them to create innovative digital products (Amaliah, 2020). Using Edpuzzle Learning Videos increases students' interest in the information (Shelby & Fralish, 2021). Additionally, Hidayat and Praseno (2021) pointed out that employing Edpuzzle Learning Videos in a flipped classroom had a better influence on students' writing achievement than using a traditional approach. Further, study conducted by Bursa and Kose (2020) on showed students subjected to videos using Edpuzzle Learning Videos exhibited a statistically significant gain in learning achievement. However, a study by da Costa et al. (2021) found that using technology like Edpuzzle Learning Videos did not boost students' marks in Accounting science, therefore they suggested a longer follow-up period. Though there are numerous benefits of Edpuzzle Learning Videos, there are literally no studies conducted on effect of Edpuzzle Learning Videos on academic learning score in Bhutan. Thus, this study intends to investigate effect of Edpuzzle Learning Videos on the academic learning score for Biology subject.

OBJECTIVES OF THE STUDY

This study aims to investigate effectiveness of Edpuzzle Learning Videos on academic performance of grade 9 Biology students on topic Variations, Genetics and Evolution. The problem raised in this study was to find out the difference between scores of students in pre-test and post-test on the topic Variations, Genetics and Evolution in conventional teaching (textbooks, lecture and chalkboard) and showing of Edpuzzle Learning Videos. Based on the research problem, the hypothesis in the study is included as follows:

HO1 There was no significant difference between pre-test scores of students taught using conventional pedagogy and Edpuzzle Learning Videos on topic Variations, Genetics and Evolution of Biology.

HO2 There was no significant difference between post-test scores of students taught using conventional pedagogy and Edpuzzle learning videos on topic Variations, Genetics and Evolution of Biology.

METHODS

Research Design

Quasi-experimental pre-test and post-test control group design was conducted at Trashigang Middle Secondary School, of Trashigang district, Bhutan to collect data. The pre-test and post-test were conducted for controlled and experimental groups to measure the impact of Edpuzzle Learning Videos.

Sampling

Sample consist of 30 purposively selected grade 9 students of Trashigang Middle Secondary School. It is important that for essential information, the researcher must limit the responses to those who share the same

perspectives and are ready to provide it (Etikan & Bala, 2017). Consequently, the respondents in this study were selected based on their willingness to participate in the study. The respondents were selected based on willingness-based, attendance, topics studied, Edpuzzle Learning Videos lessons and performed both pre-test and post-test. Since sample was selected on aforementioned criteria, if students don't fulfil the criteria, they were forbidden to participate. Respondents consist of two groups: control (Conventional pedagogy) and experimental (Edpuzzle Learning Videos); both groups were taught by same Biology teacher. Both control and experimental group consist of 15 members each. Depending on their academic achievement from previous academic year of grade 8, students were grouped into two groups.

Research Instrument

Achievement test

The achievement test in this study was self-developed with 15 multiple choice questions with four items from the chapter of Variation, Genetics and Evolution of grade 9 Biology. According to Kara and Çelikler (2015) content validity of test can be achieved by reviewing it by domain experts and lecturers. Content validity of achievement test in this study was accomplished by seeking approval from 3 experienced researchers and a teacher who taught Biology for at least six years.

The development of a consistent instrument for trustworthy goals can be accomplished by test items with content standards and objectives (Gay et al., 2011). The multiple-choice questions in this study are designed to fulfil all the levels of Bloom's Taxonomy. Further, to ensure validity and reliability of the test, achievement test was pilot tested on 10 students of grade 10 who were taught Variation, Genetics and Evolution in their previous grade 9 Biology. The pilot test refined test items by eradicating sentences with vague language, utilizing appropriate vocabulary, and adding appropriate examples (Wahib & Tamer, 2021).

To retain validity of the study, the pre-test and post-test achievement test of the study were purposively kept identical. According to Galey et al. (2011), using two different tests could lead to inconsistent measurement and inaccurate evaluations of students' performance, endangering the test's internal validity. Additionally, pre-testing could not be an issue for the study because there was enough time between the pre-test and post-test (Gay et al., 2011).

Research procedure and data analysis

Lesson plans were prepared to ensure that same lessons were delivered to conventional(control) and experimental (Edpuzzle Learning Videos) groups. The control group was taught employing textbooks, a whiteboard and marker. Conversely, an experimental group was taught using Edpuzzle Learning Videos. To assess students' academic achievement, both the control and experimental groups were administered with pre-test and post-test. The independent variable for study was result of conventional and Edpuzzle Learning Videos pre-test, in contrast, the dependent variable was differences in respondent's post-test (Kiat et al.,2020).

