This study assessed the impact of two teaching styles on how well 30 students mastered a section of the psychopharmacology unit within the Survey of Physiological Psychology course. The first method consisted of the instructor's primary method of instruction, a lecture supplemented by demonstrations and discussions, neither of which involved computer technology. The second method, used in the same class to cover a subunit about depressants, consisted of a lecture supplemented by a computer-based learning module with hands-on demonstration and an Internet discussion group. All lecture and supplemental materials came from the same instructional materials supplier. Results suggest that students scored significantly higher on material presented through the active learning teaching style without computer technology than students who were presented with material using the computer-based technology. The in-class active learning approach that did not use computer technology was associated with better performance in this class. Students were asked about the advantages and disadvantages of using computer technology in class, and their responses provide some explanations for the current findings and some suggestions for future research. (SLD)
An Assessment of the Role of Computer Technology in the Classroom
Computer technology has had a tremendous impact on the teaching of psychology, from class web pages to interactive learning modules to entire courses taught online. Specific course pages and interactive textbook information, study guides, and interactive discussions are a few of the many applications of computer technology in the teaching of psychology. Students are able to link onto nearly every professional society in psychology, many of which link to resources in psychology, job openings, newsgroups, and mailing lists. Many sites also provide a wealth of information on psychological issues as well as graduate schools, GRE preparation, employment announcements, grants, and online Resume or Vita databases.

Students have access via the internet to many professional psychological journals, where they can obtain lists of abstracts and/or full text articles depending on database resources of the library.

Not only can students obtain full text articles for research projects, they also can find references for numerous tests and assessment materials for research projects and may even be able to review the proceedings of international conferences on their topics. Through the internet, students can obtain a wealth of information from the National Institute of Mental Health and the Center for Disease Control. In many cases, these government agencies provide toll free numbers whereby students can call and obtained free articles on ongoing government supported research across the nation.

Before we can take advantage of this tremendous technology as well as conduct assessment research on the quality of student learning, we have to overcome numerous barriers (DiBlassio, Simonin, DeCarolis, Morse, Jean, Vassalotti, Franks, & Chambliss, 1999; Lane & Atlas, 1999; McClure, 1999). Barriers to the use of technology in the classroom consist not only of the cost and distribution of hardware and software, but also the increased demand on faculty course preparations. Another challenge is setting up a system to ensure that students are reviewing quality sites and discussion groups. Despite the rapid movement of the use of technology in the classroom, another barrier is the assessment of the value of this technology on improving the quality of education that students receive.
Numerous studies have demonstrated that the more deep processing (critical thinking and analysis) and elaborative processing (seeing the applications of psychology course material to their own lives and society) occurs for psychology instructors who take an active learning approach, whereby the traditional lecture material is supplemented with demonstrational, discussion, and laboratory material (Aschraft, 1994). Active learning teaching styles not only engage the student's interest more, they also enable instructors to present the material in different ways, which increases the likelihood the method of presentation will match the learning style of the student.

In light of research on active learning instructional approaches, it seems reasonable to expect that the use of computers in the classroom would be a tremendous tool to engage students, encourage collaborative learning, and match the learning styles of students. For instance, a lecture on the neuropsychological basis of memory supplemented with online brain images of Magnetic Resonance Imaging (MRI) and Regional Cerebral Blood Flow (rCBF) studies and real-time video clips of dementias and amnesias, would be ideal. With this interactive teaching strategy, students would also be able to participate in discussion groups with other students, professionals, and patients with memory disorders as well as link up to other universities for real-time conferencing.

The present study will assess the impact of two different teaching styles on how well students master a section of the psychopharmacology unit within the Survey of Physiological Psychology course. The first teaching method consisted of the instructors' primary method of instruction, which consisted of a lecture supplemented by demonstrations and discussions, neither of which involve computer technology. This teaching method was used to cover the psychopharmacology subunit on stimulant drugs. The second teaching method was used to cover the depressant subunit of the psychopharmacology material. This teaching method, consisted of a lecture supplemented by computer-based learning module instruction, hands-on demonstrations, and an internet discussion group. Since the design was within subjects and both subunits were presented during one class, the first class in the psychopharmacology unit, it should be noted that this was just the beginning of an in-depth unit covering five class sessions.
To ensure that the content of the material for each subunit were of equal difficulty, all lecture and supplemental material were obtained through the Carlson (1998), Physiology of Behavior, Instructors Resource Manual with companion internet material. Both subunits were introduced for twenty minutes each using a within subjects design (the same classes), with order of presentation counterbalanced. Students were then given a short multiple choice quiz after each introductory subunit. Quiz questions covered the same material for each of the subunits, asking about the general effect of the drugs on the central nervous system and how three exemplar drugs for the subunit affect behavior at the level of the synapse. All questions were taken from the Carlson (1998) test bank and were of equal difficulty as rated by this resource.

