MESSing with Mathlets: requirements for interactive teaching software

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Abstract

This poster specifies the requirements for applets that will enable a positive, kinaesthetic, learning experience that will also engage the user with a sudoku-like appeal. The research is based on applets for teaching specific tertiary-level mathematics topics but the principles would apply to other disciplines. Underwood et al identified a set of 21 design principles for mathematics applets (mathlets) used to present an interactive problem-of-the-week (Underwood et al., 2005). A group of tertiary, discrete mathematics students were exposed to some different mathlets and asked for comments. A Mathlet Evaluation and Scoring System (MESS) was created from the Underwood criteria by adding weightings and a rating for each criteria.

1 Introduction

There are many maths applets (mathlets) available to supplement the teaching of maths. At the tertiary-level it seems that most are of the demonstration type e.g.("MathinSite: Applets and associated Worksheets", 2007). This research seeks to identify the requirements for mathlets that will primarily engage the learner, are kinaesthetic and interactive.

2 The Underwood Criteria

The Underwood criteria were developed from observations of students working on Educational Software Components Of Tomorrow (Escot) Problem-of-the-Week.

If a mathlet is to be used primarily for student learning it needs to meet most of the design criteria and intended effects identified by Underwood et al. across each of their three categories:

- motivation – the student should get "hooked" on solving the problem
- presentation – it is easy to get started
- support for problem solving – it makes the student think mathematically and not just try and trash.

This research used the Underwood design criteria as a starting point for evaluating mathlets.

3 Development of MESS

A questionnaire was compiled that asked about aspects, raised by the Underwood criteria, which were considered relevant for this type of mathlet e.g. early reward, easy to get started etc. Other questions considered its effectiveness as a learning tool and one asked for suggestions on how it could be improved. A group of tertiary-level, discrete maths students provided comments on four of the mathlets associated with the Ensley & Crawley text (Ensley et al., 2006).

3.1 Student Comments

Student comments indicated a need for an applet that:

- had different levels
- provided a "show answer" option
- made you think
- was fun
- provided encouragement/feedback
- provided help
- was easy to use

3.2 MESS

An evaluation system was created by adding a rating (0 no support, 1 some support, 2 well supported) to each principle. Six of the principles were considered particularly important for kinaesthetic learning and were given a weighting of 2. A score for each principle (weighting x rating) can be calculated and a total score obtained for the mathlet. MESS can be used to evaluate a mathlet. MESS also provides a list of requirements to be considered in the development of a mathlet.

4 References

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