Individual student's marks were determined once they have completed pre-test and post-test. According to Mishra et al. (2019), normal data is fundamental premise of parametric testing, and many statistical tests demand that data be normal. Further Mishra and colleagues (2019) described that for samples less than 50 Shapiro–Wilk test is more appropriate and on other hands if sample is more than 50 while Kolmogorov– Smirnov test can be used. Normality test was performed to determine distribution of data and data was analysed by T test at 5% level. Statistical Package for Social Sciences (SPSS) version 22.0 was used for descriptive analysis, which included percentages, means, standard deviations.

RESULT

Normality test

Prior to analysis of data, the Shapiro-Wilk test was run to ensure normal distribution of data. The normality test depicts controlled group pre-test with the p-value of 0.117 and experimental group pre-test with the p-value of 0.581. The normality test shows the controlled group post-test with p-value of 0.904 and the experimental group post-test with p-value of 0.154. The p-value for pre-test and post-test for both controlled and experimental group is greater than 0.05 ($p > 0.05$), consequently it was concluded that data had a normal distribution (Mishra et al., 2019). As a result, parametric tests were used in this study to compare data, including total score, arithmetic mean, standard deviation, and t-test.

Pre-test

Pre-test scores for both controlled and experimental groups were used to check hypothesis one. An Independent Sample t-test was used to examine significant differences between pre-test scores of the controlled and experimental group. The result of pre-test scores for controlled and experimental group is shown in table 1.

Table 1

<i>T-test result for pre-test result in the controlled and experimental group</i>					
Group	<i>M</i>	<i>SD</i>	<i>T</i>	<i>Df</i>	<i>Significant</i>
Control	7.0667	1.75119	.934	28	.358
Experimental	6.4667	1.76743			

The result of independent sample t-test showed that pre-test scores of controlled group ($M = 7.0667$, $SD = 1.75119$, $n = 15$) and experimental group ($M = 6.4667$, $SD = 1.76743$, $n = 15$) were not statically significant at the .05 level of significance ($t(28) = 0.934$, $df = 28$, $p > .05$). The null hypothesis which suggested that there is no significant difference between pre-test learning scores of students taught using conventional pedagogy and Edpuzzle Learning Videos in the topic Variations, Genetics and Evolution of Biology failed to be rejected as value p was higher than a significant level, α ($p = 0.358 > 0.05$). Students in controlled and experimental groups also had an equivalent level of knowledge before the study, as evidenced by their almost identical pre-test mean scores for controlled and experimental group.

Post-test

Mean scores during post-test for the controlled and experimental group was used to test hypothesis two. An independent Sample t-test was used to examine significant differences in post-test learning scores for conventional pedagogy and Edpuzzle Learning Videos. The result of post-test scores for controlled and experimental group is shown in table 2.

Table 2

<i>T-test result for students' post-test result in the controlled and experimental group</i>					
Group	<i>M</i>	<i>SD</i>	<i>T</i>	<i>Df</i>	<i>Significant</i>
Control	8.2667	1.94447	-7.274	28	.000
Experimental	12.6000	1.24212			

The result of independent sample t-test revealed that post-test learning scores of controlled group ($M = 8.2667$, $SD = 1.94447$, $n = 15$) and experimental group ($M = 12.6000$, $SD = 1.24212$, $n = 15$) was statically significant at the .05 level of significance ($t(28) = -7.274$, $df = 28$, $p < .05$). The null hypothesis which suggests that there is no significant difference between post-test scores of students taught using conventional pedagogy and Edpuzzle Learning Videos in the topic Variations, Genetics and Evolution of Biology was rejected as value p was lower than a significant level, α ($p = 0.000 < 0.05$). Also, we can conclude that academic achievement of the experimental group improved than the controlled group, since mean scores of post-test for the experimental group was 12.6 and for the controlled group was 8.27. It can be concluded that teaching of topic Variations, Genetics and Evolution of Biology for grade 9 is more effective in improving students' academic performance when Edpuzzle learning video was applied in classroom.

