Producing Interactive Web Lectures with Authorware

Teemu Kerola
Department of Computer Science, P.O.Box 26, FIN-00014 University of Helsinki

Teemu.Kerola@cs.Helsinki.fi

Abstract

All universities are in the process of utilizing the web more and more in education. In addition to placing normal course information, home works, PowerPoint slides etc. into the web, we need to have more emphasis on new teaching/learning methods that the web empowers us to use. One such l earning tool is interactive web lecture, which is a kind of a cross section between a lecture and a book. Usually production of such web-based learning modules requires a relatively large team of experts. In this project we show that good and usable web-based learning material can also be produced with powerful authoring environment and relatively modest manpower requirements better suitable for university settings. The starting point for our content development is the existing PowerPoint slide set and the instructor know-how on what topics to discuss with each slide.

1 Introduction

There exists a general demand to utilize the web (Internet and Intranet) more and more in education. New teaching/learning methods are now needed that were not applicable before. One can broadcast live lectures to students in their own homes or at least in remote classrooms, one can build large systems co-operatively with other students without ever meeting them face-to-face, or one can do independent studies using interactive material accessible in the web.

Such new learning methods are not necessarily simple to use, nor is the teaching/learning material associated with them easy to produce. This paper concentrates on one learning method, interactive web lectures, and how to produce it in university settings. We are not emphasizing (in this paper) how this material will be used in university course settings even though that is ultimately its planned use.

We had the opportunity to study the IBM process to produce just this type of learning material, and we found the process too cumbersome and expensive for our current needs. The IBM process is based on a specific Knowledge Factory Team that can independently produce the any material with just one subject matter expert (e.g., university instructor) advising the team on the material to be taught. The team can be quite large (15 different roles for 5-30 team members) and seems better suitable to industrial settings than for universities. The course contents must be specified in a detailed manner during the process, and it is not easy to modify the course later on without bringing in the whole team again. (Laine and Kerola, 2002)

The IBM process is built around their own content development software, Knowledge Producer (IBM, 2003a). Knowledge Producer generates educational material that is suitable for IBM Lotus LearningSpace (IBM, 2003b), but not for generic web browsers. Before the production phase begins, all non-content details must be specified in a thick High Level Design Document and all content details in even thicker Detailed Design Document. In business environment both these contractual documents are important as they define in a precise manner all expectations and demands for the final product. So, the content development process is cumbersome and costly because of the large team involved, and the use of the material is expensive. We wanted to have a smaller process and the final product in a form that easily and freely accessible to all students.

We needed commercially available, economical software for our content development. It should produce learning material that would run in a standard web browser, or with a free plug-in. We needed a tool with which one teacher (in our Computer Science department)

would do all the content development by herself. She could use help in specific instances, e.g., in graphics or animations, but in general she would develop the content alone in a similar manner that is used to create PowerPoint slides for lectures. It was also important, that it would be easy to update the contents annually.

After a short study we selected Macromedia Authorware (Macromedia, 2003) as our content development platform. Other platforms exist, but this one seemed to offer the functionality we needed and lots of associated software that may become handy (E.g., Fireworks for graphics editing and Flash for animations). Also, we wanted to have a quick start, and we felt that this was a solid platform to start our experimenting. Later on, we may try out other platforms.

The main goal is the production process, not the produced contents. However, it is obvious to us that the process cannot be very good unless the learning material produced with it is of high quality.

2 Resulting Learning Material

We wanted to produce stand-alone learning material that is somewhere between a lecture and a book. The idea is that the student will get pretty much similar learning experience to listening a good lecture, but having no possibility to interrupt the teacher and ask questions. However, one can go back and forth in the material, and listen (and read) difficult parts of the lesson as many times as needed. The lesson can be browsed anywhere, anytime, and at a pace determined by the student.

The material is also like a book, because it can be browsed here and there. It is better than a book, because it may include not only pictures worth of million words but also moving pictures and animations worth of billion words. It has sound and it may include built-in interactive problems to solve.

Terms interactive book or interactive web lecture would be suitable to describe this type of material. We prefer the latter term, interactive web lecture. So far, the interaction is mostly navigation, but in the actual use of the material there will also be interactive animations, problems and practice questions for students. Those components could be directly linked into this material, or they could be separately accessible from the course home page.

Students using this material need a modern multimedia PC with Internet connection. It is recommended to have broadband access to Internet. With a 56 kb/s connection the prototype material can be browsed, but it behaves in sluggish manner. However, we have not yet even tried to optimize the learning material for smaller bandwidth connections. If the material is to be used in public settings (e.g., in a computer lab), each student should have headphones. The department has a pool of (cheap) headphones that the students may check out in case they do not have their own headphones.

3 Starting Point for Development

We assume that the course material already exists in PowerPoint format. In addition to the PowerPoint slides, the instructor of course knows very well the learning objectives of each slide and how he would present the material in a standard lecture. The instructor himself will be the person doing all the content development, and so he must be also familiar with the production software, which in this case is Authorware.

We assume that most CS dept teachers can learn to use Authorware well enough for this purpose with relatively small training, either as independent study or using a departmental short course. If this process would be extended to other departments, where teachers are not involved with computer technology so much, we assume that one consultant would be needed to help the instructor at least for a while in web lecture production.

