

Creating a Web Based Learning Environment

In this assignment I aim to document the planning, preparation and production of a web based learning environment (WBLE). I will evaluate the final product and look at the ways that both the process and the end product could be improved.

Background:

When tasked with a project to design a WBLE I wanted to choose something that would be challenging and useful. As an ICT teacher much of my time is spent teaching face to face practical lessons often teaching by modelling or using a mixture of behaviourist and constructivist tasks. These practical tasks are where I am in my comfort zone. One of the areas I find most challenging to teach is year 13 A-level Computing theory lessons. The topics are often complex to convey and don't always lend themselves to computer based activities. I decided that this would be both a challenge and an opportunity. I specifically chose one topic, database normalisation. This is a substantial topic that is complex but that I also have a comfortable understanding of. I hoped to produce materials that would be able to help me in the classroom and the students at home.

I will discuss the design rationale and process in more detail later on but there were a couple of early decisions important to note. A WBLE is a rather broad term. It describes a form of online learning that is built with specific pedagogies in mind. It could be achieved using a range of online technologies (Mioduser, 1999). I have built a number of websites in the past and am generally comfortable doing so. I also had experience building a pilot Virtual

Learning Environment (VLE) that I had been using for a year with my classes including the one I wished to produce the resources for. Building a website or new VLE didn't appeal to me and didn't fulfil my personal aims of creating something that would be a challenge, useful and reusable. I decided to build a WBLE in the form of an online learning object (or a single package containing a number of learning objects) that could be imported into a VLE.

The Learners:

As previously mentioned the learners are year 13 computing students. The class being used to test the WBLE has seven pupils aged 17 to 18 all male. Though the abilities of the students are mixed all have chosen to take Computing A-level and all have done sufficiently well to progress to the second year of the course. Due to the nature of the course, students in general are highly computer literate. The experiences and preferred learning styles of the class do differ between pupils. For example during theory lessons some pupils make notes on paper while others prefer to do so on computer. With written homework some students hand in work online while others only do so when they have to. I did not expect that all students would want to learn exclusively online and this was factored in during the design process. All students had previous experience of using the school VLE. One aim of the WBLE was for it to be a reusable resource to be used again in the future. In my school the class the WBLE was designed for is representative of a typical computing class in size, makeup and abilities with the only shortcoming being the lack of female students in the class. This as will be

discussed later would not have made a difference to the pedagogical or design choices.

The Content:

The topic of databases is taught as part of Module 5 of the “AQA A-level Computing Specification”. (AQA, 2008) There are many subsections of this topic. As a whole topic it takes approximately 8 hours of teaching time in the classroom. Database normalisation is one of about ten topics that students must learn.

The process of normalisation builds onto previously learnt skills such as redundancy and relational databases. Students’ knowledge in this topic is assessed by external examination. Past questions are available from past exam papers and going through these papers and practicing questions is an important part of the course in all topics.

Pedagogic Rationale

Normally I teach this topic over two lessons using as resources; textbooks, computer slides from the teacher and practice questions. At the end of the lessons students should be able to understand the topic, know various definitions and be able to answer examination questions in the topic. In the first lesson we may go through the textbook looking at the notes, definitions and examples; with students making notes as we go along. In the second lesson I review the topics using a presentation and go through another example. Students complete practice exam questions both during lessons and for homework and I go over the answers to the questions in class. I may

introduce other activities such as students explaining exam questions or students creating revision materials but the process described above is typical of my standard theory lessons. Breaking down the methods used in a standard lesson I would describe the strategies used as fitting into a mixture of behaviourist and cognitive theories of learning (Conole, 2004)

