

# Effect of Multimedia Instruction on Learning: A Case Study

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## Abstract

Multimedia are increasingly one of the most popular information access devices; and what stands out from the study is the high use of interactive, multi-user functions which can at times be disruptive or beneficial during the study. The use of multimedia in education has proven its importance due to its positive impact on the teaching and learning process. So, the present study investigates comparative effectiveness of multimedia-aided teaching on students' academic achievement and attitude at the undergraduate level in the teaching of science. The valid and reliable questionnaires were used as data collection tools. Moreover, a face to face survey was conducted in Jahangirnagar University students of the second year to the fourth year from different departments of science faculty. The results indicate that multimedia-aided teaching is more effective than the traditional one. Therefore, higher institutions can take the advantage of the potential and capitalize on the multimedia for educational purposes because of the intrinsic motivation of university students.

**Keywords:** Multimedia-aided teaching (MAT), academic achievement, information access devices, factor analysis

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## INTRODUCTION

Instructors in higher education are under pressure to provide more effective and efficient learning environments and educational experiences to their students. In universities, teaching serves as an important vehicle for achieving institutional goals of enhancing students' knowledge and learning and engaging them in the learning community to prepare for the future citizen. Therefore, educators always are looking for ways to make their educational initiatives more effective [1]. Educators continuously seek innovative ways to present quality instruction for a number of reasons, including to: (a) increase their service for student's learning, (b) fulfill their institution's mission by integrating institution's core concepts into each curricular, and (c) address students' demographic needs [2].

Hsu and Wolfe showed that the learning experience in higher education has been changed i.e., an instructor-focused approach has shifted to learner-centered pedagogical methods [3]. Feinstein *et al.* mentioned that educators pay a great attention to the instructional systems as well as educational

technology in order to enhance students' learning [4]. They also mention that the hospitality educators have become aware of the benefits and shortcomings of various traditional methods used to provide instruction and training to hospitality students and practitioners and the possible benefits of educational technologies. Feinstein *et al.* mentioned in their study that at present, the educational technologies, for example, multimedia presentations, simulation methods, online courses, and computer-assisted case-based instruction are becoming more popular [5]. Several researchers agreed that the hospitality educators presently are applying innovative techniques that outspread their instructional methods [6, 7]. However, Feinstein *et al.* mentioned that hospitality educators are facing the challenge of implementing the successful instructional systems for future hospitality professionals in order to balance the academic subjects knowledge and industrial applications [4].

Deale and Hovda quantified that service was the focus of the hospitality industry; however it was not the prime focus of educational

organizations [8]. They suggested that in order to make a distinguished educational institution, you have to provide excellent services which are useful to improve its performance and reputation, especially in highly competitive markets. Feinstein *et al.*; Lewis; and Power and Riegel addressed the issues and concerns about the future of hospitality education [5, 9, 10]. Furthermore, teachers used the multimedia to present comprehensive information for their students to better understanding the specified course outcomes. Bartlett and Strough mentioned that, multimedia formats may offer benefits to instructors teaching multi-section courses because it ensures the uniformity in the lecture content across the sections [11]. They also suggested that the multimedia is one of the most famous and effective training tools and will lead in future. Thus, the present study tries to find the effects of multimedia instructional material on students' knowledge and their perceptions.

## METHODOLOGY

This is a case and field study research which has been made on the basis of a survey. A well-structured questionnaire has been developed after an intensive review of the literature and practical experience. The target population of the study is the students of the undergraduate level of different departments of mathematical and physical science faculty of Jahangirnagar University. A face to face survey was conducted in Jahangirnagar University students from different departments of science faculty. The composition of departments included statistics, environmental science, mathematics, computer science and engineering, geological science, chemistry and physics. The survey was administered to 152 students which included male and female students. The nonprobability sampling (Convenience sampling) technique has been used to select the respondents from different departments at Jahangirnagar University. Primary data has been collected through a questionnaire survey, the time period of which is around four months at the mid of the year 2017. A Likert scale questionnaire approach is also used here. The result of this entire report is computed by using IBM SPSS 22 and Microsoft Office Excel-2013.

