

[P20] Using the technology – integrating the learning experiences

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INTRODUCTION

During the 1990's a number of important new teaching and learning resources were developed with funding from the Higher Education Funding Councils. Within the sciences some of these still survive, notably CVC (1), Mathwise (2), FLAP (3) and SToMP (4) projects, and the latter two are still evolving. The subject of this paper is the SToMP project, and some of its recent developments.

The SToMP project was awarded three years funding in 1992 to develop two modules (Waves & Vibrations and Measurement & Uncertainty). Further funding was awarded in 1995 in order to maintain the existing product and to support the organisation of further development work. In 1998 a further round of development funding was awarded for a module in Mechanics. Since 1995 a new module in Optics has been developed from contributed work and from monies taken in sales. Another module in Astronomy has been drafted, but only a few units have been prepared.

The original product presented a wide range of document types to the user by means of a document management system called Microcosm. This had its own viewers for standard document types, and a well defined system interface so that interactive applications prepared using different development systems and languages could be integrated seamlessly into the modules. The SToMP materials themselves have recently (2005) been

republished in their original formats but with a new presentation system to replace Microcosm.

STOMP VERSION 5

The new version of SToMP uses a completely new presentation system that runs over the internet. It operates in a similar manner to the World Wide Web, but uses its own document viewers that are designed specifically for this type of learning environment. One of the features of the original SToMP system that is maintained in this version is the ability to display several documents at once. Windows are kept simple, with the minimum of wasted area, allowing users to manipulate their environment to be able to use whatever combinations of documents they need.

The original aims of logically grouping together appropriate instructional scripts, interactive simulations and animations, other documents of various media types, problems and tests has been maintained. These groupings are achieved as before by use of button links (for those which the author wanted grouped), by keyword searching (providing topic groups) and by associative links. The result is a system that can be used in a variety of different ways, with documents of different purposes available for each topic covered.

Whilst maintaining the philosophy of the original system, there have been a large number of minor improvements incorporated

into the new system, as well as a few larger changes. One of the more important developments is a new testing system for the self tests and assessed tests that form an integral part of each module.

ASSESSMENT SYSTEM

The new assessment system offers compatibility with other commercial and academic testing systems for conventional questions (via IMS QTI compliance (5)). It also provides the numeric functionality of the original SToMP testing system together with some enhancements. These include number bases other than decimal, the checking of values for order of magnitude errors, and the use of incorrect student responses to create alternative answers for later parts of multi-part questions.

The new system can be used in a stand-alone mode without SToMP, and has been used in this way for a number of years within the author's department for a substantial part of the coursework of one first and one second year course. Questionnaires have been used to find student attitudes and opinions about what aspects are better than or worse than setting the equivalent coursework on paper. Results of these questionnaires have led to improved functionality of the system and ways in which questions are asked (6).

One such improvement concerns the propagation of errors through multi part questions. This allows a student's incorrect answer in an early part of a question to be used to create alternative answers to a later part. An example is a question where the standard deviation of a set of data points was to be calculated. The question was split into eight parts (sum, mean, square of the mean, sum of squares, etc.). If the sum value is entered incorrectly, it is used to calculate an alternative mean value. If the student obtained this new value for the mean, then they did not lose marks for the second part of the question, only for the first part. There were seven

additional answers in this eight-part question, and several students gained marks from this, and were thus marked more nearly as if hand marking had been employed.

CONCLUSIONS

SToMP provides an environment in which learning can take place, and therefore can honestly be described as a learning environment. It is possibly as appropriate for use in the sciences as some of the so called virtual learning environments, but at the moment it lacks content for more than just part of a first year course in Physics (Waves & Vibrations, Optics, Mechanics and Measurement & Uncertainty). As the functionality is developed to make it even more like a VLE, the project needs to be joined by users and developers to become a community owned resource for the benefit of Physics. The Physical Sciences Subject Centre has contributed to this aim by purchasing free access for all UK HE until summer 2006.

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