

**RESEARCH PAPER****Effect of Video Lectures on Academic Achievement of Secondary School Students in Biology: An Experimental Study****¹Farhana Kazmi, ²Dr. Muhammad Asghar Ali and ³Dr. Muhammad Jamil Bajwa***

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Corresponding Author farhanakazmi367@gmail.com**ABSTRACT**

The purpose of study was to examine the effect of video lectures on academic achievement of students in biology at secondary level. This study empirically tested effectiveness of video lectures on students' achievement. In this research experimental and post-test equivalent group design was used. The sample was students of 9th class studying Biology in Kashmir Model High School Dhulli, district Bagh, Pakistan. The researcher divided sample in to two groups; an experimental and control group. The experimental group was taught by using projector and control group was taught by traditional lecture method. The findings revealed that there is significance difference between the achievement of experimental and control groups. The Cohen's d value is above 2 shows high effect of video lectures on academic achievement. It is recommended that the video lectures should be used for the teaching of Biology at secondary level.

Keywords: Academic Achievement, Experimental design, Teaching of Biology, Video Lectures**Introduction**

Teaching of biology has been a noteworthy challenge at secondary level in Pakistan and particularly in Azad Jammu and Kashmir. In Pakistan; no work has been reported in the concern area of study in Pakistan. Hence, it was important to work out on the effect of teaching method and academic achievement of students towards the learning of biology at secondary level.

Biology is a subject in the field of science and furthermore one of the science subjects at the senior secondary school. Research results indicated that in spite of the importance attached to Biology, academic achievement of students in the subject at the secondary level has been decreasing throughout the time. Secondary biology is normally taught through lecture and note-taking (Lyons, 2013). If students are not satisfied with the method of teaching biology, then this lead to disinterest in and negative attitudes towards biology and its teaching.

The science subject were analyzed by the average answers, the correct percentage was 42.6 for physics, 46.4 for chemistry and 38.1 for biology, making biology the lowest-percentage subject for students (Telli et al, 2009). The concern among many teachers about the lowest percentage of questions answered correctly, students and researchers in Turkey, who all is unsure why students have difficulties on national exam, in answering biology questions correctly. From this perception, there is clear need for further and deeper insight into the factors that may cause low achievement in biology. It is recognized that poor performance is due to the poor teaching methods, faulty instructional strategies among others (Adebanjo, 2019). This is reported that most Biology teachers in secondary schools were using lecture method and this has consistently led to poor academic performance of the students particularly in Biology (Raji, 2017).

Many researchers have revealed that poor achievement in secondary education is traceable to teaching method adopted by teachers in teaching Biology (Ahmed & Abimbola, 2011). The traditional learning system, students are considered as passive receptors of information and without deliberation of the need to actively take an interest in the learning process (Emma, 2010). We should add technology based learning in our daily lives and learning, for the delightful outcome, (Karehka, 2012). It showed that students' satisfaction with video lectures has a strong relationship with positive overall learning experience and perception of impact of video on learning process (Scagnoli et al, 2019).

In addition, activities such as massive open online courses (MOOCs) are offering free video-recorded lectures from top university professors to individuals around the world with an Internet connection. Within conventional classes in schools and colleges, teachers are increasingly using the flipped classroom approach, where students watch video recorded lectures before class and then participate in group discussions and problem-solving activities in class (Lo, Hew, & Chen, 2017). To view actual objects and realistic scenes, video permits students to see sequences in motion, and to listen to narration (Zhang et al, 2006).

The utilization of video lectures in the classroom has demonstrated to be powerful in the teaching of biology. While in most classes use traditional face-to-face instruction, many online courses are accessible in which video lectures are utilized in advanced form. Created by simply uploading a video recording of a lecturer, a video lecture might be more complicated, paired with slide presentations, interactive quizzes and demonstrations (Osborn, 2010). In teaching of biology, the video lectures motivated student interest and engagement and they learned the material better as they had the opportunity to work on problems during class time. Utilizing Videos in teaching of biology, providing students with practice problems to solve during class resulted in significantly improved exam scores, as compared to having the instructor describe the same problems and their solutions during the course of a lecture (Stockwell, 2015). Videos in teaching of Biology are very important due to it provides a concrete basis for conceptual thinking, which motivates students to learn more (Edessa, 2017). Students learn and perform better in biology, as they are taught with videos because using instructional materials gives the students the chance to view, feel, listen and touch the material during teaching, which help to raise the students' attention and interest on the process of learning (Catherine, 2015). Therefore the importance of teaching using videos and real specimens cannot be over, in teaching and learning of biology concepts in secondary schools. Hence, these studies show that the effectiveness of video lectures on academic achievement of students in biology teaching at secondary level indicates more evidences for researcher to carry out research on it in Azad Jammu & Kashmir.

