Overview of a Draft Proposal for a Ph.D.
THE EFFECT OF WEB-BASED ATOMISED E-LEARNING ON ACHIEVEMENT
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Introduction

(Please go to this web page (using any browser other than Internet Explorer) to see how this introduction might look if it were an atom.)

The standard model of giving out a piece of coursework in September and expecting the students to return it in May does not work. Common sense says that the students will only start the work once they feel confident they can complete it – and for the best students that will only be a few weeks before the hand-in date. Those less diligent either do badly, fail or do not submit at all.

A better system for the coursework is to break it down so that the students have something to show on a regular basis. This has three advantages; first, the work gets completed. Second, the progress of individuals can be monitored more closely and finally, early successes to lead to increased motivation.

This proposal takes this idea one stage further. Here the students would be presented with (and assessed on) one item of learning at a time (an atom of learning). An atom has the following five characteristics:-

1. An atom is a discrete unit of learning.
2. An atom does not have a level since the same atom may be used for qualifications at different levels.
3. If an atom relies on prerequisite knowledge then these should be in separate atoms.
4. Once completed, an atom stays owned for life.
5. An atom should, as far as is practical, be presented in a learning style and ability independent format.

It is then be possible to map atoms to qualifications - and there will be overlaps. For example, an atom on calculating a mean would be appropriate for GCSE mathematics, A'Level Biology and maybe a university course. The atom is neutral to the level. It is the context into which the atom is put that gives it a level.

The fifth point in the list above, learning style and disability independence, is important in several ways. All of us who teach hope to present the materials in the most understandable format, but in reality we do so in the way we work best. Our students come from other educational experiences have other abilities/disabilities. The students may become confused through no fault of ours or theirs. Atoms should be presented in several ways, as

text, videos or MP3s, for example then the student is not bound to follow our way. The site should allow the font size and background colour to be altered to help those with sight or dyslexia difficulties. If lots of people produce lots of atoms then the student would have the opportunity to use an atom which explains the topic in their preferred way. This would be open learning.

A further distinction to be made is that the physical implementation of an atom is called an aPage (an abbreviation of atomic page). Whilst this could be on paper, a web page would be more appropriate since it would allow hyperlinking to the various learning media. The intention is to have two inter-linked websites; one to allow people to create and consume atoms and the other to handle the administrative side. This would make separating the two functions easier and more logical. These sites are www.o-vl.com (O-VL) and www.edulevel.com respectively.

O-VL (short for Open Virtual Learning) will allow anyone to create aPages which will add a breadth of learning experience for all. Apart from the links to text, video and MP3, an aPage would also have a self-assessment quiz and allow coursework to be submitted for the material covered, thus linking process and product for the student.

The students on an atomised curriculum will need monitoring and this is where their lecturers or teachers will use EduLevel. This site will allow staff to set up a course, mark submitted atoms and monitor the progress of their students from their own on-line virtual office. The students will also have a virtual office in which they can monitor their progress and set goals. Verifiers and inspectors will also have virtual offices in which they can view student work and feedback.

EduLevel will also contain a virtual Common Room to which everyone would have access. Here summary statistics will appear, but only if there is a sufficient quantity of data that ensures no individual or individual institution can be identified.

Whilst both sites will share a common database, the educational and administrative functions will be separated.

This system will mean that students can progress at a pace with which they are comfortable. Student progress would not be tied to a scheme of work, but to their level of motivation and monitoring. An increased speed of feedback and the small nature of the tasks involved could be expected to increase achievement.

Portions of this have been trialled and the results for these were positive. Now it would be nice to provide the academic justification for atomisation.

Literature Review

e-Learning is still in its infancy. Whilst its origins are disputed (Özgün et al., 2013)(Zwiauer, 2003)(Nicholson, 2007) it is fair to say that they go back to near the start of digital computing. A "newcomer" to the arena is m-Learning (mobile learning) which claims its origins in the pre-digital era with things such as Lingaphone on cassettes (Wikipedia, 2013). However, for the purposes of this study, only the current digital media such as mobile telephones, MP3 players, etc. will be considered. The computing and mobile technologies will be aggregated as if they are one since the websites will work on both, giving me-Learning.

me-Learning has two components; the hardware (plus the operating system) and the software (the websites). The hardware is currently dominated by computers but mobile devices are starting to eat into this market with their share going up by nearly 50% in the past year (W3C, 2013)(Meeker, 2012, slide 10). The largest growth rate for Internet usage since 2000 is in Africa (3,607%) and the Middle East (2,640%) with Europe logging 393% (Internet World Stats, 2013). The future take up of the Internet looks healthy and with that, me-Learning can be expected to grow too.

However, there is little agreement on a standard for me-Learning materials. The larger VLEs (such as WebCT, Moodle and the late Bodington) use SCORM (Rustici Software, 2013). Other systems, such as those developed by the University of Cambridge, the University of Nottingham and London Metropolitan University use the standard set by IEEE (Hodgins and et al, 2002) for reusable learning objects (Cook et al., 2006). The latest initiative in Higher Education, the MOOCs, will presumably each have their own closed standards. However, this top-down approach to content creation does not reflect the spread of knowledge. Two relevant examples of potential alternative content sources might be occupational specialists and those with an academic background who are also fluent in another language. Education should have room for all of this material.

Another facet of this top-down approach is the assumption that academics produce materials. This ignores the learning style preferences of students. Some work has been done on matching learning styles to preferred learning environments (Peter et al., 2008-11-17). However, this approach has two problems; first the computer is adapting the materials presented rather than allowing the user to choose and second the materials are still presented in a particular way which may not match the student preference for that type of material.

There appears to have been little, if any, research on the way content is presented in a VLE, let alone tying this to learning styles. An objective would be to create a system which was as learning style independent as possible. In other words, the student would choose the route, the speed of working, the style of materials presented (text, sound or visual) and be able to submit work all where the materials are presented (Wicks, 2011).