

Question banks may be provided or purchased, as in the case with software that accompanies

Figure 1 Responses To complete online assignments I had to read the textbook and lecture notes regularly

Figure Responses Online assignments helped me to learn the course material better

How can we replicate online what we have observed with paper assignments in our workshops? We support discussion among students for the purpose of learning

Students use an online monitored discussion board, which accompanies each problem, to communicate mathematical questions and ideas among themselves. The fact that a large number of students became involved in these discussions came as a surprise to the authors.

How can we avoid cheating?

We tried to educate students about the ethical side of cheating and the fact that cheating on homework assignments, or on any other required course work, jeopardises their own learning experience. On the practical side, online technology allows for parametrically generated questions, as mentioned in Section 3, and thus eliminates simple copying of somebody else's answers.

It is our opinion that question banks are a limited resource. However, existing question banks do provide a platform to get started with the creation

system via a code provided with the textbook, register, enroll in the subject and do all required work. Codes slightly increased the price of the textbook packages. There was the possibility of purchasing codes separately for CAN in case a student bought a used textbook.

The described approach was extremely convenient for SFU instructors and incurred no extra cost for the Department of Mathematics. The onus of the work was on the students. However, soon it became clear that teaching and learning became disconnected. The instructors' choice of questions was limited by the medium, with no questions of the types *prove*, *graph*, or *give an example*. The students' answers were constrained by the medium, which did not provide any experience with writing down answers as they would in an exam. At the end of this first trial in the autumn semester of 2003, students were surveyed about their experiences with online assignments and paper assignments for understanding, quality and enjoyment. The 40 responses are summarised in Table 2.

Table 2. Summary of Student Survey after Trial of Online Learning System

	Online assignments better	Same	Paper assignments better
Understanding the material	6	34	5
Quality of your work	3	21	58
Enjoyment of the subject	22	33	45

Although the survey results indicated a clear preference for paper assignments, conversations with individual students encouraged us to continue with our online assignment trials. The next step was

statement, demonstrate their problem-solving skills, graph a function or give an example or a counterexample for a particular mathematical phenomenon. The main role of online assignments is to provide students, instructors and academic institutions with a useful, efficient and low-cost assessment and tutoring tool. The two biggest challenges for an instructor creating and managing online assignments is that both tasks are time-intensive. By sharing online questions, teaching no longer remains a solitary activity and individual instructors can save time. This paper has addressed these and other challenges, but also described many benefits of this pedagogy. The most important benefits of online assignments include that students receive immediate feedback and build a learning community. Further, online assignments allow the construction of creative questions, this can contribute to the instructor's self-enrichment. Online assignments engage each student in the class with the content and allow the instructor to easily follow students' development. This paper provides some guidance to instructors willing to try out online assignments.

We aim for holistic teaching and learning rather than linear instruction. Our goal is to avoid the confusion students feel when an instructor moves from one topic (i.e., textbook section) to another without connecting these topics. We would like to encourage instructors to develop online problems that combine a variety of topics, thus ensuring ongoing learning and a continuous

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