My aim in creating a WBLE for this topic was initially to create a resource to make the topic more engaging and understandable for students. In some ways having an ICT based resource does this automatically as students are generally enthusiastic towards computer based activities (Kirkwood, 2005). Although I didn't want to create a resource that would replicate my teaching style in the lesson I needed something that would teach students the theory, definitions, examples and practice questions. Some of the advantages of learning using ICT and the internet are the opportunities for learners to learn using tools or methods to promote constructivist or socio-cultural theories of learning (Pinkett, 2000, Papert, 1993). I wished to take as many opportunities as possible to use as many different ways of learning but I could not think of sensible ways to incorporate these theories. Building a socio-cultural learning environment would certainly have been possible using tools like discussion forums or chat rooms but my experience with the class using similar online tools had yielded mixed results with two or three out of the seven students not participating well. In any case my particular group of seven students who already spend almost five hours a week in a classroom together was not an ideal group because of their small size (Tung, 2006). I decided not to pursue this road. I also did not feel that this was a problem as my WBLE wouldn't prevent teachers from adding on extra socio-cultural activities should they

wish for their particular group of students. A behaviourist approach seemed the most appropriate for the task and the students. Concentrating on one learning theory does not mean using one learning method and only catering to one type of learner (Rayner, 1997). I certainly wanted my WBLE to have a range of activities and methodologies for learning. Gardner's multiple intelligences (Brualdi, 1996) are often simplified into three or four preferred learning styles lists the main being visual, auditory and kinaesthetic (Drago, 2004). For the style of topic planned I roughly mapped these out as; Visual, reading notes and looking at diagrams; Auditory, hearing explanations; and Kinaesthetic taking part in online activities or doing practice questions. To cover all three styles I would have notes, illustrations, examples, online quizzes and practice exam questions with the possibility of having sound music or video and links to other resources. The notes, illustrations and examples would cover the visual learners and would contain the main theory that students need to understand. The online quizzes would cater partly to kinaesthetic learners and provide student self assessment opportunities. Practice exam questions allow all students to practice their theory partly covering the kinaesthetic learners. Doing practice exam questions is an integral part of the course as the topic is examined. Music or sound would cater for the auditory learners with video additionally covering visual learners. I wasn't optimistic that I would use sound and video, mostly for technical reasons but I didn't want to discount them so early. Finally links to other resources could allow students to extend their learning beyond the notes, or just to revise their understanding using extra resources from elsewhere on the internet. This gave me a list of tools to start my planning.

Having an online resource for this topic brings two additional pedagogic benefits that influenced my decisions. First of all the resource could be accessed from anywhere. This means it could be used in lessons but it could equally be used for homework or for personal revision for exams at home. At my school 95% of students have internet access (Barham, 2007). In the particular class that the WBLE is designed for it is 100%. Out of hours learning is a great attraction for schools that are gradually embracing more online content as well as VLEs (Selwyn, 1999)

The second benefit is that students can work at their own pace through resources. In the UK one of the Government's buzzwords is personalisation of learning (Miliband, 2006). This is a vague phrase with a variety of definitions. One of the definitions is students working through activities, assignments and exercises at their own pace (Miliband, 2006). This means they can properly take time to review and understand all the materials. It also means students can learn independently which, is a skill in itself. From the teachers perspective in class it means time can be spent addressing individual problems that students may have as and when they arise. On the negative side of things with complicated subject matter there may be many students who have problems at the same time but cannot be helped together as they are all on different places. To get the best of both worlds I decided that although the primary aim was to allow students to work on the WBLE independently it should be usable for a teacher in a more structured and rigid format to use in front of a class when needed.

Design Rationale

One of the challenges I set myself was to create a WBLE as a learning object that would be portable and reusable across VLEs. A way of doing this is by packaging resources as an IMS content package or Scorm object (ADL, 2008). These are standards that define how material is saved and packaged so any Scorm compliant VLE could open it up. In order to create a Scorm package I needed something to help me package it up and preferably something that contained a variety of features to help me add functionality and interactivity to my WBLE. To do this I tried three tools for creating content. First was myudutu.com this is a free web based tool that I had registered for previously but never tried. It had a variety of examples and tutorials as well as an online community to support authors. It included various functions including templates, a PowerPoint import tool, navigation, quiz tools and a library of building blocks that make up the resources. The next was Exe a free downloadable course creator. Exe lets you create courses including various types of media and a range of quizzes. I also planned to try Course Genie (now called "Wimba Create") a plugin for the Microsoft Office which is provided by Leeds University. It similarly allows creation of rich content courses. Unfortunately because of security restrictions on my work laptop I was unable to install it. In the end I chose to use Myudutu, it produced more aesthetically pleasing results than Exe, it organised pages better and the PowerPoint importer meant I could incorporate existing resources. Being web based it meant my resources could be created and easily tested online.