Teachers use old traditional methods, rely completely on text books, and don't engage students in projects, group discussion and activities. Biology is considered as a specialized subject at secondary level in Pakistan. Teaching of Biology in Secondary schools of Bagh is carried out many of problems. One of them is lack of skills among science teachers in teaching science contents with display of videos. Studies have shown high enrollment and low achievement of students in biology. Teachers' method may also be a factor that affects students' learning. A motivating approach should be encouraged to help students' better learning, understanding and retaining the concepts of Biology such one approach is Video Lecture, which allows two modes of information processing, visual and auditory. Present study has focus on measuring the effect of Video lecture on academic achievement of secondary school students in the subject biology.

Literature Review

Results of past researches indicated that in spite of the importance attached to Biology, academic achievement of students in the subject at the secondary level has been decreasing throughout the time. It is recognized that poor performance is due to the poor

teaching methods, faulty instructional strategies among others (Adebanjo, 2019). This is reported that most Biology teachers in secondary schools were using lecture method and this has consistently led to poor academic performance of the students particularly in Biology (Raji, 2017).

Biology at secondary level is normally taught through lecture and note-taking (Lyons, 2013). In so many topics of biology students face difficulties which shows negatively affects on students' motivation and achievement (Özcan, 2003). The difficulties of students with so many topics in biology have motivated researchers to research why students experience these difficulties and how defeat to these difficulties (Zeidan, 2010). In learning science, the reasons for the difficulties are the nature of science itself and its teaching methods, similarly the biological level of organization and the abstract level of the concepts make learning biology difficult (Lazarowitz & Penso, 1992).

In teaching biology, the teaching methods and techniques may also be factors that affect students' learning in biology (Çimer, 2004). If students are not satisfied with the method of teaching biology, then this leads to disinterest in and negative attitudes towards biology and its teaching. From this perception, there is a clear need for further and deeper insight into the factors that may cause low achievement in biology.

Furthermore, to determine the factors which lead to negatively affected on students' learning in biology, understanding students' views on what makes their biology learning effective is crucial, as many researchers suggest that students' views must be taken into consideration by researchers, teacher educators, schools and teachers, in order to improve the quality of teaching of biology (Ekici, 2010).

It is under consideration that how students recognize the learning environment in biology which affects their attitudes towards biology and its learning (Telli et al., 2009). Hence, understanding secondary school students' perceptions of biology will support policymakers, teachers and teacher educators plan more effective teaching activities that can help students learn biology better and have more inspirational perspectives towards it. It is declared that teacher-centered or traditional lessons can be non-productive and, at times, detrimental to student learning (Zoller, 2000). Traditional lessons are less likely to promote conceptual understanding or to facilitate conceptual change and subsequently are more averse to advance the development of technical skills (Lanier and Little, 1986). In this manner, in both biology as a discipline and its teaching, teachers' competencies and knowledge are essential for improving students' learning. In the event, that if teachers show weaknesses in their knowledge into the subject, this may make distrust in students of the teachers' abilities and knowledge.

From research evidence, educators see the squeezing need to re-evaluate the techniques and methods of instructions at secondary school level. There is a necessity for an instructional system that is maintained by a technology for meaningful learning. In the 21st century, a motivating and captivating approach should be encouraged to help students better learn, understand, and retain biology concepts and promote their future involvement. Multimedia presentations supported in Visual and verbal formats supplemented with pictures, animations, texts, and narration, is one of the promising approaches, (Adegoke, 2010). The cognitive theory of multimedia learning builds on the cognitive load theory, noticing that working memory has two channels for data obtaining and processing: a visual/pictorial channel and an auditory/verbal processing channel (Mayer and Moreno, 2003).

Video has become a significant part of higher education. It is incorporated as a significant part of traditional courses, serves as an establishment of several blended courses, and is frequently the main information-delivery mechanism in online courses. Numerous meta-analyses have shown that technology can enhance learning (Schmid et al., 2014).

