

How to do.

Article Critique Key

The most positive aspect of this article is its clarity in the statement of research problem and the most negative aspect is the methodological flaws and the limit in its scope of content. The big debate among educational technologists as reflected in classic research papers such as Clark's, (1994) study is also missing.

The article explains the gap in the literature "Investigations of educational technologies, such as Microsoft PowerPoint slide show presentations, have produced mixed results". However, the authors don't explain or even guess why the results are mixed. It is not enough to mention there is a gap the authors should explain how their research will be different and why they expect their research would fill the gap. One possible explanation is the results depend on the teaching method or instructional strategies used in those studies.

Furthermore, proving or disproving that technology is effective for a small group of students in a very limited content (a chapter in a psychology textbook) does not fill the gap. Hundreds of research on effectiveness of technology have been performed in the last 5 decades. The results are still mixed and this article does not help either. When you compare the traditional method with technology based method you are comparing apple with orange. You cannot say which one is better or which one would lead to more learning. It is almost impossible to offer the exact same content once without technology and once with it. Not all teachers use PowerPoint or BeachBoard the same way.

Statement of the Problem

The article outlines a statement of the problem in the introductory paragraphs that emphasizes the lack of research on the effectiveness of educational technologies. The statement of the problem was implied in the abstract section of the article, but the specific problem was not directly addressed until the authors identified their hypotheses later in the article. The article starts with an inaccurate statement. "*Educators are increasingly using educational technologies at the postsecondary level although little research has investigated the effects of such technologies on learning*". Later in the article they explain that many research has been done on the effectiveness of technology but the results are not conclusive.

Literature Review

The researchers selected 18 relevant sources published between the years of 1998 and 2007. Seventeen of these references were primary sources. The authors did a reasonable job of highlighting the previous research on topics related to their research and even provided comparisons of the literature when possible. However, the authors neglected to summarize or synthesize the information or provide their opinions on the implications of the research and instead moved directly into stating their hypotheses. The researchers wrote a brief thematic literature review, documenting common themes but not going into detail on any of the studies mentioned. It would have been beneficial to provide more information on these studies and give further explanation of how the cited researchers had gathered their data and how they had defined the examined variables.

Hypothesis

The authors explored testable aspects related to educational technology, type of instruction and amount of learning and student frustration. Frustration was the only condition that the authors made a clear hypothesis about, predicting that frustration would increase as technology use increased. For the type of instruction the authors declined to make a prediction and instead stated it was exploratory due to the conflicting research. They also stated interest in comparing VLE and SSL specifically because that has not been addressed in previous research, but did not make a prediction about the results, which was appropriate.

Method

The design of this study was experimental and apparently appropriate to answer the questions being asked and to test the researchers' hypotheses. The use of Linear regression and ANOVA to evaluate the results of the study was appropriate as were the descriptive statistics that were presented (academic pretest, posttest, and frustration score), which included the mean and standard deviation of the results.

Another strength is The MANOVA they conducted to examine teaching style (i.e., duration of lecture, use of humor, use of explanatory stories, number of student questions asked, and instructor's physical movements) which did not reveal significant differences between the TL and SSL conditions.

The design of the study was very limited because the researchers only tested one class lecture instead of measuring learning and frustration over the course of an entire semester or year. Therefore, although the researchers were able to test their hypothesis, the design lacks the required external validity and is not entirely appropriate to gain the most accurate conclusion. The authors mentioned the variables they controlled for, including instructor, classroom, academic content and lecture length but they do not detail how they controlled for these variables. The teaching conditions were described and the differences in the mode of presentation were explained. The researchers identified and explained the variables that they controlled for but as mentioned above they did not indicate any confounding variables they felt would affect the outcome of their study. The three testing conditions were appropriately controlled through videotaping and analysis for similar teaching styles and procedures. However, the most important confounding variable here is the TEACHING METHOD. The evaluation of the videotaped sessions was done to determine whether there were differences in teaching style, however the actual process of the evaluation was not outlined and it was done by only one person, which compromises the validity of the process. Although steps were taken to ensure there were no differences in teaching style, this still remains a confounding variable because it is impossible for a person to be exactly the same in all situations and therefore the instructor could still influence the results. While the authors did not provide a lot of detail on the procedures of this study, it would be possible for another researcher to replicate the same type of study with relative ease.

Sample

The method of selecting this sample was clearly described. The selection was not random or an example of nonprobability sampling because participants were chosen based on the fact that they

were willing and available to be studied. The gender and age of participants is noted but the researchers could have provided more detail, including what year in school each student was, their learning style preferences and their prior experiences with educational technologies.