Although as mentioned earlier I had ideas of what I wanted in the WBLE my next step was to create two scenarios to start the design process (Carroll, 1999).

I created two scenarios for fictional students, Peter and Jane. One was a user in school and one was a user at home. Both scenarios show fairly independent students who pick and choose what sections of the WBLE they want to use and when. This highlighted the need for effective navigation for the WBLE and a non-linear navigation system. To have a system with a mix of flexibility but also optional paths I decided on a Tree structured navigation system allowing students to choose which branch they wanted to start with. Myudutu also gives the option of showing an index to all pages. This was enabled to allow students to jump to a required page immediately and choose their own path through the resources.

The scenarios highlighted two other key areas to plan for. Practice exam questions and definitions. Practicing exam questions is an important aspect of our exam preparation. It can be time consuming for students and teachers to go through pages of past papers to find appropriate questions to revise a particular topic. Having easy to access questions and worked solutions would add a lot of value to the WBLE. Both scenarios had students looking for definitions of keywords and terms. This again is something students need to know for examinations. In the scenario the student using the WBLE at school noted down keywords on paper, the other student used them to answer exam questions on computer. These definitions must be accessible easily for students. How students may use exam questions and definitions depends on their preferred method of learning but various options were built into the

design plan including the option of adding places for students to write answers or notes online.

My next step in the design process was to become familiar with the design environment. I created my empty course and started adding various pages to it purely to test the features out. I created examples of navigation pages, drag and drop quiz pages and tried importing a PowerPoint presentation. Through doing this I discovered other options that were available, such as adding narration, video and case studies. After this experimentation I started planning. I decided what I needed in the WBLE, how it would be split up, and what the actual content would be. Despite a degree in software engineering I am still very much a back of the envelope planner especially when I am working alone. Producing extra documentation is not a task I enjoy.

Nevertheless the back of my envelope was getting rather full. I planned first how the theory section could be broken up into topics. First normal form, second normal form, third normal form and boyce-codd normal form. Looking at the PowerPoint presentation I normally use to teach this topic I realised it was 113 slides. Even cutting out the unnecessary information I was left with 45 slides. This is when the enormity of the task I set myself started to dawn. I decided to take a step back again before I committed myself to following a particular path. Originally I had hoped to be able to create a prototype WBLE, let my class test it to give feedback and then refine and change it.

Unfortunately I had run out of time to do this so I had to get it right first time, or as close to right as possible. To compromise and still include some feedback from my class I gave my class a brief questionnaire to complete. I made a list

of features that students would like and asked the question “which of these features would you find useful in an online resource about normalisation?”

The list had the options of, detailed notes, brief notes, definitions, narration, games, examples, practice exam questions, videos, and links to other websites. I also asked, “Do you think you would use this resource at home?”

Of the six questionnaires distributed I received four back. This is certainly not a statistically significant or particularly scientific survey but it did have two benefits. It gave me an overview of what my particular class wanted in a WBLE; though I had only four replies this was four pupils of seven in my class. It also gave me some reassurance that I was headed in the right direction before I actually created my WBLE. Three students ticked the short notes box and one ticked detailed notes. This told me that they definitely wanted some form of notes to help them learn. Two pupils ticked the box for definitions. All pupils chose practice exam questions. None of the other options were picked by more than one student and not a single student asked for narration or videos. I was surprised that games and videos were not more popular but not surprised that narration wasn’t seen as important as voiceovers on computer based resources can be distracting for the learner.

With this feedback I went back to work creating my WBLE made of four main sections, notes, definitions, quizzes and exam questions.

