

Running head: COMPARE DISTANCE ED AND CLASSROOM INSTRUCTION

Comparison of Web-based Distance Education and Classroom

Instruction: A Literature Review

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Comparison of Web-based Distance Education and Classroom Instruction: A Literature Review

Research in distance education (DE) has varying reports of DE effectiveness relative to classroom instruction (CI). One or more media types can be used in DE (e.g. video, bulletin board, print, simulations, conferencing, and text chat), just as classroom environments lend to a wide mix of interactions not possible in DE. It is important to identify, from the 232 studies with comparisons of DE and CI, relatively equal applications of DE and CI, regardless of the media used (Bernard et al., 2004).

This review discusses the differences between studies about DE. Some recurring patterns of differences between studies are identified for further research.

Background

Bernard et al. (2004) wrote about a study by Shale (1990). Shale argues DE ought to be regarded as equivalent education to CI, just at a distance. All of the process of education when teacher and student meet face-to-face also constitutes the same process of education when teacher and student are physically separated. To wit, regardless of the media, DE and CI should be relatively equal. In fact, Bernard et al. (2004) identified a widely cited report where Russell (Russell, 1999) compiled a list of 355 DE studies claiming no significant differences between DE and CI; however, according to Bernard et al., Russell failed to define studies of equal quality and rigor, instead basing the report on fragmented annotations (e.g., "...no significant difference was found...").

Even for those who have done research to find benchmarks for individuals' online learning aptitude, Maki and Maki (2003) found evidence to suggest readiness questionnaires to judge success in online verses lecture satisfaction are not useful. Maki and Maki believe web-

based courses provide a better learning experience because it allows the instructor to enforce deadlines and provide feedback without the need for a face-to-face meeting. Compounding methods of instructional design to cover multiple learning theories helps give learners more opportunities to encode information to memory (Bruning, Schraw, Norby, & Ronning, 2004).

A study of online verses traditional lecture courses showed students did as well or better than students who attended lecture in a course on casual and statistical reasoning (Scheines, Leinhardt, Smith, & Cho, 2005). However, the same publication from Scheines et al. admits a long list of contrasting research showing either no difference between online learning and lecture (Carey, 2001; Hiltz, 1993; Mishra, 2002), a failure of online learning to match success of lecture-based courses (Brown & Liedholm, 2002), or just a complete difference in the core skill outcomes of CI and DE (Yumuk, 2002). Smaller recitation lectures were shown to be more effective than large audience lectures in the study by Scheines et al. (2005). This contrast of outcomes stimulated a review of the literature, which set out to answer the following question: What are some factors that might explain the differences in outcomes of supposed identical DE and CI instruction?

Method

Articles published between 1995 and 2005 were accessed via PsycARTICLES and PsycINFO. Searches were limited to start at 1995 to recognize the significance of Microsoft Windows 95 as a landmark change in options available for web-based DE. The sole search, “evaluating distance education” was employed to identify potentially useful articles. Where references in articles from the APA-based research databases could not be found, Academic Search Premier, ERIC, Primary Search, and Professional Development Collection were searched,

in addition to Google Scholar to search the Internet for original texts. In total, 43 articles relating to web-based DE were reviewed.

Results

Initial searching identified only two articles, however one was a meta-analysis of empirical literature, which was used as a resource to identify potential studies with related characteristics. For the purposes of this review, DE is limited to web-based instruction, which involved omitting many articles classifying interactive television and courses by correspondence as DE.

The use of a computerized peer tutoring system helped 10-year-old students develop their creative thinking by trying to teach each other in an electronic environment (Wheeler, Waite, & Bromfield, 2002). The same study also admitted the lower attainment students tended to get off task by roaming around the Internet. Interviews in the Wheeler, Waite, and Bromfield (2002) study asserted learning did not really start until skills of using the online learning environment became “over-learned”. In sum, the Wheeler, Waite, and Bromfield study did not employ a specific grounded instructional method and came to its conclusions by qualitative interview processes.

Mishra (2002) tried to identify the most important parts of DE and CI in her proposal of a design framework for learning environments. In her framework, she identified the following areas of importance in combining the best elements of CI, mixed mode instruction, and DE:

- Behaviorism and content
 - Objective-based course units
 - Self-assessment online
- Constructivism and learning activities

- Participation in discussion forums
- Email contact
- Reading lessons
- Cognitivism and learner support
 - Learner guide
 - Mentor support online
 - Online library
 - Social interaction
 - Synchronous chat-counseling

The ADAPT model uses a similar blended approach to instruction. Using the ADAPT instructional design for computer-mediated coursework yielded a significantly higher post hoc average GPA of the ADAPT students in comparison to a conventional classroom version of the same coursework (Tuckman, 2002). The ADAPT method defined itself from the classroom instruction by offering self-surveys, quick practices with immediate feedback, multiple-choice and short essay spot quizzes, and online discussions. A number of other studies found higher post-test scores with students in DE courses over CI (Schulman & Sims, 1999).

A recurring theme in the research is a perception of greater workload associated with DE over CI (Noyes, Garland, & Robbins, 2004). Noyes, Garland, and Robbins reasoned that lower-performing individuals are disadvantaged when taking computer-based assessments (p. 113). Brown and Liedholm (2002) found students in web-based courses needed to work harder and failed to recognize important concepts relative to their classmates who attended lecture. Some possible explanations for the difference between DE and CI include difference in typefaces on a computer monitor verses paper and differing resolution on computer monitors (Clariana &

Wallace, 2002). As a result, students given identical assessments in computer format and on paper can have significant differences in outcomes. A different explanation of differing outcomes agrees with the original assertion of DE and CI (Shale, 1990). Better performance was observed for courses with an online component of assessment in an environment where instruction was equivalent (Caywood & Duckett, 2003).

None of the aforementioned studies have a solid answer to the effectiveness of DE. What the studies do prove is the effectiveness of DE for causal and statistical reasoning, business undergraduate, or psychology students (Carey, 2001; Clariana & Wallace, 2002; Scheines, Leinhardt, Smith, & Cho, 2005; Waschull, 2001). If research had already pinpointed the benefits, pitfalls, and best-case scenarios of DE, it would likely have a stronger presence in grade schools. Studies seem to include have research subjects in grade school, and in higher education for the arts and sciences. Many studies were excluded from the review because they were based largely or in whole on the perceptions of students and instructors, without any data on the actual educational differences between DE and CI.

This research showed strong findings that DE and CI had essentially identical learning qualities. Future research might include definitively identifying some causes for significant differences between scores on computer-based assessments verses paper format. If perceptions of students and teachers are included in effectiveness studies, they could also potentially account for a correlation between the success of computer-based assessments and DE over CI. DE is likely better for some subject areas than others. Narrowing down whether DE is better for the arts and not the sciences could be important base information to guide what particular aspects of DE are best for teaching economics, sociology, or computer programming.

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