## RESULTS AND DISCUSSION

Out of the total sample of 152, male students constituted 84 in number which percentage is 55.3% whereas female students included 68 in number which percentage is 44.7%. Also, the majority of the students (74.34%) are between the ages of 20 and 22 years. Figure 1 depicts the distribution of the academic results of the students surveyed in this study. The graph illustrates that out of the total sample of 152, the results (CGPA/GPA) of the majority student fall within the interval 3.00 to 3.75 out of 4.0 and only one student has CGPA/GPA under 2.75. Furthermore, results also represent that the average CGPA is 3.43 with standard deviation 0.253 and has minimum 2.75 and maximum 3.88. It is also seen that the distribution of performance is negatively skewed.

Among the students, the majority (79.6%) agree that they can easily find out their topics while using teachers conducting the classes with the help of multimedia whereas only one-fifth of the students were having the opposite opinion in this regard. Moreover, almost three-quarters of the respondents say that they straightforwardly understand the graphs, figures or diagrams, pictures as well as enjoy the multimedia classes. Also, more than 70% students think that multimedia helps to improve the quality of the education of a country (Table 1).

More than 80% of the students say that multimedia is helpful to improve the presentation skills i.e., they can simply present the works to the audience. This scenario is same for all departments. Only below 30% students give the opinion that multimedia is not more enjoyable than the white/blackboard. Furthermore, approximately three-quarters of the respondents agree or strongly agree that managing the class is comparatively easy. In physics department, more than 30% students agree that the multimedia kills class time due to the technical problems; however, overall about 50% students agree or strongly agree in this about multimedia killing time for a technical problem. Finally, more than 70% students agreed that a multimedia classroom is an effective tool for the students of all abilities (Table 1).

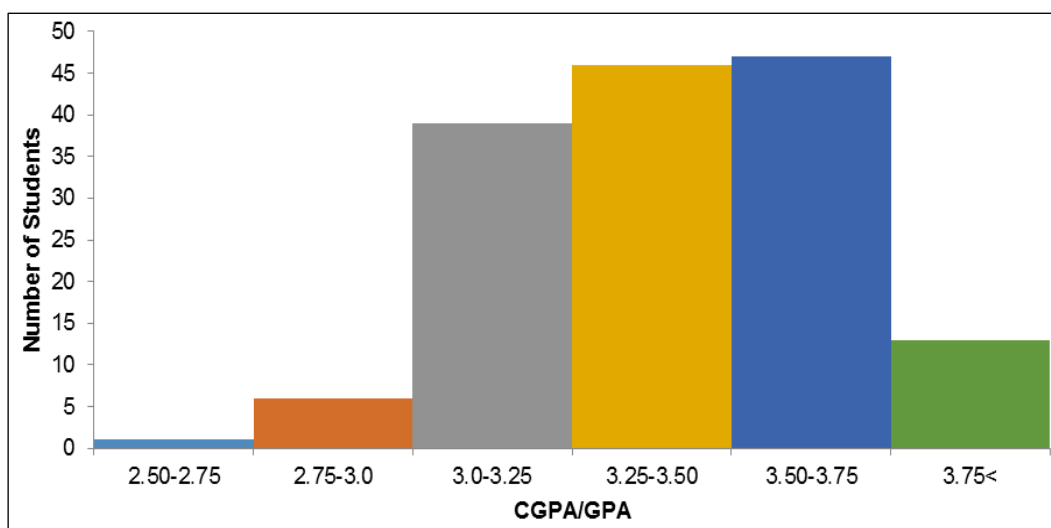


Fig. 1: Histogram of the Result of the Respondents.

Table 1: Cross-Tabulation of Different Opinion Related to Multimedia Learning with Departments.

