

A Comparison of Online Instruction vs. Traditional Classroom Instruction in an Undergraduate Pharmacology Course

E.A. Mirakian* and L.S. Hale

¹Department of Physician Assistant, College of Health Professions

ABSTRACT

Background: Online instruction has become a vital element in higher education. Most published research finds no significant difference between online (OL) and traditional (TD) instruction. **Purpose:** Compare student satisfaction and learning outcomes of an undergraduate OL pharmacology course to a TD lecture course taught by the same instructor. **Methods:** The OL and TD courses for Fall 05 and Spring 06 Clinical Pharmacology used the same notes, text, learning objectives, and exams. Three validated surveys measured aptitude for OL instruction, preferred learning styles, and student satisfaction with the course and self-perceived progress on relevant objectives. Learning outcomes were also objectively evaluated using exam scores and withdrawal rates. **Results:** Mean satisfaction scores for both courses were high, generally > 4.0/5. Mean scores in the TD courses were significantly higher than OL courses regarding overall course satisfaction, instructor's displayed level of interest in students, students' perceived ability to share ideas, and self-perceived gains in factual knowledge, fundamental principles and application of material. Mean scores related to difficulty of subject matter were similar between courses. There were no significant differences in objective exam scores or withdrawal rates. **Conclusion:** Overall, the OL and TD pharmacology courses had similar withdrawal rates and course grades, indicating similar learning gains. Although the OL students were highly satisfied with the course and their self-perceived knowledge gains, the OL satisfaction ratings were generally lower than those found in the TD courses.

1. INTRODUCTION

Distance education has gone through many generations of evolution since its initiation in 1892 when Penn State offered a distance education program that utilized the US Postal Service.[1] Distance education has since evolved to encompass interactive video, email, and World Wide Web technologies. Spooner et al. defines distance education as any form of education that geographically separates the instructor and students, requiring communication through media.[2] Today that media is most often the Internet and is commonly referred to as online education.

Online education has become increasingly utilized as a means of instruction. The fundamental premise of distance learning using online modalities was to create

and widen access to education and to improve its quality, using current technologies to meet the particular requirements of individuals who are unable to participate in the traditional classroom environment due to job and/or family obligations.[3] The flexibility and freedom from time and attendance requirements afforded by online education is one of the greatest appeals for many learners. Theoretically, it provides an alternative to traditional education that is accessible "anywhere" and "anytime" and allows the student more freedom to work at their own pace thus providing more control over their learning achievements and daily schedules.[4,5] One consequence of the flexibility is students indiscriminately pursuing online education for the sake of convenience without consideration of the appropriateness of online education for their individual learning styles.[4,5] Most published research finds no significant difference between online and traditional instruction with regards to learning outcomes.

The purpose of this study is to compare the effectiveness of an undergraduate, online (OL) Pharmacology course to a traditional (TD) in-class lecture course taught by the same instructor as measured by: 1) percent of student withdrawals from course, 2) average exam scores and overall course grade, and 3) student satisfaction with the course and instructor, self-perceived gains in knowledge, and perceived difficulty of the course.

2. METHODS, RESULTS, SIGNIFICANCE

Methods: This study was conducted at Wichita State University, College of Health Professions. The study population included 224 students enrolled in a 3-credit hour, undergraduate, clinical pharmacology course, in Fall 2005 and Spring 2006. This class was offered in both a TD and OL course each semester.

Similarities and Differences between Courses: Both courses had the same instructor, text, course notes, and learning objectives; used a similar grading scale; and used the same or similar paper-pencil exams. The instructor was available to both courses during the same allotted office hours, by appointment, or via email or

telephone. The TD course had weekly quizzes while the OL course had weekly homework. The TD course received lectures in a face-to-face format using PowerPoint presentations while the OL course viewed previously videotaped lectures though streamed media accessed either online or through CDs. The OL students met with the instructor for a 2-hour orientation session and were not required to meet at any other time. Exams occurred in a proctored testing facility.

Measurements: Learning outcomes were objectively evaluated using course grades and withdrawal rates. Grades were analyzed only for students completing all exams. Three validated surveys measured aptitude for OL instruction, student learning style preference, and student satisfaction with the course and self-perceived knowledge gains. The distance learning appropriateness (DLA) survey comprised 12 validated questions related to the likely appropriateness of distance learning for the student followed by 11 characteristic questions. The Canfield's Learning Styles Inventory (CLSI) measured preferred learning styles. Student satisfaction of the course and instructor was evaluated using the standardized Individual Development and Educational Assessment (IDEA) Survey. The DLA and CLSI were administered to both courses through Blackboard™ and paper-pencil following the 2nd and 3rd exams. The IDEA survey was administered on paper following the 3rd exam.