Implementation:

Although I had my structure planned, I was working with new tools and on a project different from anything I had previously completed. I did not expect

everything to go exactly to plan and during the project I went through a few iterations of creating, tweaking, testing, redoing and changing. This is the order in which I worked on all the sections of the WBLE.

Creating the notes:

One of the largest parts of the WBLE was creating the notes and theory. As I already had a presentation I used to teach the class it seemed pointless creating new notes. I used the myudutu PowerPoint importer to bring in all the slides. The first attempt at doing this left me with 113 pages which I could not manage to rearrange or move easily using the myudutu interface. Slides were also unhelpfully named slide_1 to slide_113 giving me no indication of what was on each slide until I clicked on it to load it up. Doing this on a web based design tool was slow and frustrating so I tried another way. I went back to the original presentation on my computer and split it up into sections and pages. This had the additional benefit of making me think how I should split up the sections of notes to make them accessible to students. I decided to put in an introductory section, followed by each normalisation section split up individually. I ended up integrating the key definitions at the beginning and end of each section to keep them in context rather than having them in a separate section as previously planned. Each one of these now smaller presentations was imported individually into a separate branch of the navigation tree.

Navigation:

Having uploaded the core of the notes I had the hang of arranging pages and creating new pages. I decided where to put menu pages and how to structure hyperlinks between sections. I created two main navigation pages, the first page and the theory sub-menu. These were created using a standard myudutu template giving four hyperlinked buttons a main graphic and a main text box. The main page linked to notes, quizzes, exam questions and credits. The notes section linked to the five sections of notes as well as having a button to return home.

Creating a quiz:

The quiz section was the next to be done. Again I started off working out what features were available in myudutu and experimenting with them. Adding a quiz wasn't something I was well prepared for. I created one drag and drop quiz for students to practice definitions of the four forms of database normalisation. Although it worked fine, when testing it I realised I had designed the question badly so that the answer was given away in the question. I decided to leave creating further quizzes until I had completed the exam questions section which was more urgent.

Exam Questions:

For the exam questions sections I envisioned an area where students could view practice questions for a particular topic and then choose to view the answers and mark schemes for the questions. I did not have a way of allowing students to enter answers online and all questions required free text responses which can't easily be marked automatically. It was therefore down

to students to check their own answers against the mark schemes. I picked out a selection of two multipart questions from two different exam papers and found the corresponding answers in the mark schemes. The papers and mark schemes were all saved in Acrobat PDF formats which made them difficult to import. In the end I had to take screen captures of the questions and import them into the myudutu pages. I rearranged sections of the questions to make them fit neatly onto a page and followed the same for the answers.

Refinements:

My basic WBLE was now complete albeit with room for improvement. I wanted to present my WBLE to my students for feedback but I didn't yet feel happy with the final product. I worked on making a few refinements to what I had completed. The first section that needed tidying up was the quiz section. I added a new menu page, added three new quizzes and corrected the previous quiz. I found it quite challenging thinking of useful questions that would both enhance students learning and be simple enough to fit in the question formats. In the end I added four questions. The questions used three formats of question, one tick box, two drag and drop matching and one sequencing style. Next I tidied up and improved the three menu pages. This was partly for aesthetic reasons and partly to make it easier to navigate. I added a relevant image to each menu and where I had used hyperlinks I made sure they were large and easy to click on.

Adding narration:

I experimented with adding narration on the title slide. It took a while to record and upload it all but once it was done it loaded quickly and worked well.

Despite students not expressing a desire for narration in the WBLE I went ahead with adding audio to certain slides. Some of the notes that I had uploaded were not as easy to understand as I had wanted, there were some diagrams and tables without much explanation which I felt may confuse students and I hoped audio might improve this. To create the audio I recorded myself speaking in audacity and saved the files as MP3 files to upload to the myudutu pages. To decide which slides needed audio I went through every page of notes systematically and recorded narration where I felt appropriate explanation was lacking. Each MP3 file was saved with the name of the corresponding slide title so I knew which slide to upload them to. In the end I added audio to 12 slides.