DISCUSSION

The finding of this study was consistent with the study conducted by Shelby and Fralish (2021), and result showed that, when mean quiz scores from the pre-lab quiz and the Edpuzzle formats were compared, and students' scores increased by an average of 5–10% for majority of evaluations. The use of Kahoot and Edpuzzle Learning Videos as an instructional intervention on the academic achievement and motivation of grade 9 Natural sciences learners on the topic of skeletal system revealed statically significant differences in the result of pre-test and post-test, which ultimately suggested that the use of digital resources in the science classroom was effective (Ramaila and Mpinga, 2022). Moreover, Edpuzzle-assisted flipped classroom proved to be an effective pedagogy in students having better achievement in writing as compared to conventional learning (Hidayat & Praseno, 2021).

Finding obtained from this study concluded that use of Edpuzzle Learning Videos facilitated self-regulated learning skills for students, where students learn at their own pace, additionally, students better comprehend concept embedded in the Edpuzzle Learning Video. Especially low-achievers learn and discuss own their own pace. The substantial difference between pre-test and post-test for an experimental group clearly indicated that the students better comprehended the concepts. By assisting students in better understanding concepts being taught and allowing low achievers to learn at their own pace, Edpuzzle Learning Videos for Chemistry helped students develop self-regulated learning abilities (Silverajah & Govindaraj, 2018). The features such as embedded questions in Edpuzzle Learning Videos were responsible for students' engagement with learning, thus it improves the students' engagement with content (Shelby and Fralish ,2021)

Additionally, the study by da Costa et al. (2021) in an accounting science course found that despite the post-test showing no significant improvement, students still showed a great deal of interest and enthusiasm in completing the assignment in the Edpuzzle Learning Videos. Since the experimental group's students in this study performed better on tests after receiving an intervention that involved teaching concepts using Edpuzzle Learning Videos, it was obvious that the students could remember the concepts. Students are engaged while using an Edpuzzle Learning Video as an interactive tool to acquire vocabulary, and engaged learners are more likely to recall what they have learned (Rahayu & Bhaskoro, 2022). While the exercises and video clips in the Edpuzzle Learning Videos keep the students engaged, if the material is overly straightforward, they can find it tedious and uninteresting. However, the majority of the Edpuzzle exercises are entertaining, short, and thorough, so students are interested (Silverajah & Govindaraj, 2018).

CONCLUSION

In the lecture method students passively receive information from teachers, which results in students losing motivation. Therefore, teaching and learning in modern era consist of greatly involving students in learning. By engaging students' many senses, using multimedia in teaching and learning deepens learning and improves its effectiveness. Teachers frequently use Edpuzzle Learning Videos as multimedia because they can construct and incorporate questions, and students may grade their own work, integrating them in learning process. Owing to the greater flexibility and convenience of Edpuzzle Learning Videos number of studies are done on its practice and

impact on the academic learning score. However, there is a lack of empirical studies done on its use and impact on academic learning scores, particularly in schools across Bhutan.

To fully involve students in teaching and learning process use of interactive multimedia like Edpuzzle Learning Videos greatly enhances the learning process of students. Although adequate studies employed multimedia like video lessons, YouTube greatly enhances students learning. Nevertheless, Edpuzzle Learning Videos might be interactive due to its additional facilities such as teachers uploading videos from YouTube, Khan Academy, Crash course, and TED-Ed. Additionally, Edpuzzle Learning Videos is an online video editing tool that enables you to use videos from a variety of sources, including those made by teachers, to create interactive video classes by adding diverse questions and providing feedback. Thus, Edpuzzle Learning Videos is user-friendly due to its convenience and students considerably benefit in involving while learning. Student's academic learning score significantly improve when teachers employ Edpuzzle Learning Videos.

RECOMMENDATION

The findings from this study have proven usefulness of using Edpuzzle Learning Videos in achieving higher learning scores in Biology for grade 9. Therefore, Biology teachers and science teachers, in general, can adopt Edpuzzle Learning Videos in place of the lecture method. On the other hand, pre-services and in-services teachers are recommended to provide extensive training on some of the educational multimedia such as Edpuzzle Learning Videos for significantly involving learners and improving their academic learning.

Although there are many empirical studies conducted on use and effectiveness of educational technologies such as Edpuzzle Learning Videos in other developed countries, however in Bhutan there are few empirical studies on use and effectiveness of Edpuzzle Learning Videos. There is a need, to conduct more and diverse studies on the usage and effectiveness of educational technologies such as Edpuzzle Learning Videos in other subjects and confirm its effectiveness in the Bhutanese context. Furthermore, more studies need to be conducted at different educational levels to gauge effectiveness of Edpuzzle Learning Videos in involving students, therefore improving their academic learning scores.

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