Data Analysis: Statistical analysis was performed with SPSS, 13.0. Significance was set at $p \leq 0.05$. Mean data were compared using the independent sample, two-tailed student's t-test and Lavene's test for equality of variance. Frequency data were compared using the Chi-square test.

Results: The withdrawal rate for the OL courses was similar to the TD courses, 28% vs. 22%, $p=0.148$; and average course grades were similar, 83.5 ± 10.6 vs. 83.0 ± 10.7 , $p=0.768$, respectively. DLA and CLSI data were similar between groups; survey completion rate >45%. Mean IDEA satisfaction scores for both courses were high, generally > 4.0 (range: strongly disagree = 1 to strongly agree = 5); survey completion rate >80%. Mean scores in the TD courses were significantly higher than the OL courses regarding overall course satisfaction, instructor's displayed level of interest in students, students' perceived ability to share ideas, and self-perceived gains in factual knowledge, fundamental principles, and application of material. Mean scores for amount of reading and difficulty of subject matter were similar between groups. Mean scores in the OL courses were higher for amount of work in non-reading assignments, however in response to the statement, "I worked harder on this course than on most courses I have taken" mean scores were higher for the TD courses.

Table 1: Standardized IDEA Student Evaluations of Course

	Online	Traditional	p-value
Course satisfaction	4.33 ± 0.993	4.65 ± 0.686	0.048
Instructor's level of interest in students	4.14 ± 1.014	4.50 ± 0.824	0.018
Ability to share ideas	3.31 ± 1.473	4.03 ± 1.156	0.005
Gains in factual knowledge	4.21 ± 0.871	4.57 ± 0.755	0.011
Gains in fundamental principles	4.10 ± 1.031	4.40 ± 0.772	0.043
Gains in application of material	4.05 ± 1.125	4.51 ± 0.740	0.015
Amount of reading	3.49 ± 0.768	3.55 ± 0.817	0.672
Difficulty of material	4.05 ± 0.754	4.19 ± 0.725	0.281
Amount work in non-reading assignments	4.09 ± 0.868	3.43 ± 0.989	<0.001
"I worked harder on this course than on most I have taken"	3.79 ± 1.013	4.25 ± 0.836	0.004

Significance: Due to increasing demands for OL education, evaluating the quality of OL courses is important. While most published research has found no significant difference between OL and TD instruction, our study does illustrate some statistically significant differences in student perceptions and course satisfaction. The lower satisfaction related to instructor and peer interaction may reflect the less frequent personal interaction that generally occurs in OL courses. High quality and quantity of instructor and peer interaction can occur in OL courses and should be encouraged. The OL students were less satisfied with their gains in knowledge and application of material; however, there were no significant differences in exam scores which required them to apply knowledge and express factual knowledge and fundamental principles. The varied responses to workload/effort may indicate real differences in type of workload expectations, but not necessarily overall workload/effort.

3. CONCLUSION

Overall, the OL and TD pharmacology courses had similar withdrawal rates and course grades, indicating similar learning gains. Although the OL students were highly satisfied with the course and their self-perceived knowledge gains, the OL satisfaction ratings were generally lower than those found in the TD courses.

References

- [1] Carnevale D. Turning traditional courses into distance education. *Chron High Educ.* 2000;46:A37-38.
- [2] Spooner F, et al. Student ratings of instruction in distance learning and on-campus classes. *J Educ Res.* 1999;92:132-140.
- [3] Hillstock LG. A few common misconceptions about distance learning. Paper presented at: Association of Small Computer Users in Education Conference; 2005; Myrtle Beach, SC.
- [4] Diaz D, et al. Students' learning styles in two classes: online distance learning and equivalent on-campus. *Coll Teach.* 1999;47:130-135.
- [5] Kaminski CW. Formative use of select-and-fill-in concept maps in online instruction: implications for students of different learning styles. Paper presented at: Annual Internatl Conference of the Assoc for the Education of Teachers in Science, 2002; Charlotte, NC.