



Evidence Summary

Computer-Assisted Library Instruction and Face-to-Face Library Instruction Prove Equally Effective for Teaching Basic Library Skills in Academic Libraries

A review of:

Zhang, Li, Watson, Erin M. and Banfield, Laura. "The Efficacy of Computer-Assisted Instruction Versus Face-to-Face Instruction in Academic Libraries: A Systematic Review." The Journal of Academic Librarianship 33.4 (July 2007): 478-484.

Reviewed by: Stephanie Walker

Acting Chief Librarian & Executive Director of Academic Information Technologies

Brooklyn College – City University of New York

Brooklyn, NY, USA

E-mail: swalker@brooklyn.cuny.edu

Received: 28 November 2007

Accepted: 23 January 2008

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Abstract

Objective – To conduct a systematic review of several studies comparing the efficacy of face-to-face versus computer-assisted instruction (CAI) for teaching basic library skills to patrons of academic libraries.

Design – Systematic review of existing studies (randomised controlled trials and controlled trials).

Setting - College and university libraries

Subjects – The subjects studied were patrons of any type of academic library,

whether university, college, or other post-secondary institution, receiving instruction in basic library skills. Ten studies were included in the review, of which seven were done in the United States, two in Australia, and one in Canada. The total number of subjects in all of the studies under review was 1283. Nine of the studies focused on undergraduates enrolled in specific courses (undergraduate courses ranging widely in subject area, or in one case a first year experience program); the other study focused on library instruction methods taught to students in a graduate research methods course, yet the study was still intended to measure the efficacy of library

instruction methods, yet the study was still intended to measure the efficacy of library instruction methods.

Methods – One included study was a randomised controlled trial; the other nine were controlled trials. The date range under consideration was for studies done between 1990 and 2005. All original studies were required to compare the efficacy of face-to-face versus CAI instruction. Both information skills and students' reactions to receiving the instruction were considered. To identify appropriate studies, searches were done across the following library and education-related databases: *LISA*, *ERIC*, and *Library Literature*. The authors screened the 728 unique studies' bibliographic information for relevance against four criteria: studies had to be of a particular type of design (randomised controlled trials, controlled trials, cohort studies, and case studies), with a sample size greater than one and with pre- and post-test measurements; study participants had to be academic library patrons; the study needed to compare CAI and face-to-face instruction; and both the students' information skills and reactions to the instruction had to be measured. This left 40 unique studies, which were then retrieved in full text. Next, studies were selected to meet the inclusion criteria further using the QUOROM format, a reporting structure used for improving the quality of reports of meta-analyses of randomised trials (Moher et al 1896-1900). Evaluation of methodological quality was then done using a dual method: authors Watson and Zhang assessed the studies independently, each using the "Checklist for Study Quality" developed by Downs and Black (Downs and Black 377-384), adapted slightly to remove non-relevant questions. After analysis, when additional information was needed, original study authors were contacted. Finally, ten studies were included in the analysis.

The instruction sessions covered many topics, such as catalog use, reading citations, awareness of library services and collections, basic searching of bibliographic databases, and more. But all could qualify as basic, rather than advanced, library instruction. All studies did pre- and post-tests of students' skills – some immediately after instruction, and others with a time lapse of up to six weeks. Most authors created their own tests, though one adapted an existing scale. Individual performance improvement was not studied in many cases due to privacy concerns.

Main Results - Nine of the ten studies found CAI and face-to-face instruction equally effective; the tenth study found face-to-face instruction more effective. The students' reaction to instruction methods varied – some students felt more satisfied with face-to-face instruction and felt that they learned better, while other studies found that students receiving CAI felt more confident. Some found no difference in confidence.

It was impossible to carry out a meta-analysis of the studies, as the skills taught, methods used, and evaluation tools in each case varied widely, and the data provided by the ten studies lacked sufficient detail to allow meta-analysis. As well, there were major methodological differences in the studies – some studies allowed participants the opportunities for hands-on practice; others did not. The CAI tutorials also varied – some were clearly interactive, and in other studies, it was not certain that the tutorial allowed for interactivity.