Uploading to the VLE:

Although this isn't technically part of the design it was certainly part of my implementation so that the WBLE could be used for my students. I also had to upload my prototype versions to the VLE to test the WBLE outside of the myudutu environment. I first had to export the WBLE from myudutu as a Scorm object. The resulting zip file was uploaded to our VLE and then added to a test course as an IMS/Scorm object. I had to change the VLE default settings for window size and scrollbars to get the WBLE to display correctly. It worked best with object set to open in a new window.

Evaluation of the system:

I had three periods and areas of evaluation when working on the WBLE. The first was evaluating the system as part of an iterative process during construction of each section, second was getting my students to evaluate the system and third was my final evaluation.

Evaluation as part of implementation:

As I created the WBLE I stopped regularly and changed, tweaked or redid sections. Some parts of the original design were left out, some were enhanced and some I noted as a problem but didn't have time to enhance. Much of this procedure is documented in the implementation section.

Evaluation by students:

When the WBLE was ready I introduced it to my class as part of a one hour and ten minute lesson. I had promised them a revision lesson for some time on the topic as they had covered it about 2 months previously. I told them before that I would be looking for feedback at the end of the lesson and to jot down any notes as they worked through the resource. I then left students for about 50 minutes to work their way through the resource. Most of the students went straight to the quiz section and then when they couldn't work out the answers moved back to the theory section. Some needed help using the course map features during the lesson. Some happily shouted out complaints about the navigation and problems with the quizzes not automatically restarting. At the end of the 50 minutes I brought the group together for feedback. Everyone had tried the WBLE. They looked through all of it though didn't necessarily read every slide in detail or work through every exam

question. I would not describe it as a 50 minute activity; this was more the limit of students' concentration. I ran an oral feedback session with students by asking them a list of questions and noting down their answers as a group. I made sure everyone had the chance to speak by asking everyone individually if they had any opinions to share. I also allowed any general comments at the end. I was surprised as to how positive the feedback was. Students said that the WBLE would be especially good for revision, had a good amount of information and that they would be more likely to revise at home if the WBLE was available to them. They found the content easy to understand, broken up step by step with good summaries and found the narration helpful for emphasising confusing aspects. They found it very useful to have a bank of exam questions packaged together and felt they were in a good order going from easy to hard. They also had plenty of criticisms and ideas for improvement. Students felt that overall it was harder to learn using the WBLE than from a regular lesson with a teacher explaining (which as their normal teacher was rather satisfying to hear!) They felt that the navigation had a lot of room for improvement with better buttons, and links to the index. This was felt even more on the quizzes than on the static notes. Scroll bars on some pages were criticised for making notes harder to access. Contrary to the feedback in the design process students suggested that there should have been more narration and also that the narration should have sounded more interesting and been better scripted. The main final criticism was of the exam questions sections which were hard to read with text too small. Additional enhancements suggested were adding some animation and video, populating the empty glossary with keywords, and enhancements to the exam questions

allowing answers to be input directly into the computer. There were some requests for additional content and summaries of content.

Overall the student feedback was much more positive than I had expected. Before presenting my WBLE I was not optimistic as I felt there was a lot of room for improvement. Students picked up on many of the same problems that I had seen but still gave overall positive feedback. I agree with all of the criticisms made by my students and feel that they were all well founded. The enhancements suggested by students were very useful to hear. I again do not disagree with any suggestions though I feel using animation and online response boxes for exam questions would probably not be worth pursuing from a design point of view rather than a pedagogical point of view as both are enhancements that would require a great deal of time and specialist skills to implement. The other ideas for improvements are all things I would certainly consider adding if I was to refine the WBLE further. I did worry at the time of getting feedback that students would be scared of being critical as they know me and may not wish to offend me. Going by the number of criticisms they gave they did not seem to be holding back. At the end of the process the only part of the student evaluation I am suspicious about are comments that they would be likely to use the WBLE for revision from home. This is because from my past experiences with the group they have not made much use of online resources at home via our VLE. Admittedly the resources we did have up were not very interactive or it may also be that students' intentions and actions don't always match up.

