

A Comparison of the Learning Outcomes of Traditional Lecturing with that of Computer-Based Learning in two Optometry Courses

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Abstract

Background and purpose: The literature on distance education has provided different reports about the effectiveness of traditional lecture based settings versus computer based study settings. This study is an attempt to compare the learning outcomes of the traditional lecture based teaching with that of the computer based learning in the optometry curriculum.

Methods: Two courses in the optometry curriculum, Optometry I, with 24 students and Optometry II, with 27 students were used in this study. In each course, the students were randomly divided into two groups. In each scheduled class session, one group randomly attended the lecture, while the other studied in the computer stations. The same content was presented to both groups and at end of each session the same quiz was given to both. In the next session, the groups switched place. This process continued for four weeks. The quizzes were scored and a paired t-test was used to examine any difference. The data was analyzed by SPSS 15 software.

Results: The mean score for Optometry I, lecture settings was 3.36 ± 0.59 , for Optometry I computer based study was 3.27 ± 0.63 , for Optometry II, in lecture setting was 3.22 ± 0.57 and for Optometry II, computer based setting was 2.85 ± 0.69 . The paired sample t-test was performed on the scores, revealing no statistical significant difference between the two settings. However, the mean score for lecture sessions was slightly higher in lecture settings.

Conclusion: Since this study reveals that the learning outcomes in traditional lecture based settings and computer based study are not significantly different, the lecture sessions can be safely replaced by the computer based study session. Further practice in the computer based setting might reveal better outcomes in computer study settings.

Key words: LECTURING, COMPUTER BASED LEARNING, DISTANCE EDUCATION

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Introduction

Lecturing is a traditional and a common teaching method in universities. The reasons for continuing

the tradition of lecturing are: 1) it is traditional and is therefore expected by the students and teaching staff, 2) it enables the lecturer to present a heavy load of content in a short period of time. The question remains whether students learn more by studying the content on their own or by simply listening to a lecturer? By studying the content rather than attending a lecture, students can be actively involved in their own learning from the beginning and save some time and energy. By decreasing the lecture hours, the

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faculty could also spend more time on other academic tasks such as research. The tradition alone is not enough justification for continuing with lectures in these times of heavy workloads for both faculty and students (1).

The use of self-study courses in universities is not an entirely new trend. In United Kingdom and Ireland, in 1976, there is a report of 43 courses offered in self-study format in the undergraduate physical, social, and applied sciences (2). By the advances in IT, computers started to play a major role in delivery of learning content. However, the transition from the traditional educational settings to more technology oriented settings has not been easy. In comparing traditional methods of teaching to more computer based study approaches, there are contradictory results in the literature. Many studies report the virtual learning environment as more effective, efficient and satisfying than the traditional learning situation. Sahin, C. S., Koskela et al, Arle, Lynch, Rieger, Shachar have reported significant difference and better results with technology (3-4). In a meta-analysis study by Shachar M. and Neumann M. in which eighty-six experimental and quasi-experimental studies were included (including data from over 15,000 participating students) demonstrated that: 1) in two thirds of the cases, students taking courses by distance education outperformed their peers enrolled in traditionally instructed courses. (5) In contrary, Brown, Liedholm, Hartzoulakis, Wadsworth, Wood, Ojano-Sheehan, McMullen, have reported significant difference and better results in traditional face to face classroom (3,6,7).

In other studies, White and Okojie, Press, Vroeginday, Carlisle, Johnson, and Musumeci, have reported no significant difference between the two settings (3,8).

Since the above results were inconclusive, we decided to compare the learning outcomes between the traditional lecture based teaching and computer based study approach in the optometry curriculum.

Methods and Materials

The students selected for this study were in the

Optometry program at Shaheed Beheshti University of Medical Sciences. Optometry in the Higher Educational System of the Islamic Republic of Iran is a 4 year program leading to a Bachelor of Science degree and is categorized under the medical sciences programs. Two courses in the optometry curriculum, participated in this study: having the same instructor, Optometry I, with 24 students and Optometry II, with 27 students. In each course, the students were randomly divided into two groups. In each scheduled class session, one group randomly stayed in the classroom where the lecturer used power point slides to present her lesson. At the same time, the other group attended the library, where the same set of the power point slides became available to them at the computer stations. In the beginning of each session, the students in both groups were informed that there would be a quiz at the end the session based on the content presented in that hour. The content presented at each session was new in both courses. In the classroom, the lectures did the routine tasks; the students were allowed to take notes and ask questions. In the library, the students were free to take notes and communicate with other classmates in the library orally or electronically. At the end of each session, the instructor visited the library briefly and students could ask any questions for further clarification of the subject. In all sessions, the same amount of time was given to the students in the classroom and in the library. In the next session, the groups switched places and this process continued for 4 weeks. The quizzes on average contained 4 short answer questions and they were scored out of 4. Paired t-test was used to examine the differences. The scores were analyzed by SPSS vs15 software. A p value of less than 0.01 were considered significant.