Instrument

For the pretests and posttests the researchers modified an existing instrument by selecting questions from an introductory psychology textbook test item file. However, an explanation for why this textbook was selected was not given. It was reported that their choices were based on content and the level of difficulty as determined by the author but it is not explained where they obtained that information, how many original test questions they were choosing from, how this test was administered or the testing conditions. A more detailed rationale behind the selection of questions would have been preferred and the audience would benefit from seeing sample questions.

The second instrument was used to assess frustration levels among students. The researchers used a subscale of the computerized version of the National Aeronautics and Space Administration-Task Load Index. Strengths in this area included the operational definition of frustration that the researchers provided and the explanation of how participants rated their experiences with bipolar descriptors on a continuum of 1 to 100. However, the description of this test is also lacking in detail. It is not explained why they determined this test to be the most appropriate measure, how this test was administered, how many questions participants were asked and validity and reliability were not discussed.

Results and Analysis

Strengths of this section include that the statistics they used were appropriate and the greater detail provided on the demographics of the participants. They used linear regression to create an adjusted posttest variable that controlled for the covariate of participants' pretest knowledge. This helped the power of their ANOVA analysis to compare groups.

The researchers explained that prior to reporting the results of the study they compared the demographic features of participants in each condition and it was determined that there was not a significant difference in the distribution of men and women, participants' mean age, mean year in school or performance on the administered pretest.

The researchers used descriptive statistics and presented their findings in a single table. The table included the mean scores on the pretests and posttests and the mean frustration scores for all three conditions. The table is easy to read and understand, summarizes important information and is also discussed in text. The authors did not explain or describe the table in the text which made the results less cogent and organized.

Because they never clearly stated a prediction in regards to the relationship between teaching method and student learning it is not clear whether their findings supported or rejected a hypothesis in this area. Researchers explain that results pertaining to students' frustration were as they had predicted.

They also discussed that the participants reported greater frustration with the VLE method of instruction showing that their original hypothesis was partially correct. Their results, however,

did not indicate a moderate frustration for the SSL condition as stated in the hypothesis and should have been discussed. The possible explanations for such results are consistent but could have been elaborated.

Discussion

The authors provide possible explanations for their findings and clearly state how their results differ from existing literature and studies but do not go into any detailed comparisons between studies. They suggest that one possible explanation is that the SSL and VLE formats created an active learning environment, which produced greater academic gains than the more passive learning environment. However, they don't explain how or why SSL & VLE might be more interactive (active).

Results are discussed in terms of the relationships the researchers were examining and they address both student learning and frustration levels. One strength of the discussion section is their identification of the limitations in their own research. They discuss how having only one research assistant perform the videotape coding process resulted in the lack of reliability data in regards to the instructors teaching style and indicate the limitations caused by the one lecture model. The researchers also provide strong suggestions for further research based on practical significance and identify various areas for future exploration. It is evident that this study is important and relevant because of the increased use of educational technologies at the postsecondary level and that the findings can be useful to schools which have these types of learning environments as well as those with online degrees.

Since their results were contrary to past research, no theoretical implications or significance were discussed and very few practical implications and significance were discussed. They only briefly mentioned that guidance and feedback from professors can help to alleviate high frustration in the VLE method of instruction. The authors could have expanded their implications but perhaps they were unable to with so many limitations of their study. They did, however, give several recommendations for future research, which include expanding the study to include a more cumulative influence of educational technologies and examining the role of assistance in VLEs.

Outline of the research (summary)

1. What is(are) the research question(s) (or hypothesis)?

The primary goal was to explore three commonly used methods of instruction: traditional lecture (TL), slide-show-supplemented lecture (SSL), and VLE to determine which produced the greatest amount of learning and which one led to more frustration among college students .

2. Describe the sample used in this study.

The participants were 154 (78 women, 76 men) undergraduate students at a large, Midwestern university who were enrolled in the Psychology Department's participant pool to fulfill 2 hr of required research

participation associated with a psychology class. The majority (90.26%) of our participants were between 18 and 24 years old.

3. Describe the reliability and validity of all the instruments used.

The validity and reliability of the instruments was not discussed

4. What type of research is this? Explain.

Experimental design

5. How was the data analyzed?

Linear regression to create an adjusted posttest variable that controlled for the covariate of participants' pretest knowledge. They examined mean differences among the three levels of the experimental lecture conditions on the adjusted posttest scores using univariate ANOVA. They conducted follow-up tests to evaluate pairwise differences among the experimental conditions and used the Fisher's Least Significant Difference (LSD) test procedure to control for Type I error across the three pairwise comparisons.

