What's Wrong With Online Teaching Tools?

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Abstract

Pedagogy has traditionally been thought of as a one-way transfer of information from the instructor to the individual student. ELearning, and more specifically online teaching tools, have largely followed this bias: little support is given for group training, and little support to facilitate students learning from each other. Instructors generally lack facilities for assessing individual contribution to groups, or for providing feedback on group activity.

Introduction

Traditionally pedagogy has been thought of as a one-way transfer of information from the instructor to the individual student. Economy-of-scale and limited availability of expert instructors often force larger classes, nevertheless one-on-one instruction was usually considered ideal. The apprenticeship paradigm is a case in point: working on real or simulated projects under the guidance of a master craftsman, the student is expected to pick up skills and judgment.

Of course there are circumstances where a group needs to be trained together as a team. This often is because the roles of different team members are different: the only way to appreciate and to internalize the different roles may be to try at different times functioning in each different role. It may be that to train someone to function effectively in a particular role, such as team leader, requires intense experience working in that role, facing different scenarios and attempting different ways of addressing them. Allocating resources, making scheduling and synchronizing decisions, guaranteeing commitments, developing people skills and resolving dissention are examples of many skills that require practice in the role within a team. Often the interaction between team members is key to the success of a particular mission, or is key to team-building or maintenance of team spirit and cohesion.

Beyond situations where team instruction is essential, there is always the possibility that students might learn from each other, not just from the instructor. For any student in a group, even just listening to confusion other students have, or reading questions frequently asked by others could expose weaknesses in the student's own understanding. Moreover, in the 1930s and 1940s social theorists, philosophers and psychologists began to conjecture that learning always has a social aspect, so that learning in groups rather than individually might have merit even beyond necessity. After the May and Doob 1937 research showed groups pursuing shared goals could be more successful than individuals working independently on the same goals,

interest grew in *Cooperative Learning,* group activities within the classroom. *Collaborative Learning* is a related but more general concept in which the instructor plays a lesser role, indeed the group may learn together beyond the context of a single course.

Evolving expectations in learning objectives

The Bloom taxonomy describes an ordered set of learning objectives, which in the cognitive domain run from knowledge to evaluation. Just as Guttenberg's invention of the printing press reduced the need to memorize information which could instead be looked up in reference books, recent ability to access current information sources on the web from mobile devices anywhere further reduces the need for memorized knowledge and reduces the risk of obsolescence. Comprehension, analysis and synthesis have been less affected by this context, rebalancing the emphasis on what students need to learn and want to learn.

E-Learning

E-learning comprises all forms of electronically supported training and learning. It started in the 1960s with pioneering efforts such as the work by Stanford psychology professors Patrick Suppes and Richard Atkinson, or the work by University of Illinois electrical engineering professor Donald Bitzer. E-learning has today grown into a worldwide market estimated as $48 billion. A wide range of material is presented with E-learning, from tutorials on specific products such as Microsoft Project 2010, Adobe Premier CS4 or even Millipore Lab Water Solutions, through to introductions to broad subject areas, such as Math for 13 and up (COOLMATH), Physics problems and answers (CAPA), or Linear algebra (LYRYX). Most of these follow the traditional bias of being directed at a single learner.

From the beginning, most E-learning systems were networked rather than stand-alone, and discussion forums among students were supported. Today online learning software systems on the Internet are common. Nevertheless, although *Computer-based Collaborative Learning* is talked about, support for collaborative learning in the systems I have investigated goes little beyond those early text-based discussion forums, despite the advances over the past 50 years in relevant Computer Supported Collaborative work (CSCW) and in relevant multimedia.

There are on-line training tools that are specifically designed to support team-training. It appears that most of these are military, but as an example of one that is not, this week Georgian College's Owen Sound Ontario campus opened the Great Lakes International Marine Simulation and Research Centre with four ship bridge and engine room simulators and a full-mission ship simulator for training Great Lakes ship's crews. Simulators often play a major role in team training, with course design addressing the scenarios in which these simulators are used and what lessons they convey.

One of the attractions of online learning systems for course designers is that they can control the choice and sequencing of information to be presented to the learner. However this is at least as illusory as would be a similar claim by a textbook author: there is no guarantee the learner will go through all topics or in the intended sequence, and if the instructor succeeds in captivating the learner, the later will be motivated to explore many other sources. Similarly, an attraction of online learning systems is that they can facilitate communication, between the instructor and the learners, and between the members of groups of learners. Again, the closed world assumption is false, especially contrasting a discussion forum of typed messages with the rich enhancements of communication channels such as Microsoft Office Live Meeting, Communicator Web Access or Windows Live Messenger: synchronized audio-video, rich media presentations, handouts, shared documents, shared app sessions, automated reference lookup, etc. and record/playback capability to support subsequent review and critique.

For the instructor, online training systems also automate tedious housekeeping responsibilities: tracking student progress, presenting quizzes, homework and tests (perhaps even grading them), providing feedback and recording student assessment.

Practical operational considerations

Course designers may build custom software systems, but many choose to build on any of over 100 generic learning management systems, such as Blackboard or Moodle. Getting students to participate in collaborative learning, even just to type into text forums, is hard [Ellis 2001]. This has been my experience too. Nevertheless, once they try it, many are converted to collaborative learning as a way to get more value out of courses.

In team training or collaborative learning, evaluating students is hard. Was a product really a joint effort or were some students merely along for the ride, copying and cheating? How much was each student contributing? How can the instructor guide them to improve learning effectiveness? Debriefing calls for monitoring and insight into the process, not just the end result.

Relevance to Teaching Software Testing

Software testing is a team activity. Team training is appropriate. Given the diversity and richness of experience of students in AST's BBST courses, collaborative learning seems a highly desirable goal.

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