Various studies have shown that video, in particular, can be a highly effective educational tool (Stockwell et al., 2015). In the past quite a while, we have seen an exceptional growth in the utilization of video-recorded lectures. Internet learning is assuming an increasingly prominent role in many schools (Shea & Swan, 2012). The utilization of video-recorded lectures is one key component of learning in online environments (Breslow et al., 2013).

To view actual objects and realistic scenes, video permits students to see sequences in motion, and to listen to narration (Zhang et al., 2006). Teachers can present, teach and internalize information by utilizing video lectures (Brecht and Ogilby, 2008). Such presentation leads to excellent venues for focusing the students' attention on specific details based on the prepared material itself. Video lectures are a helpful technique to enhance bibliographic instruction or online tutorials (Crook and Schofield, 2017). It was noted that video lectures can improve a feeling of engagement with content due to learners' control of the media and instructors' presence. It showed that students' satisfaction with video lectures has a strong relationship with positive overall learning experience and perception of impact of video on learning process (Scagnoli et al., 2019). It was found that students can also benefit their new knowledge construction from the increased interactivity of interactive video lectures (Ronchetti, 2011). Currently, interactive video lectures are increasingly being utilized in digital learning contexts for increasing interactivity (Hung and Chen, 2018).

Research Hypothesis

The hypothesis of this study was:

H₀: There is no statistically significant difference in post-test scores between the experimental and control groups.

Material and Methods

Current study is experimental in nature. The post-tests, equivalent group design is used for this study. This is an effective design to decrease the biasness of experimental strength. After each experimental period researcher collected data with post tests. The researcher first selected 10 topics from Grade 9th biology published by the Azad Jammu and Kashmir text book board Muzaffarabad. The researcher developed a MCQs type test of every lesson topic and then made lesson plans on those lessons. Every lesson plan had four steps i.e. Prior knowledge, Presentation stage, practice stage, production stage. Twenty students were divided into ten students in control group and ten in experimental group. All participants were from Grade 9th studying at Kashmir Model High School Dhulli Azad Jammu and Kashmir. To achieve objectives, the comparison of the mean of experimental and control groups the independent sample t-test was applied on overall tests, and three Dimensions of cognitive domain i.e. knowledge, comprehension and application.

Results and Discussion

Table 1
Tests of Normality

Tests	Groups	Shapiro-Wilk		
		Statistic	df	Sig.
Overall Achievement in Post-Test	Experimental Group	.918	10	.342
	Control Group	.855	10	.066
Achievement in Post Test at Knowledge-Level	Experimental Group	.845	10	.051
	Control Group	.831	10	.034
Achievement in Post Test at Comprehension Level	Experimental Group	.945	10	.607
	Control Group	.871	10	.103
Achievement in Post Test at Application-Level	Experimental Group	.950	10	.667
	Control Group	.879	10	.128

Table-1 shows that the significance value calculated in Shapiro-Wilk test for all data is greater than standard value .05 except control group at knowledge level. Hence, data is normally distributed and independent sample t-test could be used.

Table 2
Result of Achievement in Post-Test of Experimental and Control Groups.

Groups	N	M	SD	t	df	sig	Cohen's d value
Experimental	10	414.80	26.51	5.147	18	.000	2.30
Control	10	277.90	79.82				

Table 2 displays the mean value of experimental group (M=414.800, SD. =26.507) is more than the control group (M=277.900, SD. =79.819) and $t(18) = 5.147$, $p < .05$ shows that significant difference was found between the achievement of students regarding (overall post-test) of experimental and control group. Hence, the null hypothesis is rejected. The size of effect of video is Cohen's d value which is 2.30 showed high effects on achievement. The performance of experimental group is very good and it was due to the use of videos. There is overall positive effect of using videos in the classroom for educational purpose.

Table 3
Achievement of experimental and control groups at Knowledge level

Groups	N	M	SD	t	df	sig	Cohen's d value
Experimental	10	147.80	10.23	4.532	18	.000	2.03
Control	10	109.10	24.99				

Table 3 displays the mean value of experimental group (M=147.800, SD. =10.228) is more than the control group (M=109.100, SD. =10.228) and $t(18) = 4.532$, $p < .05$ shows that significant difference was found between the achievement of students regarding (overall knowledge level) of experimental and control group. Hence, the null hypothesis is rejected. The size of effect of video is Cohen's d value which is 2.03 showed high effects on achievement. The performance of experimental group is very good and it was due to the use of videos. There is overall positive effect of using videos in the classroom for educational purpose.