Personal Evaluation of the WBLE:

My personal evaluation of the WBLE at the end of the project was mixed.

Overall I was happy that students had given a positive response. I was happy that I had created what I set out to create, an engaging and understandable resource for students that would help them learn theory, definitions, examples and practice questions. I also managed to create a resource independent of a particular system that was successfully imported into a school VLE.

I wasn't happy with quality of some of the resources in the WBLE and I wasn't happy with the final navigation. The resources were imported from a PowerPoint presentation and as a result had a plain style of presentation that didn't make full use of the possibilities of an interactive online system. Rather than clicking through and reading each slide I would have liked more interactive notes that students could work through online not just read through. This is certainly something I have criticised in commercial learning resources. Improving this could be a very large job. Despite the lack of interactivity I felt the notes were of a good quality and the audio narration offered something extra. The presentation of exam questions was not good as they were fuzzy and hard to read. This would be an easy problem to overcome by retyping or rescanning the questions rather than using screen captures. The navigation of the WBLE worked but it needed to be more accessible, I would like to add extra navigation buttons to some pages. This could also be rectified by adding clear titles to every page making the site map easier to use.

Evaluation of the process:

I successfully created a WBLE that achieved my aims but the process that I used to create it certainly has room for improvement. My main criticism is that I tied myself into a particular authoring system early in the project. This restricted my vision for the design as I had an idea what I would be able to achieve and what I wouldn't. Similarly although it didn't stop me from designing using pedagogic principles or my judgement as a teacher; it did mean my ideas were constrained to what the environment allowed. If I had used a selection of tools rather than just one tool I could have been more creative in my solutions. My desire to create a standards compliant learning object was important to me and was a useful experience.

Time and time management as always was a problem. I was creating a WBLE to fit in with two deadlines, that of the project and that of the evaluating class. This made me prioritise what I could achieve but I do not regret decisions I made. Shortcuts that I took during the implementation can be easily improved in the future.

My designs at the start of the project were hazy and unstructured but I found it incredibly hard planning on paper without the prior experience. If I was to start again I would certainly do more detailed plans but I don't think the end results would be vastly different.

I feel that my topic may have been too big for me to create resources that were as interactive and as high a quality as I would have liked in the time available. I had to weigh up creating resources that would actually be useful in the classroom against a resource that would be impressive but not have enough content to be particularly useful. In the end creating a comprehensive resource for my students took priority and I am happy with that decision.

The final task that I didn't do and certainly need to before moving any further is to gain permission to use copyrighted material. The PowerPoint notes used are freely available for download but do not come with permission for editing and redistribution. All illustrations were sourced from creative commons search engines but some still need attributing. Exam questions are freely available for download from the AQA examination board but I did not ask for permission to edit and redistribute them and I do not know if there would be a charge for this.

Overall I am happy with the decisions that I took in the design, implementation and evaluation. There are certainly many criticisms that can be made of the final product and if I was to do the project again I may do some things differently but overall I don't think my final outcome would be remarkably different.

Conclusions:

Having seen a number of commercial offerings for content for VLEs I was always left unimpressed. Most were expensive, uninspiring and did not comprehensively cover the topics I needed. Part of the challenge I wanted to take on was to see if I could do better. Though I created a resource that did a good job for me and my class I'm afraid I didn't do better. The overall quality of my resource was not on par with commercial offerings in terms of layout and design. My content was good but every teacher likes to use resources in a different way and they may not meet the requirements of many teachers. The time taken to create the resources was also prohibitive. I did not tally the exact time spent creating the WBLE but I estimate I spent 6 to 8 hours

creating a resource that is far from perfect and that would occupy a student for a maximum of 2 hours. For a software house this may be a good return on investment but for a teacher it is a prohibitive amount of time. One of the problems with getting teachers to use online learning environments is the time it takes them to prepare online resources (Dabbagh, 2002). This project has left me a little downhearted that this is a problem that will be very difficult to overcome for teachers who want to create comprehensive and professional materials. On the other hand, a few years ago I felt I could not create a professional quality website. Now there are online tools that I have mastered that have changed this. I hope in the near future that rich learning creators will be available that produce professional and immersive resources with minimal effort. Until then I shall be leaving any similar projects of this kind to the professionals and concentrating on making use of simpler tools WBLEs have to offer.