	Department							Total
	Statistics	Mathematics	Physics	Chemistry	CSE	Environmental Science	Geological Science	
<b>I Can Easily Find Out My Topics</b>								
Strongly disagree/disagree	1 (4.3)	8 (33.3)	5 (22.7)	5 (21.7)	4 (20.0)	7 (35.0)	1 (5.0)	31 (20.4)
Agree/Strongly agree	22 (95.7)	16 (66.7)	17 (77.3)	18 (78.3)	16 (80.0)	13 (65.0)	19 (95.0)	121 (79.6)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)
<b>I Can Easily Understand All Types of Graphs, Figures, Diagrams, and Pictures</b>								
Strongly disagree/disagree	6 (26.1)	5 (20.8)	11 (50.0)	5 (21.7)	3 (15.0)	4 (20.0)	5 (25.0)	39 (25.7)
Agree/Strongly agree	17 (73.9)	19 (79.2)	11 (50.0)	18 (78.3)	17 (85.0)	16 (80.0)	15 (75.0)	113 (74.3)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)
<b>Multi-Media have Helped to Improve the Level of the Quality of Education</b>								
Strongly disagree/disagree	3 (13.0)	5 (20.8)	8 (36.4)	11 (47.8)	5 (25.0)	6 (30.0)	4 (20.0)	42 (27.6)
Agree/Strongly agree	20 (87.0)	19 (79.2)	14 (63.6)	12 (52.2)	15 (75.0)	14 (70.0)	16 (80.0)	110 (72.4)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)
<b>I Can Easily Present My Presentation Using Multi-Media</b>								
Strongly disagree/disagree	3 (13.0)	2 (8.3)	8 (36.4)	5 (21.7)	3 (15.0)	2 (10.0)	3 (15.0)	26 (17.1)
Agree/Strongly agree	20 (87.0)	22 (91.7)	14 (63.6)	18 (78.3)	17 (85.0)	18 (90.0)	17 (85.0)	126 (82.9)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)
<b>It is More Enjoyable than White Board or Blackboard</b>								
Strongly disagree/disagree	2 (8.7)	3 (12.5)	8 (36.4)	8 (34.8)	7 (35.0)	9 (45.0)	7 (35.0)	44 (28.9)
Agree/Strongly agree	21 (91.3)	21 (87.5)	14 (63.6)	15 (65.2)	13 (65.0)	11 (55.0)	13 (65.0)	108 (71.1)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)
<b>Makes Classroom Management More Easy</b>								
Strongly disagree/disagree	2 (8.7)	8 (33.3)	7 (31.8)	8 (34.8)	8 (40.0)	5 (25.0)	3 (15.0)	41 (27.0)
Agree/Strongly agree	21 (91.3)	16 (66.7)	15 (68.2)	15 (65.2)	12 (60.0)	15 (75.0)	17 (85.0)	111 (73.0)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)
<b>Demands that Too Much Time be Spent on Technical Problems</b>								
Strongly disagree/disagree	11 (47.8)	11 (45.8)	14 (63.6)	12 (52.2)	10 (50.0)	9 (45.0)	6 (30.0)	73 (48.0)
Agree/Strongly agree	12 (52.2)	13 (54.2)	8 (36.4)	11 (47.8)	10 (50.0)	11 (55.0)	14 (70.0)	79 (52.0)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)
<b>It is an Effective Tool for Students of All Abilities</b>								
Strongly disagree/disagree	7 (30.4)	7 (29.2)	11 (50.0)	7 (30.4)	3 (15.0)	6 (30.0)	3 (15.0)	44 (28.9)
Agree/Strongly agree	16 (69.6)	17 (70.8)	11 (50.0)	16 (69.6)	17 (85.0)	14 (70.0)	17 (85.0)	108 (71.1)
Total	23 (100)	24 (100)	22 (100)	23 (100)	20 (100)	20 (100)	20 (100)	152 (100)

