

Internet-based Teaching and Learning: The Past and the Future

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This article has been prepared from notes taken during Shirley's keynote address and the slides used in her presentation.

Introduction

Three main issues: design, evaluation, dissemination.

The past: How technologies have evolved

(1) Teaching machines (1940s)

Claims: tireless examiners of students.

(2) Computer-aided (-based, -managed) learning

Claims: patient teachers; scrupulous examiners; tireless schedulers of instruction.

For students: freedom to follow their own path of learning; work at their own pace in their own time; richer materials; automatic measurement of progress.

“Personal computers will revolutionize society and will create powerful new opportunities for those who can handle them”. [Collis, *Social Vision 1979/80*, 1996]

(3) Interactive multimedia

Claims: facilitates immediate feedback to students; individualizes instruction; combines text, graphics and animation, provides “moving video segments, and dual sound tracks so that learning need not be dependent on language alone”. [Powell, J., *Fostering Multimedia in Higher Education*, 1990]

(4) Internet-based teaching

Claims: makes teaching and learning richer and more effective; expands time, place and pace of education; provides improved quality of interaction; is highly motivating for students and teachers. [Harosim, L., *Learning Networks*, 1995]

“The information superhighway will revolutionize society and will create powerful new opportunities for those who can handle it”. [Collis, *Social Vision 1996/97*, 1996]

In other words, the claims for each type of innovation are really the same. The more things change, the more they stay the same! It is the design of the learning experiences that are most important, not the technology.

So what do we want from these technologies?

Firstly there are learning issues: instant feedback; increased access to information; enhanced research skills; interactivity and communication; visualization and animations; enrichment materials. Then there are productivity issues: ease of editing and maintaining; distribution; cost savings.

The present: What has been learned

Studies of teaching effectiveness

Early work by Kulik and Kulik [1980, 1986, 1991] reported 0.25, 0.51, 0.3 of a standard deviation higher results of students using technology than those in a traditional classroom; but the 0.51 difference was reduced to 0.13 when the same enthusiastic instructor was used to teach all the face-to-face classes.

“While computer technology affords a number of important possibilities, none of them can be assumed to be automatically realized only because of the technology’s presence”.
[Salomon, G.]

Soon to be released is a CAUT Commissioned Study: “Evaluation of Information Technology Projects for University Learning: the CAUT Experience”.

Evaluation

“Aside from obvious research design problems, the main obstacle to multimedia and learning studies is that they are conducted without any benefit of why one would expect differences in the first place”. [Clark and Craig, 1992]

Kirkpatrick identifies four levels of evaluation: (1) reaction of participants; (2) changed attitudes to learning and improved knowledge; (3) change in behaviour; (4) increased production of materials, improved quality of results, etc. Of these, (1) and (2) are relatively easy to do. They can be done with students while they are doing the course. But (3) and (4) are much more difficult. They need longitudinal studies over several years, but without the learning materials/experiences changing during that time.

Dissemination of Innovations

It is a fact that most of the materials produced die with the original developer.

“There are many examples of what can be done, but these examples tended not to be adopted for classroom use by anyone other than the original developer”. [Geoghegan, 1996]

Everett Rogers identified five classes of user.

- (1) Innovators: 5–10% of the population who are keen to try out new things. Risk takers.
- (2) Early adopters: opinion leaders who take the role of decreasing uncertainty of others.
- (3) Early majority: want to know if it works before they will use it.
These three categories account for ~50% of the population. The other 50% comprises:
- (4) Late majority: Skeptical, adopt only under extreme pressure.
- (5) Laggards: not interested in change.

Attributes of a successful innovation: the relative advantage of the innovation over what it replaces or supplements (time, cost, effectiveness, etc.); the innovation’s compatibility with existing practices, values, needs, “culture”, etc.; the complexity of the innovation — how difficult it is to learn, to understand, and to use effectively.

Innovations: the innovation’s trialability, how easy or difficult it is to experiment with the new way of doing things before making an adoption decision; the visibility to other potential adopters of the results achieved by using the innovation.

Conclusion: Inventing the future

We must: disseminate what we do; cooperate in development and use careful design; and evaluation.