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Appendix 1: Scenarios

Scenario 1 (at school): Peter walks into his Computing lesson, sits down and logs onto his computer. While he waits for the other students to arrive he loads up a news site to check the sports headlines. When the lesson starts he minimises the window while the teacher explains the lesson. The teacher introduces the topic of "database normalisation" Peter isn't excited as when they did it a couple of months ago it wasn't that exciting. The teacher asks the students to log onto the VLE to use a self study resource, he explains that it has notes, multimedia, quizzes and practice exam questions. Peter is quite excited to try something new. Peter logs in and clicks on the A-level Computing group, he then clicks on the resource to load it up. On the main menu he chooses to jump straight to a quiz, he has to drag and drop the definitions of normalisation to the titles. He gets it right by trial and error and

decided to go back to read the notes so click on the home button. He then clicks through the notes for first second and third normal form, stopping to listen to audio explanations. He makes some notes on paper as he reads the definitions. When he gets to the end he goes back to the main menu and back to the quizzes. He completes all the quizzes though he doesn't get all correct first time. He takes a look at the exam questions and flicks through them finding that the answers are at the end of each question, he goes back to try the first question. A little bored by now he clicks home but plans to visit again at home to complete the exam questions. He then heads off to check his e-mail.

Scenario 2 (at home): Jane has an exam next week and wants to revise the topic of normalisation. Though she understood the topic when they did it in class it was rather confusing and she has forgotten most of it and didn't have a clue how to answer the practice exam question set for homework. She logs onto the school VLE from home and looks at the latest announcements. She then checks her messages to see if any friends have written anything recently. She moves onto her work and clicks on the A-level computing group and scrolls down to the database topic. She looks at what resources are available including past homeworks for future reference. She clicks on the Normalisation resource to load it up. She goes straight to the notes section by clicking from the main menu and starts reading through the notes and examples. When some of the narration starts she goes to get some headphones to plug into the computer. She clicks through the notes not reading most of the first half as she remembers how to do it all already. When

she finishes the notes she goes back to the main menu and starts working on the exam questions section. She completes the questions on paper and then clicks through to the answers to mark her work. She doesn't understand one question and goes back to the notes as well as her textbook to clarify the question. She closes down the window and logs off.

Appendix 2: Student Feedback Results

Questions followed by answers.

Was the WBLE useful? Yes, good for revision. Didn't have too much information.

Would you use it at home? Easier than using a text book. Was nice having all the information in one place. More likely to revise with this tool.

How does it compare to a regular lesson? Questions more fun on the computer. Harder to learn without a teacher explaining it.

How was the navigation? More menu buttons for navigation, especially on quizzes, better navigation needed. Better links to glossary and index would be good. Would be good for glossary to be populated.

How was the theory? Easy to understand, step by step, good summaries. More narration would be good.

What other features would you like to see? Animation and movement, videos

How were the exam questions? Text too small, was good that they were collected together. They started easy and got harder which was good. It would be good to be able to enter text online rather than on paper. It would be good to have more questions, direct links to more questions or exam papers or instructions such as for more questions see question 5 June 08.

How was the narration? Narrator could sound more interesting! Emphasise keywords, script beforehand, was good at emphasising confusing aspects.

Other ideas or feedback? The scrolling was annoying on some page, would have been good to have smaller writing. It would have been good to have more summaries and bullet points.

Appendix 3: URLs and Miscellaneous

For copyright reasons I cannot publish the URL on this online version. Please get in touch if you would like to see it.

