A “Low-Tech” Design Experiment Improving Student Work

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ABSTRACT

Following Collins’ work [1,2], a design experiment had graduate music students create an on-line journal of peer-reviewed articles to introduce them to the professional process. The students reported learning a great deal and the professor found that most produced work that greatly exceeded his expectations. Positive results were independent of previous computing or subject matter experience, and improvement was noted in all but the lowest performing student.

1: Design experiment

Collins [1] suggests that we “begin to develop a science of education” on an experimental, rather than ad hoc basis. This science is to be a “design science” rather than an analytic one, and to achieve it we must “determine how different designs of learning environments contribute to learning, cooperation, motivation, etc.” (p. 15). We can accomplish this through the careful planning and execution of design experiments, wherein the researchers solicit the active involvement of teachers who provide the courses. To this Brown [3] adds a holistic view of learning recognizing the many interwoven aspects in any learning situation that lead to “highly interdependent outcomes of a complex social and cognitive intervention” (pp. 166-7). This complexity strongly suggests that we are unlikely to hit upon a definitive experimental intervention on our first attempt, and that success will come with a series of refined experimental prototypes. This methodology is especially well adapted to the use of technology.

2: The Case Study

Many students find the transition from school to the working world difficult. I proposed a design experiment to a colleague to help bridge this gap, using a framework of Legitimate Peripheral Participation [4], in which the learner works as a novice professional (or apprentice) at the periphery of practice in their chosen field. Such a situated approach to learning builds on constructivism [5] and cognitive apprenticeship [6] but stresses the socially constructed nature of knowledge as situated in communities of individuals working at similar practices. Rather than “learning facts” the learner addresses the practices and skills of the community. This works particularly well in graduate school, where an on-line community of scholars is possible. Here we gave them a common goal: create an on-line journal of peer-reviewed papers by the end of term (rather than doing term papers for the teacher’s eyes only).

Qualitative methods of research have been shown effective in studying educational cases [7] and design experiments [2], and case study is particularly useful for exploratory studies [8,9]. Given the dearth of data from the student’s point of view [10], ethnographically-informed approaches [11] using participant-observation, field notes, and grounded theory [12] are useful. Gardner [13] has shown that students attend to and want to learn different things, and they often are not aware of their own learning strategies and goals. Observation and careful interviewing can help uncover them. Belmont [14] points out that Vygotsky’s Zone of Proximal Development is negotiated between learner and teacher, and may be most apparent to an observer.

Both classes studied met once per week for a three-hour seminar. Computer conferencing kept students in touch with the professor and each other between classes. My colleague taught the course, and I was free to study the class as a participant-observer, taking field notes during class sessions and on-line discussions; giving the students bi-weekly open-ended surveys; and triangulating this data with a 90-minute exit interview.

The first full experiment was conducted from September to December 1999 with a class of eight masters’ students in a class of music analysis. The course was very popular with the students, and the professor considered it a success as 7 of 8 students produced work that significantly exceeded his expectations for them. He attributed this to the greater number of drafts written in response to peer review. The students were satisfied that they had learned computing skills that they wanted; that they learned analysis as a career skill; and that they had a publication, albeit one in a journal of dubious importance in their own eyes.

The second experiment was conducted from September to December 2001, again with a class of eight masters’ students in music analysis. This time the professor found that all students exceeded his expectations, although by a narrower margin. These students had better computing skills, but were still happy to have improved them; to have learned analysis as a career skill; to have a publication; and to have improved the look of the journal.
Students formed communities in different ways. The first class split into two groups, but were more cohesive on-line, whereas the second class was more homogenous both in class and on-line. Both classes left the brunt of the technical work to one student: the first class to a former computer science student, the second to an interested computing novice. There were common factors in student success in both classes: the number of drafts, visibility of work on the web, peer pressure, personal interest, and publication.

A single study can only suggest the efficacy of a given intervention. The excellent results from the first study encouraged us to repeat it with minor modifications. The second study suggested that the efficacy of the student journal was independent of the individuals in the class. Personalities did enter into the efficiency with which the journal was run: the first class had two highly motivated and organized editors that kept the work on schedule, while the second class had less organized individuals.

3: What did we learn?

Strictly speaking we found that these two classes did well producing a student journal, and may have produced better work than in doing a normal term paper. Acknowledging that qualitative data is suggestive rather than definitive, the data from these studies suggests that students value their learning and produce very good work with a peer-reviewed web journal. This finding holds across different levels of previous computer experience, differing levels of analysis study, interest, and career goal. The only student in either class who did not flourish had extreme difficulty in passing the course, and the professor felt that no intervention would have helped this situation.

All students in both classes reported that a very important aid to their learning was the perspectives that other students had on the subject matter and their methodologies in doing their coursework. Even when the same advice was given by the professor, students gave it more credibility, and acted on it more often when it came from other students. This applied to subject matter learning as well as ad hoc computer tips and other operational concerns. Another vital factor was the students’ own interest in developing a web journal. Over half of the students put in extraordinary amounts of time on their journal, and their reported levels of absorption and feelings of empowerment are strongly reminiscent of Csikszentmihalyi’s concept of “flow.”

I find the success of a relatively “low-tech” intervention gratifying; keeping the students central and using technology as a tool seems to have produced better results than we had dared hope for. This design experiment does need further refinement and extension into areas other than music analysis, and indeed outside of the humanities. Our data suggests that students considered this journal a stepping stone into the “real world” of work after university, and while such a project is not authentic to every discipline it surely must apply to many more than music.

REFERENCES