Table 4
Achievement of experimental and control groups at Comprehension level

Groups	N	M	SD	t	df	sig	Cohen's d value
Experimental	10	138.10	11.64	4.830	18	.000	2.16
Control	10	84.50	33.11				

Table 4 displays the mean value of experimental group (M=138.100, SD. =11.637) is more than the control group (M=84.500, SD. =33.110) and $t(18) = 4.830$, $p < .05$ shows that significant difference was found between the achievement of students regarding (overall comprehension level) of experimental and control group. Hence, the null hypothesis is rejected. The size of effect of video is Cohen's d value which is 2.16 showed high effects on achievement. The performance of experimental group is very good and it was due to the use of videos. There is overall positive effect of using videos in the classroom for educational purpose.

Table 5
Achievement of experimental and control groups at Application level

Groups	N	M	SD	t	df	sig	Cohen's d value
Experimental	10	129.30	8.86	5.941	18	.000	2.66
Control	10	86.00	21.28				

Table 5 displays the mean value of experimental group (M=129.300, SD. =8.857) is more than the control group (M=86.000, SD. =21.275) and $t(18) = 5.941$, $p < .05$ shows that significant difference was found between the achievement of students regarding (overall application level) of experimental and control group. Hence, the null hypothesis is rejected. The size of effect of video is Cohen's d value which is 2.66 showed high effects on

achievement. The performance of experimental group is very good and it was due to the use of videos. There is overall positive effect of using videos in the classroom for educational purpose.

Discussion

In this study, learning outcomes between two groups of students was compared where one group was exposed to active learning by video lectures while the other group was exposed to lecture style pedagogy. There was significant difference found between these two methods of instruction. The result of the analysis of the null hypothesis which stated that 'There is no significant main effect of Video Lectures on students' achievement in teaching of Biology at secondary level revealed that the experimental group performed significantly better than the control group. It is evident and was clearly indicated that treatment was statistically significant on the students' achievement. A plausible reason for this outcome might be due to the fact that students exposed to video lectures method were actively involved in the learning process. Video lectures facilitate students learning in interactive ways. In this method students take more interest in learning because they seen everything clearly in videos and the knowledge remain in their memories for longer time. At the same time both audio and visual sense are active. As in literature review, by laying down two memory traces to the information, verbal and image, the information is more accessible to the learner (Thomas, Jackson & Raymond 2014). Through video lectures students never become bore and remain active throughout the class time. Active engagement helps students to construct knowledge and organize information into meaningful schema (Mayre, 2003). If they feel any confusion then they demand to repeat the video for better learning.

The results of current study and documented study in literature review are similar in some aspects. The finding agrees with (Stockwell et al., 2015)'s finding which revealed that video, specifically, can be a highly effective educational tool. Through this technique students motivated and enhanced their academic performance. Research providing in literature review for the study proposed that a video lecture must harness learning motivation, increase learning performance, satisfy individual learning needs with different learning styles, and select the most appropriate format to facilitate learning.

Thus these findings found that the learning process through video lectures facilitates better understanding, enhances better memory retention and improves learners' achievement.

Conclusions

The effect of instructive video lectures on students' academic achievement in the teaching of biology at secondary level in district Bagh, were appeared by the current research. It is important to direct such sort of research in the field of teaching at different levels because of the continuous upgrade in the field of innovation. Teaching learning process is significantly and positively affected by the use of educational video lectures. Whole learning process is positively and significantly affected by the usage of educational video lectures and it is found in the present study that it has an effect on academic achievement in the text book of biology at secondary level. It presents learning environment to the students to augment their acquaintance other than course books of secondary level of biology.

- The research demonstrated that the learners at secondary level were very excited in the text book of biology by using video lectures.

- At start, video lectures were to be considered entirely new procedure for them but they showed less interest in learning but later they became active participants of the experiment after a sometime.
- All the activities were enjoyed by them which were carried out by the researcher while teaching biology in class 9th at secondary level.
- In addition to the overall post-test results, the study examined performance across all three stages of the cognitive domain: knowledge, comprehension, and application.

Recommendations

- While video lectures can be a valuable tool, they should not replace traditional classroom instruction entirely. Consider using them as supplementary resources to enhance learning in biology that lend themselves well to video-based instruction.
- The quality of video lectures is crucial. Collaborate with experts or use professionally produced videos to ensure that the content is accurate, engaging, and aligned with learning objectives.
- It is recommended that Government of AJ&K should provide facilities in schools of district Bagh AJ&K to use video lectures in teaching of biology at secondary level for quality learning.

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