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## Mathematics Quizzes

At Macquarie University the Mathematics Department has been developing<sup>1</sup> a web-based system for producing quizzes which allow students to test their knowledge of mathematical ideas required in the courses that we teach. Currently these quizzes are used mainly at the most elementary level, for revision of the basic skills which the students should have acquired from mathematics courses at high school.

### □ Examples

- **Basic Math Skills:** MATH130, examples
- **Discrete Math Quizzes, with answers:** MATH237

<sup>1</sup>This project has received funding via a 'Targeted Flagship Grant' from the Center for Flexible Learning, Macquarie University, and the Division of Information and Communication Sciences, Macquarie University as well as an equipment grant from Apple Computer, Australia Pty Ltd, via the Apple Universities Consortium.

## Training not Testing

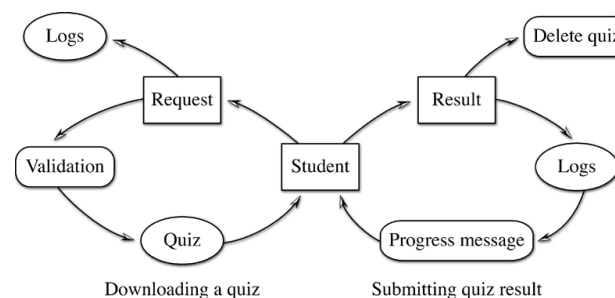
The aim of the quizzes is not so much for assessment as for self-testing and practice of material covered previously in lectures or back at school. Why use quizzes?

For various practical reasons, related to the students ...

- **wide range in ability and mathematical background;**
- **not their main area of study, so need to identify holes in their mathematical knowledge;**
- **several years since last studied any mathematics;**
- **maybe only a refresher course may be needed;**
- **insufficient staff to help every student.**

The quizzes can be used by students to **identify for themselves** where they are weak and may need to seek the extra help that *can* be provided.

## Student Interaction



- When a student requests a quiz, the identity is first validated; if authorized, a quiz is sent to the student's browser. A record is kept of all request details.
- After completing the quiz, submitted results are recorded in the student's log and in the overall quiz log. A personalized message concerning the student's progress is returned as FDF data. This appears in a form field at the end of the PDF quiz document.

## Each Quiz can be Different

An element of randomness can be used in the generation of a quiz document.

- A student may attempt the 'same' quiz many times; each will be slightly different.
- This is used to alter numerical aspects for each quiz instance.
- One way uses the *Mathematica*<sup>2</sup> software [11] to generate the exact contents of each question and its worked solution.
- Randomness applies to order of answer choices.
- Repeat the same quiz as many times as necessary, to achieve a 100% score.
- Students cannot 'cheat' by presuming, for example, that the correct answer to question 5 will always be 'b'.

<sup>2</sup>*Mathematica* is a trademark of Wolfram Research Limited.[11]

## Evaluating Student Progress

Student log-file pages are also accessible from the staff/instructor [interface page](#).

This page allows access to:

- **log-files for the available quizzes;**
- **log-files for individual students;**
- **statistical information for a whole class of students;**
- **as formatted HTML tables or raw text form.**

## Quiz Management

All management aspects of the MacQIEX quiz system are handled from the staff/instructor [interface page](#).

This page provides access to allow the following tasks:

- **design a new Quiz**
- **edit/modify an existing Quiz**
- **recover already used Quiz instances**
- **view student log-files**
- **make a login page for student access**
- **general house-keeping duties**

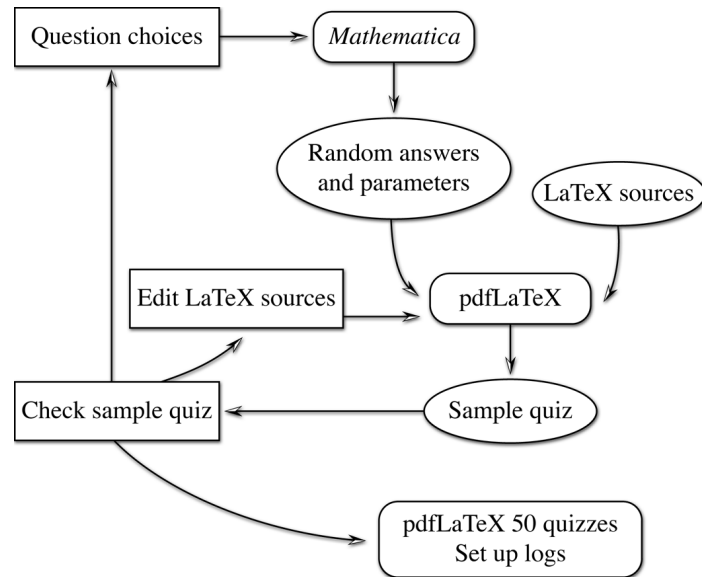
## Designing a Quiz

Also accessible from the staff/instructor [interface page](#) is the interface for creating new quizzes.

- **choose up to 12 questions for a quiz;**
- **from 14 areas of basic mathematics;**
- **up to 6 types of question in each area;**
- **use pop-ups and text-fields to make choices;**
- **can choose all questions from the same area;**

This is only the first step in the process of creating quiz instances to be available for student use. All the files resulting from these choices may be edited.

## Flowchart for Quiz Design



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## Other Features

To facilitate managing the quiz system other available options are:

- **recreate an old quiz instance from its numerical identifier;** instructor may recover the exact questions that confronted a student who is seeking further help.
- **existing quizzes may be edited for:** titles, instructions, page-layout, fix errors, change order of questions or answers, etc.
- **automatically designs a student log-in page;**
- **reset log-files and counters, to reuse the same quiz;**
- **archive or remove old log-files;**
- **remove unwanted archives.**

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