6. What is(are) the major finding(s)?

Participants in slide-show-supplemented lecture and VLE conditions demonstrated more learning than participants in the traditional lecture conditions. However, participants in the VLE conditions reported significantly higher levels of frustration relative to those in the traditional lecture and slide-show-supplemented conditions.

References

Clark, R.E. (1994). Media will Never Influence Learning. *Educational Technology Research and Development*, 42(2), 21-29.

(This article is available at http://users.cdli.ca/bmann/0_ARTICLES/Media_Clark.html)

Outline of the critique

Positives	Negatives
Is there a statement of the problem? Yes	Is there a statement of the problem? Yes but it does not match with the title. The title is misleading. This paper limits educational technologies to BlackBoard (VLE) and Powerpoint .

Is the problem "researchable," that is, can it be investigated through the collection and analysis of data? Yes to some extent	Is background information on the problem presented? Not enough
Does the problem statement indicate the variables of interest and the specific relationship between those variables which are investigated? When necessary, are variables directly or operationally defined? Yes	Is the educational significance of the problem discussed? Not enough
Are most of the sources primary, i.e., are there only a few or no secondary sources? Yes	Is the review comprehensive? Not at all
Does the review conclude with a brief summary of the literature and its implications for the problem investigated? Yes	Are all references cited relevant to the problem under investigation? No
Do the implications discussed form an empirical or theoretical rationale for the hypotheses which follow? Yes in the discussion part	Have the references been critically analyzed and the results of various studies compared and contrasted, i.e., is the review more than a series of abstracts or annotations? No
Are the size and major characteristics of the population studied described? Yes	Is the method of sample selection described one that is likely to result in a representative, unbiased sample? No (the subjects were not randomly selected and they don't represent all students)
If a sample was selected, is the method of selecting the sample clearly described? Yes	Did the researcher avoid the use of volunteers? No
Does the sample size meet the suggested guideline for minimum sample size appropriate for the method of research represented? Yes they had more than 30 in each group.	Is the rationale given for the selection of the instruments (or measurements) used? No. A few questions from a textbook on a specific chapter is too limited.
Is evidence presented that indicates that each instrument is appropriate for the sample under study? Yes for the learning instrument but no for the frustration scale	Is each instrument described in terms of purpose and content? No specially NASA-TLX was not clearly introduced.
Is the design appropriate for answering the questions or testing the hypotheses of the study? Yes	Is evidence presented that indicates that each instrument is appropriate for the sample under study? Yes for the learning instrument but no for the frustration (NASA-TLX) scale.
Are the procedures described in sufficient detail to permit them to be replicated by another researcher? Yes	Is instrument validity discussed and coefficients given if appropriate? No
Are the control procedures described? Yes	Is reliability discussed in terms of type and size of reliability coefficients? No
Did the researcher discuss or account for any potentially confounding variables that he or she was unable to control for? Yes in the discussion part.	If an instrument was developed specifically for the study, are the procedures involved in its development and validation described? No, the learning scale was based on the textbook but no further info is provided.
Was every hypothesis tested? Yes	Is the design appropriate for answering the questions or testing the hypotheses of the study?

	No. the learning content is very limited and the VLE is not really a virtual learning environment. VLE is supposed to be learning anywhere anytime and the communication should be synchronous (live) not through email.
Are the tests of significance interpreted using the appropriate degrees of freedom? Yes	Are appropriate descriptive statistics presented? No
Are the results clearly presented? Yes	Are generalizations consistent with the results? No. The sample and the content is very limited but the conclusions are over-generalized
Is each result discussed in terms of the original hypothesis to which it relates? Yes	Are the possible effects of uncontrolled variables on the results discussed? To some extent yes but important things like the sampling, content, and VLE limitations not discussed.
Is each result discussed in terms of its agreement or disagreement with previous results obtained by other researchers in other studies? Yes	Are the suggestions for future action based on practical significance or on statistical significance only, i.e., has the author avoided confusing practical and statistical significance? No. It looks that the authors only focused on statistical significance and they did not discuss many flaws in this research including the confusion of the media and the method. In other words powerpoint might have been better simply because it included photos (extra content) not because powerpoint was more effective.
Are theoretical and practical implications of the findings discussed? yes	
Are recommendations for future action (research) made? Yes	