Results

The distribution of the scores for Optometry I and II, for the lecture and computer based study sessions are presented in figure 1. The mean scores for Optometry I, in lecture and computer based study settings were 3.36 ± 0.59 , 3.27 ± 0.63

respectively. In Optometry II, the mean scores, in lecture and computer based settings were 3.22 ± 0.57 , 2.85 ± 0.69 respectively. The performance of each student was compared in two settings and paired sample t-test was performed on the scores, revealing no statistical significant difference ($P < 0.01$) between the learning outcomes in the lecturing sessions versus the computer based studying sessions in both courses.

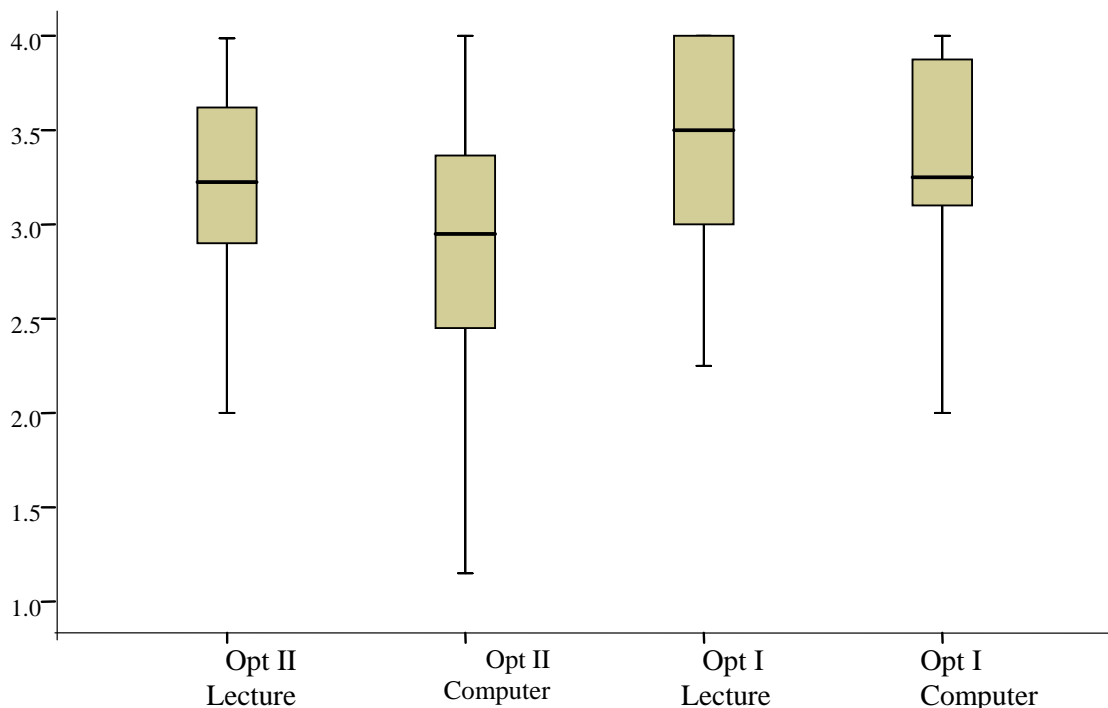
Discussion

In this study, we found no significant difference between the learning outcomes of the traditional lecture based teaching and the computer based study method in two courses in the optometry curriculum. However, in both courses, we note slightly higher mean scores for the traditional classes versus the computer based settings. One reason for this better performance could be that the students in the lecture were better acquainted to classroom setting in comparison with the

computer based study setting. In classroom, the students were able to ask any question at any time to clarify the subject, while in the computer session, they needed to wait for the instructor till the end of the session or they had to rely on their classmates' help. There could have been more source of distraction in the library. Behind the computer station, the students could have got distracted by searching the internet or chatting with others about non-related topics. In classroom, however, there are also chances of losing attention due to daydreaming or thinking about other matters. If the process continued for a few more weeks, the students could have gained more experience in managing their time in the computer based study settings.

Comparing our results to those of other studies is a difficult task. One difficulty is the fact that the types of the assessments in related studies are different. For example, in one study, the exam format was 25 True/False statements (7); while in another study, the exam started with two multiple-choice questions and the remaining three

Figure 1. The frequency distribution of the scores in Optometry I and II for the lecture and computer based study sessions



questions were open-ended: the students were asked to write freely about what they remembered on the subject (4). Our quizzes contained short answer questions. In terms of cognitive processing, True/False exams require recognition, while in short answer and open ended questions, recall plays an important role.

The other difficulty in comparing the results with those of other studies is the complexity in the nature of interactions. In our study like the other studies, whether most of the studying process took place independently or through interaction with others is unclear. Although, computer terminals provide an excellent space for independent study, but their ability to create synchronous and asynchronous interaction with others should not be overlooked. We did not use the technology effectively for synchronous and asynchronous interactions due to the limitation in time, tutor and technology features in our computer terminals.

In this study, we conclude that since there is no statistically significant difference between the learning outcomes in traditional lecturing and computer study settings, the lectures can be replaced safely by computer based sessions. With longer investigation, and using the communication technology more effectively better learning outcomes might be expected in computer based study settings.

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