The authors of the systematic review identified possible problems with the selected studies as well. All studies were evaluated according to four criteria on the modified Downs-Black scale: reporting, external validity, and two measures of internal validity (possible bias and possible

confounding). A perfect score would have been 25; the mean score was 17.3. Areas where authors lost points included areas such as failure to estimate data variability, failure to report participants lost to follow-up, failure to have blind marking of pre- and post-tests, failure to allocate participants randomly, and a variety of other areas. As well, few studies examined participants' confidence level with computers before they participated in instruction.

Conclusion – Based on this systematic review, CAI and face-to-face instruction appear to be equally effective in teaching students basic library skills. The authors of the study are reluctant to state this categorically, and issue several caveats: a) only one trial was randomised; b) seven of the studies were conducted in the USA, with the others being from Canada and Australia, and learning and teaching styles could be very different in other countries; c) the students were largely undergraduates, and the authors are curious as to whether results would be similar with faculty, staff, or older groups (though of course, not all undergraduates are traditional undergraduates); d) the tests ranged widely in design, and were largely developed individually, and the authors recommend developing a validated test; and e) if the pre- and post-tests are identical and given in rapid succession, this could skew results.

Commentary – The fact that the trials included in the systematic review were not randomised is of some concern, but this does not negate the usefulness of the work. It would be of greater concern if the lack of randomisation included students being permitted to choose their method of instruction; but this does not appear to have been the case. Lack of randomisation was more a factor in the choice of the test subjects. Studies were done on particular groups of people, such as classes of

students. It is often difficult or impossible to have randomisation in studies like this due to budgetary constraints or lack of access to other potential participants. Given this, if the objective is simply to evaluate the effectiveness of CAI vs. face-to-face instruction, controlled trials should suffice, as no one wishes to disadvantage any particular group by randomising who does or does not receive instruction. That nine of the ten studies selected were controlled trials speaks to this ethical dilemma.

As well, studies conducted across the USA, Canada, and Australia are perhaps less likely to vary as widely as studies conducted in the USA compared to studies conducted in countries which are less well-supplied with technology. This is an issue to consider when evaluating the usefulness of this work. If one conducted similar studies in developing countries, results might differ substantially.

Students were indeed largely undergraduates, but that is where libraries hope to 'catch' them – to inculcate library skills at an early stage in their academic careers. So evaluating the effectiveness of CAI vs. face-to-face instruction seems most important for academic librarians who wish to determine how best to spend their time and resources – on developing CAI to relieve us of the often-heavy burden of dozens of sections of identical or near-identical library instruction, or on face-to-face instruction, should that have been absolutely proven to be more effective.

The final two concerns of the authors, as expressed in their conclusions, seem to merit the greatest discussion. To take them in reverse order: How much is it possible that test results were biased in some studies if the pre- and post-tests were identical, and, worse still, given in close time proximity? And how much effect did diversity in the tests have on the results? Given that most

found that CAI and face-to-face instruction were similarly effective, this latter point may not be a huge concern, as there was a level of consistency across many studies. However, the authors are correct when they state that there is more to be done. Recommended changes would be a validated and consistent test, tried across multiple institutions, with pre- and post-tests that were both different and given at set times in the course. Also, an interactive version of CAI, with randomised and validated quiz questions generated to test learning, could be useful. As the authors stated, it is not clear that all CAI was interactive; yet interactivity enhances the user experience.

One additional concern is that while the studies reviewed all fall within the date range of the systematic review (1990-2005), the aim of the study was to evaluate current practices in CAI. There have been great technological advancements in the latter portion of the date range, and the usage of the web has expanded enormously. Additionally, user comfort with technology has likely grown in recent years. Additional research focusing on latter years could be useful.

This systematic review contributes to our understanding of the state of knowledge about CAI vs. face-to-face instruction for

library instruction, and points to directions for further development. This article is also useful for instruction librarians interested in developing CAI; it would also be helpful to libraries struggling with the question of whether CAI can indeed substitute for face-to-face instruction in some cases. CAI is often seen as a way to reduce teaching load for instruction librarians, though it can have huge up-front time and financial investment requirements; this study may help instruction librarians and others decide whether such investment is likely to be worthwhile for their situations.

Works Cited

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