Using an Internet based quiz system as a supplementary aid in teaching statistics

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1. Introduction

QuizComposer© is a free Internet-based system for creation and use of quizzes and questionnaires and can be used for example in teaching and education. The system consists of a collection of programs that run on an Internet-server. The system allows you to edit and save a quiz or questionnaire to be answered by one or more persons, who are registered to participate. This paper describes the system and gives examples of how it has been applied in teaching statistics at the Technical University of Denmark.

2. The QuizComposer system

The introduction given here is concerned with quizzes only, although questionnaires may be arranged in a similar way. In order to create a quiz you need a username and a password that is obtainable from the administrator of the specific quiz-server you wish to use or you can install QuizComposer on your own server. Your quiz is created as an HTML-page that is placed on the server so any user of the Internet with a browser can access the quiz and answer the questions. This is done by typing in answers in text-boxes or clicking on answer options that may be presented with the questions. When the person answering the quiz clicks a button, the answers are sent to the quiz-server and immediately compared to the correct answers and the results shown to this person. Quizzes can be created in any language that can be written with your keyboard. For languages other than English, you simply type in the words to be presented to the person answering the quiz in the relevant language. The system is structured such that it can be adapted for other languages.

There are three kinds of quizzes: multiple-choice quizzes, learning quizzes and test quizzes. A multiple-choice quiz is answered (mainly) by clicking one or more buttons in each question (you may also define questions to be answered with arbitrary text). Multiple-choice quizzes can de defined answerable by anybody, with or without registration of results, or answerable for a predefined group only. Multiple-choice quizzes are very similar to questionnaires.

A learning quiz allows the quiz answerer to try to repeat the answer, including taking one question at a time. Only the answerer can see the answers in a learning quiz. The answers can be linked with any number of hints. There can be new hints for each attempted answer in a quiz. A test quiz can only be answered by registered competitors and each participant can (in general) only answer it once. Any question can be weighted for marks given. Quizzes are evaluated immediately and if you wish, can be presented to the competitor as a percentage mark of correct answers completed in the test quiz. If you are the quiz writer, you will receive an overview of the results of a completed quiz.

3. Using QuizComposer in teaching statistics

The QuizComposer system has been used in a variety of different courses at the Technical University of Denmark. This section describes the use of the system in teaching statistics. The statistics course covers an introduction to statistics (EDA, distributions, hypothesis testing, regression, ANOVA and non-parametric methods) and the duration is one semester. It consist of 14 weeks with lectures (2 hours pr. week) exercises (2 hours pr. week with TA) and voluntary home work exercises. The final exam is a 4 hour multiple choice type of exam with aids (computer, textbooks etc). Usually there are between 150 and 250 students that follow the course of which 70% passes the final exam.

In the statistics course QuizComposer is used as a supplement to the course material. A set of leaning quizzes are available as a supplement to the regular homework and exercises from the textbook. The learning quizzes are formulated in a similar way as the final exam so that the students know what is required by them. The students may try to solve the test quiz as many times as they like.

A test quiz is given every week for the last 8 weeks of the course. The students are given a password and user id to access the quiz and are only allowed to take the test quiz once. Each test quiz is only available for one week at the time and it is voluntary for the students if they want to take the quiz. If they chose to do so they will receive a detailed solution to the quiz question by email. The answers they give on the test quizzes do not count in the final grade for the course. Along with the statistical questions given in a test quiz, a few questions regarding the students view on the course (quality, difficulties, etc.) are also given.

4.   Conclusion: Experience from using QuizComposer in teaching statistics

Due to the number of course participants and the relatively short duration of a course, it may be difficult for the instructor to recognize what the students do not appreciate about the course structure and what are the conceptual difficulties. QuizComposer may be a means to improve on this important issue. By using QuizComposer (e.g. by giving a new test quiz every week) feedback and response from the students is relatively fast. The response rate on the test quizzes has been about 60% and the test results easily accessible in a spread sheet. By analysing the answers given it may provide insight into the level (in terms of how many are able to answer the questions correctly and which topics that are especially difficult to answer questions on) as well about their opinion about the way the course is taught. A concrete example from one of the first times the test quiz was evaluated in the statistics course was that the students found some of the textbook exercises too easy since they always related to the theory just described. Thus it was difficult to decide what statistical tool to use in solving a problem when it did not precede a specific chapter. Getting this information quickly made it possible to make additional and more challenging exercises available.

So far the students taking the statistics course have expressed their satisfaction with the new possibilities in teaching that the QuizComposer system has to offer. From the students point of view the system may be a supplementary aid in learning that offers some new and interesting aspects, e.g. that the correct answer (the student performance) will be given immediately. Thus, the student becomes aware of his/her level and specifically on what need to be improved. Furthermore, by only giving out the solution on the test quiz to those students who actually takes is a motivation for participating more actively from the beginning of the course work instead of postponing the studying until the end of the semester.

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RÉSUMÉ

This paper describes an Internet based quiz system (QuizComposer) that has been used a supplementary aid in teaching a statistics course. The quiz system is free and easy to use. It offers the possibility to generate quizzes as well as questionnaires that can be answered via the internet. The main advantage using the system is that it offers a very quick feedback to the teacher especially when teaching large classes of students, and thus the possibility to tailor the structure of the course to optimize the learning outcome. From the student's point of view, the QuizComposer system is an additional source for learning, in addition to text book and computer software, where their knowledge is tested and evaluated online.