It was hypothesized that there would be a significant difference between quiz scores for sections taught using an active learning approach without the computer technology and section sections taught using the interactive computer technology. A within subjects t-test was performed on the quiz scores. Results suggested that students scored significantly higher (M = 9.23; SD = 1.68) on material presented with the active learning teaching style without computer technology than students (M = 7.97; SD = 1.75) who were presented with material using the computer based technology [t(29) = 2.86, p = 0.006].

Since there was a difference in quiz scores as a function of in-class active learning teaching methods with and without computer technology, support for the hypothesis was obtained. In sum, results suggested that students perform better with an in-class active learning approach not using the computer technology. As an additional means of assessment, students were asked to list the advantages and disadvantages of the use of technology in the classroom. In looking at the student responses, many potential reasons for the present finding as well as suggestions for future research are apparent.
<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can help point out key ideas you need to know.</td>
<td>Oversimplifies the information.</td>
</tr>
<tr>
<td>Efficient and fast.</td>
<td>Teachers in the learning module were</td>
</tr>
<tr>
<td>Graphics help in understanding the topic.</td>
<td>monotone making it hard to become interested.</td>
</tr>
<tr>
<td>Able to go over what we learned in class on the website at home.</td>
<td>Hard to take notes from what the computer said.</td>
</tr>
<tr>
<td>Better, more clearer pictures.</td>
<td>I wanted to write the information down before moving on.</td>
</tr>
<tr>
<td>The illustrations really added to the information.</td>
<td>It is too slow.</td>
</tr>
<tr>
<td>It would be a good learning tool for self-teaching out of the classroom.</td>
<td>Can have open questions but they cannot be answered.</td>
</tr>
<tr>
<td>Interesting and different.</td>
<td>We become more reliant on the technology than well trained teachers.</td>
</tr>
<tr>
<td>Excellent visual demonstrations.</td>
<td>Can't stop and ask questions.</td>
</tr>
<tr>
<td>Easy to see and hear.</td>
<td>Can be overused and become boring.</td>
</tr>
<tr>
<td>Interesting material with detailed pictures.</td>
<td>Must be reinforced by instructor to ensure comprehension.</td>
</tr>
<tr>
<td>It incorporates tools already known by many students.</td>
<td>Expensive.</td>
</tr>
<tr>
<td>Technology allows for rapid dissemination of the latest information.</td>
<td>Not as flexible.</td>
</tr>
<tr>
<td>Easy to understand.</td>
<td>Better as a one-on-one technique</td>
</tr>
<tr>
<td>It provides a nice outline for the lecture.</td>
<td>Should be self-paced.</td>
</tr>
<tr>
<td>More likely to remember what was discussed in class.</td>
<td>Every school may not be able to afford it.</td>
</tr>
<tr>
<td>Exposure to supplemental information, variety in presentation visual examples.</td>
<td>Causes people to not pay attention because it is not a real person.</td>
</tr>
<tr>
<td>Can offer information that may not be available to some people.</td>
<td>Lack of personal examples.</td>
</tr>
</tbody>
</table>

**Note.** Of the thirty students in the sample, many gave nearly identical answers about the advantages and disadvantages of the use of technology in the classroom.
Table 2
Student Comments on Computer Technology Developed for use Outside of the Classroom

"I went through the web page and I thought was the coolest was the whole brain atlas. I went under the degenerative diseases and looked at Huntington's and Alzheimer's. It is really neat how it shows step-by-step how the brain deteriorates with these diseases."

"I went to the website and checked out sleep disorders and I found tons of stuff on the problem my cousin has"

"I went to the class web page and I found a truly amazing web site on psychology and religion. I have always wondered about careers that intertwine psychology and religion. I emailed Dr. Neilson (the creator of the web site) and he gave me good suggestions on how to prepare for a career. I never knew you could use the computer for this. I feel as though a whole new avenue has opened up for me"

Note. I expect to see more feedback on the technology resources as the semester continues.
References


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