
AC 2011-50: THE EFFECT OF WATCHING VIDEO CLIPS ON STUDENT PERFORMANCE IN A CONSTRUCTION SCIENCE COURSE AT AN UNDERGRADUATE LEVEL ON STUDENT PERFORMANCE IN A CONSTRUCTION SCIENCE COURSE AT AN UNDERGRADUATE LEVEL

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Does Watching Video Clips Affect Student Performance in a Construction Science Course at an Undergraduate Level?

Abstract

The method of instruction in regular classrooms has traditionally been lectures, sometimes using a chalk board for writing important concepts. This procedure essentially requires only short-term memory acquisition and an organization that allows for efficient retrieval of the information. With the increase in class sizes, most teachers find it difficult to disseminate information and engage students in effective learning. The use of information and communication technologies is gradually becoming popular as vehicles of instruction. The purpose of this study was to examine the effect of showing relevant video clips to the students, in addition to presenting course materials in a traditional format, on student performance in a an Environmental Control Systems course. The study population consisted of 48 students. Video clips, integrated with traditional teaching format, were shown to only one group of students; instruction tool for the other group was only traditional methods. The relevant data was collected from the instructor's own data base. A General Linear Model was used to ascertain the relationship between student performance and exposure to video clips. The findings generated from the analysis of the data indicated that watching video clips has a statistically significant effect on student performance in this particular course.

Introduction

Instructional media plays a significant role in affecting the processes of learning. Many innovative teaching tools have been developed and used over years to offer excellence in teaching in schools; video instructional media is one of them. It provides for the ability to easily present static and moving materials; it also affords the option of adding animation for clarity. Used prudently, the media has the potential of making a positive influence on student performance.

A video-viewing procedure related to a course in an Environmental Control Systems was developed by the author in a classroom situation at an undergraduate level. The purpose of this study was to determine whether student performance at an undergraduate level is affected by showing related video clips in a classroom situation, supplemented by presentation of course materials in a traditional format.

It was attempted to determine whether watching videos had an effect on cumulative test grade of a student on mechanical and electrical construction course. It was also critical to find out whether this relationship, if any, existed in the presence of other possible determinants of student performance.

Review of the Literature

Use of Visual Media for Instruction

Institutes of learning are constantly striving for improving student learning processes through use of advanced instructional technologies. They include, among others, web-assisted teaching, streaming media presentation, and interactive videos.

The body of literature related to the effect of showing educational videos in a classroom situation and student performance in a course at a university level is not very wide. However, there are some studies that indicate an enhanced student understanding of materials when traditional classrooms lectures are interspersed with feature films and videos. A study of medical students¹ indicates that exposure to videos, accompanied by systematic video game training, improve the surgical skills of medical students. Another study by Lawson et al.² suggests that psychology students retain more factual information when they see videos compared to when they read only the textbook. Kreiner³ reports that the technique is appealing to most students, but in order to produce a long-lasting effect, the process should be interactive.

Research on memory indicates that people usually have a better recollection of materials when they are presented both verbally and visually⁴. Materials presented visually, particularly in an animated format, provide a meaningful context to the ideas. It is, therefore, likely that students may perform better in tests when video clips are used in classes integrated with verbal materials.

Other Factors of Student Performance

Even though the purpose of this study was to find out the effect of video-viewing on student performance, it was necessary to explore other predictors that may have significant relationship with this dependent variable. Class attendance is considered by many researchers as one such predictor. There is a wide body of literature that indicates an inverse relationship between academic achievement and class attendance. Student absenteeism is an important issue in institutes of higher learning here in the US. Class attendances, at least in practice, are optional in most schools. Although instructors have different outlook and policies toward attendance, most of them would like them to attend the classes to maintain a vibrant teaching-learning atmosphere. Most of them also associate class attendance with academic achievement. It is generally accepted that attending classes is an important aspect of college experience.⁵

Studies reveal that there is a relationship between absenteeism and student performance in courses.⁶ The hypothesis that there is a strong relationship between class attendance and student learning has been investigated empirically in journals of higher education. It is not surprising that most studies have found an inverse relationship between being absent from the class and course performance.^{5, 6, 7, 8}

Studies have been conducted on the inverse relationship between absenteeism and student performance in different courses at college level. As long back as in the 1970's, Jenne⁹ found that attendance played a major role in a health science course. Jones¹⁰ reported that there is a negative correlation between absences from class and grades in a psychology course, irrespective

of ethnicity or gender of the students. Romer¹¹ reports a similar finding on a study related to intermediate microeconomic theory.