The specific learning objective from the exam board specification is:

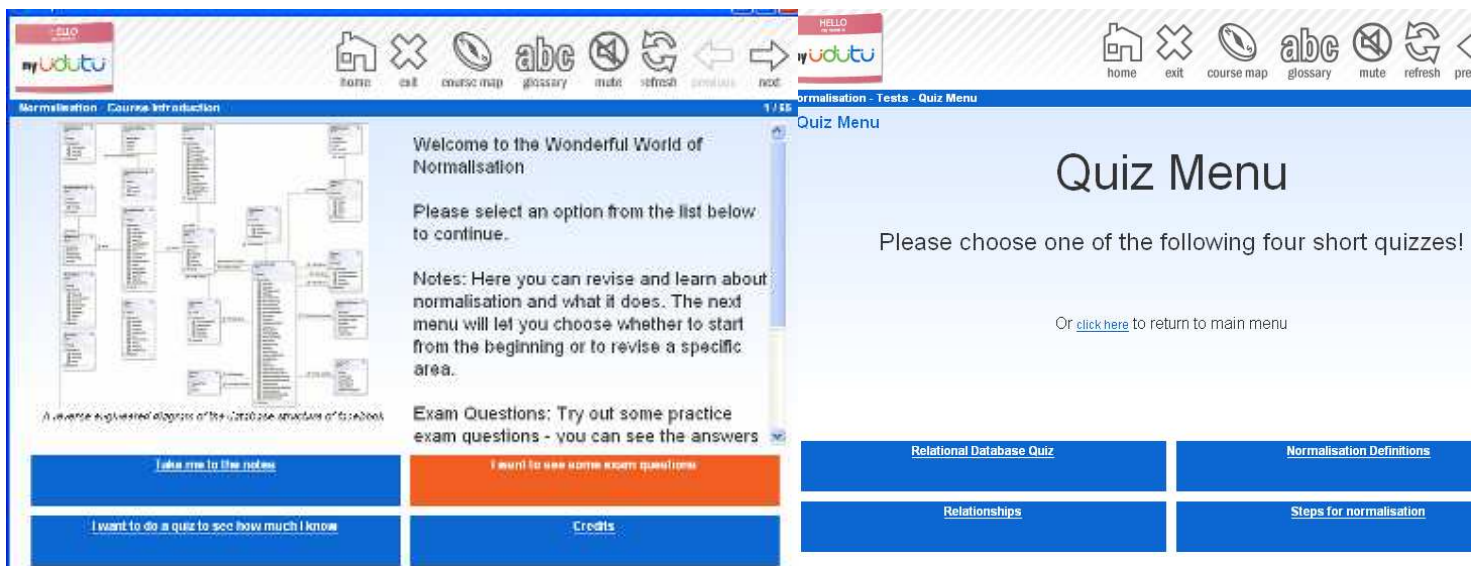
“Entity-relationship modelling. Normalisation techniques: Illustrate the principles of database design using these techniques in the production of normalised tables that control redundant data, studied up to BCNF (Boyce-Codd Normal Form.”

Full specification available at <http://www.aqa.org.uk/qual/pdf/AQA-5511-6511-W-SP-08.PDF> (last accessed June 2008)

The original database PowerPoint presentation can be viewed at http://www.teach-ict.com/contributors/Ritchie_King.htm

Appendix 4: Screenshots (nb – pictures are cropped to fit on pages)

Menus: Showing homepage and quiz menus:



Course Map Showing Sub Categories of WBLE



Drag and Drop Activity:

One to many One to many Many to many Many to many One to one

Relationship between mother and children.

Relationship between husband and wife.

Relationship between student and course.

Relationship between customer and order.

Relationship between film and film star.

i'm done show me

Example of a summary page at the end of a section of notes:

HELLO my odutu

home exit course map glossary mute refresh previous next

Normalisation - Summary - summary - 1_Slide 1 45 / 65

Normalisation - **The Six Point Plan**

1. Remove repeating groups to create a new entity
2. Create a relationship using one of the attributes that are left [Usually the primary key]
3. 'Check out' entities with concatenated keys. If any attribute is not fully dependent on both parts of the primary key remove it to create a new entity.
4. Create a relationship using one of the attributes that are left [Usually the primary key]
5. 'Check out' every entity. If any attribute is dependent on any attribute other than the primary key, remove it into a new entity.
6. Create a relationship using one of the attributes