**Table 2: Results of Factor Analysis.**

Item	Factors		
	1	2	3
Makes classroom management is easier.	0.607		
Multi-media have helped to improve the level of the quality of education.	0.553		
It is a valuable instructional tool.	0.644		
Promotes the development of communication skills (e.g. presentation skills).	0.434		
It is more enjoyable than white board or blackboard.	0.540		
It is successful only if technical staff regularly maintains.	0.663		
Improves student learning of critical concepts and ideas.	0.515		
Multi-media help to develop creativity in learning.	0.711		
It is an effective tool for students of all abilities.	0.414		
I can easily find out my topics.	0.501		
Demands that too much time be spent on technical problems.		0.420	
Is too costly in terms of resources, time and effort.		0.608	
Is successful only if there is adequate teacher training in the uses of technology for learning.		0.840	
I can easily understand all types of graphs, figures, diagrams, and pictures.			0.735
Results in students neglecting important traditional learning resources (e.g., library books).			0.750
I can easily present my presentation using multi-media.			0.803
My academic performance has been increased due to multi-media technology.			0.773
For graphical presentation, it is helpful to my learning.			0.747
Is effective because I believe I can implement it successfully.			0.442
<b>Eigen value</b>	3.999	2.722	1.103
<b>Explained variance by factor (%)</b>	34.994	18.609	10.166

Extraction Method: Principal Component Analysis. 3 components extracted.

Factor analysis is a statistical method used to describe the variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. The key concept of factor analysis is that multiple observed variables have similar patterns of responses because they are all associated with a latent (i.e. not directly measured) variable. The results of factor analysis are provided in Table 2.

Only one factor reached eigen values of 3.00, and the percentage variance is almost 35% of the total. Factor 1 includes ten items and all the items have loadings, ranging from 0.414 to 0.711. However, Factor 2 includes three items and although they only explain 18.609% of the common variance, all the items have loadings, ranging from 0.42 to 0.84. Finally, Factor 3 includes six items and although they only explain 10.166% of the common variance, all the items have loadings, ranging from 0.442 to 0.803.

## CONCLUSION

Nowadays, the teaching and learning process has been changed due to the use of multimedia. With the help of multimedia, the lessons can be presented in more effective and convenient

ways. Therefore, multimedia can be used as an innovative as well as effective teaching and learning tool because it helps students motivate their learning process and helps them understand the texts, graphs, figures etc.

Out of the total sample of 152, male students constituted 84 in number whereas female students included 68 and majority (74.34%) was between the ages of 20 and 22 years. However, the highest number of respondents (32.9%) was from the statistics department and the lowest percentage (7.2%) of the students was from the departments of geological science. Descriptive statistics of academic result of the student's shows that the minimum CGPA is 2.75 and maximum CGPA is 3.88 with mean 3.43 and standard deviation 0.253. The results also show that the distribution of CGPA is negatively skewed. Also, factor analysis was employed in order to determine the number of factors. Here, only one factor reached eigen values of 3.00, and the percentage variance is 34.99% of the total. Factor 1 includes ten items and all the items have loadings, ranging from 0.414 to 0.711. Factor 2 includes three items and although they only explain 18.609% of the common variance, all the items have loadings,

ranging from 0.42 to 0.84. Factor 3 includes six items and although they only explain 10.166% of the common variance, all the items have loadings, ranging from 0.442 to 0.803.

Teachers should actively study and grasp advanced teaching measures and teaching equipment, changes in ideas and concepts to adapt the new situation of the teaching reform and the requirements of modern teaching methods and make learning become students' individual learning and active learning when strengthening the professional knowledge. Thus, it is obvious that multimedia is more effective than the traditional one. It is more effective for the cognitive and attitude development of the students than the traditional method i.e., multimedia helps to develop higher-order cognitive skills and appeals the student psyche towards learning. The use of animations, sound, and video and audio clips makes the lessons more attractive and effective. Therefore, this study will be useful for policy-makers in the field of science education, curriculum developers, school administrators, principals, teachers, parents, as well as students. Also, this study will provide a guideline to the teachers to develop a strategy for effective teaching. It will help to develop a positive attitude of students towards science.

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