Web Browser Implements Unobtrusive Randomized Comparisons of Instruction In Health Informatics Classroom

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Background. The Hypertutorial Model for learning emphasizes five factors: presentation, learner control, practice, feedback, and elaborative learning resources. Much previous research (cited in Johnson & Grover, 1993) shows each factor, independently facilitates learning. Current Web browsers can implement the Hypertutorial Model particularly effectively, because not only can the presentation, practice, feedback and learner control features be easily implemented in HTML/JavaScript for large numbers of geographically dispersed users, but hyperlinks add additional learner control making elaborative learning resources instantly accessible. This communication demonstrates and briefly explain the workings of a browser-based hypertutorial instructional and research system named, *Essential Research Statistics for the Health and Behavioral Sciences*. The system delivers Web-based instruction and a methodology for implementing a true experimental design for instructional research in or out of the classroom. It automatically randomly assigns students to experimental and control instructional methods to evaluate effectiveness, as well as automating data collection and processing of performance data.

System. *Essential Research Statistics for the Health and Behavioral Sciences* is written primarily in HTML. It presents content, and provides learner control, practice, immediate feedback and elaborative learning resources (hypertext glossary links for substantive terms). HTML documents with embedded forms and JavaScript functions deliver the instruction, implement feedback, collect, score, and format data (including timing information), submitting it via email. Processing occurs at the client without CGI.

Evaluation. *Essential Research Statistics for the Health and Behavioral Sciences* has been used as the exclusive source of instructional content in the Web delivery of a graduate level Statistical Solutions in Health Informatics course. All five first-year health informatics students in the course voluntarily participated and were randomly assigned to two different browser-based instructional methods, switching methods lesson by lesson for 14 lessons. The composite means of the 14, 16-item, lesson evaluations for the Web-based instruction were very high overall (overall composite mean = 4.4 on a 5 point scale). Furthermore, all students' composite mean lesson evaluations rated the Web-based instruction which more closely followed the hypertutorial model superior to that of the more conventional text and graphics Web-based instruction.

Conclusions. *Essential Research Statistics for the Health and Behavioral Sciences* demonstrates that recent advances in Web-browser technologies make it possible for health science educators to distribute course instruction via the Web that concurrently administers true experimental research data collection, processing and storage. The present research demonstrates that such systems can be used in the classroom of an ongoing course to do comparative evaluations of instructional methodologies, by simultaneously conducting nonobtrusive comparisons of different instructional methods, while totally automating, instructional delivery, immediate feedback, scoring, data collection, storage and random assignment to treatments. Such evaluation results can then be used to accelerate the pace of instructional improvement inside or outside the classroom. Easy-to-use HTML and JavaScript technologies demonstrated in the lessons provide useful exemplary models and templates for further research and development.

References

1. Johnson, CW, Grover, PA. Hypertutor Therapy for Interactive Instruction. Educational Technology, 1993;33(1): 5-16.