The instructor needs a modern multimedia PC, Internet connection, and an Authorware licence. She also needs a good quality microphone, preferable one connected to headphones.

The recorded voice volume should be uniform and that is easier to achieve with a separate microphone as compared to using a built-in microphone in laptop or desktop PC.

4 Production Process

The content production process advances in two phases. The overall general design is produced in Design Phase and the actual learning material production in Content Development Phase. Once a good overall design has been developed, that can be used with all new modules.

4.1 Design Phase

Design Phase defines the layout, navigation, language, look and feel, colour scale, fonts etc for the whole material. This is implemented by setting up basic structures in Authorware with an already existing Knowledge Object (Authorware term), and modifying it to implement general design requirements.

Specifically, we do not produce any big documentation on these decisions as was done with the IBM process. With the IBM process it was important to lock in to the detailed design specification in written form as that specification was then used as a contractual document between IBM and the client. In departmental course material production such large documentation is not needed.

4.2 Content Development Phase

Actual production of the learning material happens in the Content Development Phase. This is where PowerPoint slides and instructor know- how are translated into web lectures. It should not be started before Design Phase is completed. If there are any major changes in Design Phase after the content development has already begun, one may need to implement those changes to each already produced page one page at a time.

Each PowerPoint slide set for a (1-2 hrs) lecture is implemented as one (Authorware) module, which may then be independently browsed at any time. The lecture is constructed of multiple sections (topics), and each section has many pages. Each page consists of one or more views. Each view has some visual modification to the page background and instructional text relating to that specific view. A view is smallest educational unit in this material, and it corresponds closely to what an instructor would teach between two mouse clicks during a lecture based on PowerPoint slides.

Content developing is executed by translating each PowerPoint slide (or a few tightly coupled slides) into one (Authorware) page that may have multiple views. Each page is started as a copy of the prototype page (produced in Design Phase) and it includes a background definition that applies to all views in that page. The drawing area for the background picture is marked, and it must be removed once the page is complete.

Each view in the page is built separately, again starting with a copy of a prototype view (which was also produced in the Design Phase). The view has its own visualization part that is overlaid on top of the page background. In this way, the view looks pretty much like one PowerPoint slide. In classroom setting, the teacher would have some explanation at this time to the students, and that explanation is now given both textually and vocally in the web lecture. The instructional text is first written down, then recorded separately, and finally tied in to this view. So, the information in PowerPoint slides is shown visually in each view, and the teachers know-how or instructional guidance is shown in text window and heard as voice with that view.

In the resulting web lecture, the students may elect whether they want to hear and read the instructional text, just hear it, or just read it. If the instructional text is neither heard nor read, then the material can be used by the instructor as lecture slides. However, the material

is not as good as original PowerPoint slides for this purpose, because it has been developed for independent learning and not for lecture based teaching.

The material is easy to modify, which is important to university settings where courses are often updated. Once the modification is implemented in the content, the resulting learning module is updated with a one click of the mouse.

5 Summary and Future Work

We have produced one prototype module, corresponding to 37 PowerPoint slides, designed for a 2hr lecture on Compiling, Linking and Loading for a Computer Organization course, in Finnish. The web lecture has 24 pages in 6 sections, and altogether 58 views. The production was very slow to start with, but the last 80% of the material took some 7 working days to finish. The initial slow start was due to Authorware learning curve, and our need to first develop the process, and only then to do the content development. We would anticipate that the 11 remaining 2 hr lectures could be translated to similar web lectures in 1-2 weeks per lecture. The time of course depends very much on what type of tools one would use. For example, any animation would be time consuming. Translating normal (text with simple graphics) PowerPoint slides to web lectures is straightforward and fast.

So far, we have not experimented with animation. Also, we will still fine tune the prototype before continuing with content development for new modules. We will use departmental know-how with both the user interface and web learning pedagogy.

We will try out this material with our normal lecture course this autumn. One normal lecture is replaced by this module for either all students or some section of them. Student feedback is collected with our normal course evaluation.

Once the complete lecture course is available as web lectures, one should take careful consideration on how to use that material. There should be ample room for student-teacher communication, either face-to-face or via web. There should be practice sessions, again either face-to-face with assistants or via web. However, running the complete course in web will introduce new problems that we have not yet really even considered.

Specifically, one should not simply replace usual lectures with web lectures and keep the rest of the course as is. We think that attending traditional live lectures is still the best mode for learning for most students in higher education. However, there are many situations where that is not possible, and then this type of web lecture could provide one good alternative.

Once we gain more experience in building and using web lectures, we can define useful criteria for evaluating tools to create them. That criterion must include, in addition to various components included with each tool, usability features that are more difficult to measure. Each tool should also be evaluated on how well it supports given production process, i.e., "how good is it for me?" Each tool should be tried out in practice and that will require lots of human resources.

Our emphasis will be in content production (i.e., how to produce web lectures, which learning methods to use in web lectures) and end-product use with web courses (i.e., how to use web lectures), and we will let many of the underlying technical issues (how to port to Linux, best way to store voice, best way to play videos, etc.) be solved elsewhere by the tool makers. We will not try to develop new tools, but instead find the best ways to use and evaluate them. One can always have better tools, but the current ones are quite suitable for useful work.

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