Devadoss and Foltz⁸ conducted a study on the effect of a number of predictor variables on performance in agricultural economics. They conclude that the study “provides strong empirical evidence of the positive influence of class attendance on student performance”⁸ (p. 506). Findings of another study on course in principles of economics show evidence of an inverse relationship between absenteeism and performance is statistically significant when students miss a sizeable number of classes.¹²

Investigations on relationship between absenteeism and student performance in construction science courses are negligible. However, there is on recent study by Senior¹³ that explores such relationship for course in construction management. The results of the study indicate a statistically significant correlation between missed classes and final student grade in the course.

Many courses in construction management comprise of concepts or ideas that students need to comprehend in order to succeed in follow-on courses. An in-depth understanding of the fundamentals of a course helps them transfer knowledge to from one course to another. Bransford et al.¹⁴ argue that it necessary for students to evaluate their learning current level of understanding continuously. In order to do that, they require constant feedback from instructors. Different methods are used by faculty at college level to enhance and improve such understanding by providing instant feedback.¹⁵ Most widely adopted methods are giving short tests and assigning problem-solving home works.

There are, of course, few studies that report no relationship between attendance and performance. Browne, et al.¹⁶ did not find any positive effect on attending lectures and student grades on tests in an economics course. Similarly, findings by Buckles and McMahon¹⁷ do not suggest any significant effect of class attendance on student performance.

Homeworks may also have a significant role to play in enhancing a student’s in-depth understanding of course materials¹⁸. Apart from being considered as tools for enhancing student learning, home works have been found to have a positive relationship with overall student performance¹⁹.

The effect of one other variable on performance that has been tested by many researchers is gender. Some studies indicate that men have more positive attitude toward education in engineering and science than women^{10, 21}. It is reflected by their performance in relevant courses. However, there are other studies that do not report any correlation between gender and student performance^{22, 23, 24}.

In view of the findings from this review of the literature, it was decided to include a few other variables in the model for analysis of the relationship between video-viewing and student performance. These variables include: absenteeism, home-works, and gender.

Methodology

Study Population

The study population consists of students who registered for an Environmental Control Systems course at an undergraduate level in a state university for Summer semesters in 2009 and 2010. Students enrolled in Summer 2009 did not have any exposure to video clips in class while those in enrolled in Summer 2010 were shown video clips related to the course. The sample size includes the total population of 48 students, 4 female and 44 male. There were 24 students each in semester.

Data Collection

Data related to the study was collected from the instructor's own database. The same instructor taught the course in all three semesters under the study. The unit of analysis was the student.

Variables and their Operationalization

Test Grade (TEST). It is the sum of all the scores made by a student in three tests given during the semester. It was measured by the numerical grades obtained by the student in the tests.

Absent (ABSENT). It is the record indicating the complete absence of the student from class meetings. It was measured in number of class meetings missed by the student.

Gender (GENDER). It indicates the gender of a student. It was a dummy variable, operationalized by assigning a value of 1 when the gender was female and 0 when the gender was male.

Home work (HW). It is the performance by the student for a particular assignment related to a topic covered by the course and done at home. It was measured by the cumulative numerical grade obtained by the student in all homeworks.

Video clips (VIDEO). It indicates whether video clips were shown in a classroom situation or not. It was a dummy variable, operationalized by assigning a value of 1 if video clips were shown and 0 otherwise.

Analysis

A General Linear Model was used for the analysis of the data. Following model was used for the purpose:

$$\text{TEST} = \beta_0 + \beta_1\text{ABSENT} + \beta_2\text{HW} + \beta_3\text{GENDER} + \beta_4\text{VIDEO} + e \quad \text{Eqn. (1)}$$

where β_0 = intercept, β_1 = the coefficient of ABSENT, β_2 = the coefficient of HW, β_3 = the coefficient of GENDER, β_4 = the coefficient of VIDEO, and e = error term.

Results

The results of the analysis are shown in Table 1.

Table 1: Statistical Analysis for TEST using ABSENT, HW, GENDER, and VIDEO

Variable	Intercept	Regression Coefficient	T	p< T
Intercept	38.543		4.811	0.004
ABSENT		-1.624	-6.032	<0.001
HW		0.846	2.943	<0.005
GENDER		-1.084	-0.287	0.775
VIDEO		-3.265	-2.032	0.048
F-value of the Model: 12.43	p>Model F = <0.001	Model R ² = 0.60	Adjusted model R ² = 0.55	

The F statistic of a model basically tests how well the model, as a whole, accounts for the dependent variable's behavior. The F-value of this particular model was found to be statistically significant at less than the 0.001 level.

An important aspect of a statistical procedure that derives model from empirical data is to indicate how well the model predicts results. A widely used measure of the predictive efficacy of a model is its coefficient of determination or R²-value. If there is a perfect relationship between dependent and predictor variables, R² is 1. In case of no relationship between dependent and predictor variables, R² is 0. Predictive efficacy of this particular model was found to be moderately high with an adjusted value of 0.55. The independent variables included in the model explained about 55 percent of the variance.

The results indicated that overall test grade of a student in a mechanical and electrical construction course offered at a state university is positively correlated with watching video clips in a classroom situation at the level of significance of 0.048. This relationship exists in the presence of absenteeism and homework performance, which are known to have some effect on overall student performance. Overall test grade is inversely related to absence from class and directly related to homework grades. The results implied that when video clips are not integrated with course materials, the overall test grade of a student decreases by 3.265 points. The overall test grade would decrease by 6.032 points for every absence and increase by 0.846 points for every point earned in a home work. The gender of a student does not have any statistically significant effect on test grade.

Discussions

The results of the statistical analysis are meaningful in the sense that they support the importance and effectiveness of appropriate technology, video media in this case, for instructional purposes. The study shows that student performance enhances significantly when the media is properly integrated with the instructional format for a course on Environmental Control Systems course at

an undergraduate level. Fig. 1 shows a comparison of overall test scores (TEST) between students exposed to video media (VIDEO: YES)) and those who were not (VIDEO: NO).

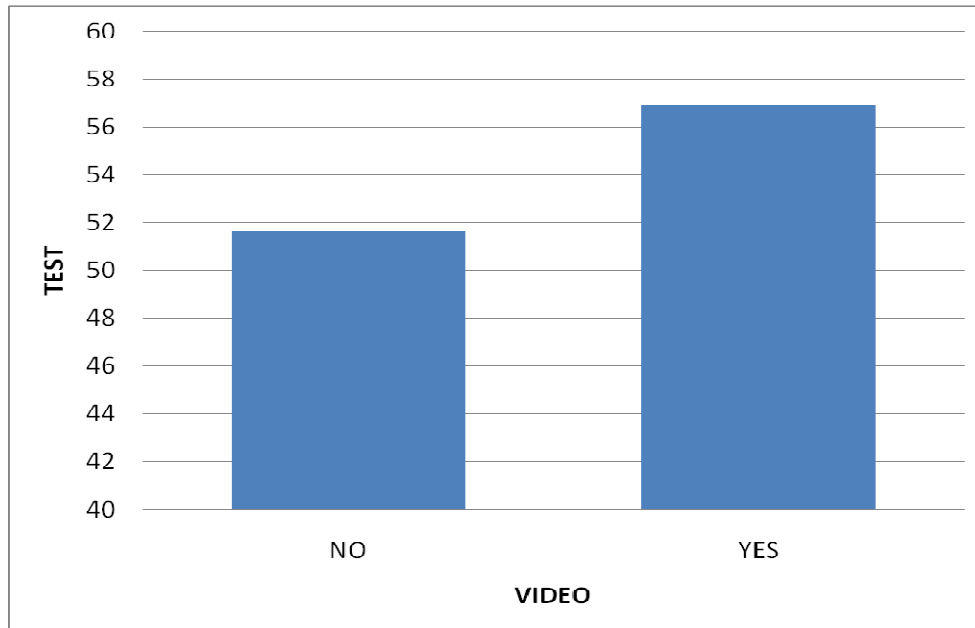


Fig. 1: A comparison of mean of overall test scores

The results also indicated that students having a higher number of absences from class tend to perform poorly in an Environmental Control Systems course offered at a state university in the United States. Studies on education done by other researchers [5, 21] provide strong support to this empirical finding. A poor performance in the homeworks indicates an inadequate understanding of the materials discussed in the class. It eventually affected a student's overall performance in the course.

Conclusions

The study provides a moderate support to the positive influence of partially video-based teaching on student performance at a graduate level. It is evident that videos have the potential of being successful instructional tools, if they are properly integrated with traditional teaching tools. However, even with the introduction of technology-enhanced instruction, attendance continues to be an important factor in terms of student learning in a classroom situation. This phenomenon challenges us to make technology-based teaching more appealing to the students and retain them in the class. The study will hopefully generate enough interest to do further research for deriving models for predicting student performance in other courses.

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