

A Best Practice Online Course Architect

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Abstract: The motivation for this work is the well known advantages of online courses that work independently of the scheduled times and locations of face-to-face courses. The project reported in this presentation began 6 years ago to support development of online courses that take advantage of the mentioned features, while at the same time compensating for the loss of face-to-face contact between students and instructor. Since 2001, 2-3 interactive online courses were offered each year to students associated with several universities and academic institutions. Student usage of each course was thoroughly logged and experience assembled in a simple, online, server-based tool for authors wanting to migrate their courses to the net.

Introduction

After the event of the web, online courses have been appearing and multiplying. They are in many respects a new generation of the old and well-known "correspondence courses" taking advantage of the possibilities for high-speed interaction of modern telecommunication. Compared with the traditional face-to-face lectures used for centuries, the online courses have some obvious advantages. They permit the teachers as well as the students the freedom to work when and where it is convenient as long as access to the Internet is present. Today, you can find teachers working on their courses at home in evenings after the kids are in bed, or in hotel rooms when attending conferences far from home. Likewise, students can take courses without getting into conflicts with their family or job responsibilities. Finally, universities and schools running online courses are free from the old and recurrent problems of assigning lecture halls and seminar rooms to courses.

Studies of online course activities indicate that a major part of the work takes place outside ordinary work hours. A recent study referred to by ComputerWorld Norge, (Schreurs, N. 2006), shows that the percentage of female web students has grown from 40% to 60% over the last 10 years. The average age is 35 years, most students have a college, or university degree, and 75% are full time workers.

There are other and less visible advantages associated with online courses. Since the sessions of an online course, the counterparts to the oral lectures of a traditional course, must be prepared and made available in a saved form, there are later no doubts about what has been said. The extensive preparation ahead of starting an online course tends to result in better documentation because the teachers themselves have a better opportunity to self-critics. The sessions are available to students for repeated studies and can be copied and used in future work as long as they find them helpful. Another aspect frequently referred, is that students in a net-based course have in general a better opportunity to get in touch with their teachers by email and other net based communication channels than students in traditional courses.

On the other side there are of course drawbacks with online courses. Usually the teacher never meets her students, and the personal visual contact is lost. Some teachers and students miss this contact, which only to a small extent can be compensated by photographs of the teacher and the students.

Experience

The authors of this paper have been teaching university courses on information and computer science for a number of years and started to adapt their previous face-to-face courses to interactive web courses about 6 years ago. These include different undergraduate and graduate courses in information sciences. Course implementations have used *ColdFusion Mark-up Language* to be run on an Adobe/Macromedia *ColdFusion MX* server and the open source *PHP 5* scripting language for running on a *PHP 5* server. The courses were designed under the assumption that the instructors should have no other contact with the students than by means of the built-in communication channels of the courses. These included e-mail, message boards, questions and answers board, and synchronous chat sessions. During the past years, courses have been offered for 2-3 classes each year. Some of the experience from this activity are available from (Nordbotten, S. 2004) and (Nordbotten, S. & Nordbotten, J.C. 2006). We have also had the possibility to learn from other experiences reported at E-Learn 2006 (Crosby, M., Nordbotten, J.C., Auernheimer, B. and Vick, R.)

For each course, we have tried to take well care of what has been conceived of as useful aspects and discard the less successful features. The experience from the operation of these courses has been systematically saved and is embedded in the tool, *Online Course Architect*, (OCA), which represents what we consider to be the key best practices to use when designing online courses. We would like to emphasize that our understanding of Best Practices accords with a description found in (Wikipedia 2006): The notion of ‘best practices’ does not commit people or companies to one inflexible, unchanging practice. Instead, Best Practices is a philosophical approach based around continuous learning and continual improvement.

The Online Course Architect

The Online Course Architect is an online tool that supports authors with only a minimum of expertise in web technologies to produce their own online courses. OCA courses are completely server-side, i.e. the course developer does not need to download any software for developing her course, and her university, college, or school does not need to acquire any new hardware or software for operating the course or find any vacant capacity for this purpose. The OCA system as well as the courses are hosted by a commercial *ISP*.

A user of OCA is called a *developer*, and the result of her work is a *course*. The end users of a course are the *students* which are automatically assigned passwords when registered. OCA permits multiple developers to work in parallel in separated segments, and each developer can work in parallel on several courses.

The course content is accessible in 3 sections, *Information*, *Sessions*, and *Communications*, Each section is optional and within a section, the developer is offered a series of optional components and features. For obtaining a more detailed view, a complete course example is also available for the developers. A typical course life cycle is composed of the following phases:

- Prepare the general course model
- Create course infrastructure
- Preview infrastructure
- Modify infrastructure
- Upload content
- Modify content
- Export course
- Run the course
- Import the course

The General Course Model

The basis of OCA is a general course model from which the developer can extract the features appropriate for her special course. The model contains 3 core modules, the *Information* module, the *Sessions* module, and

Communications module. In addition, the model consists of an *Instructors* module which is only visible to instructors.

The *Information section* contains sixteen components to provide general information on the respective subjects. The developer is free to select the components needed for the course. It is possible to modify the information structure at a later stage, by adding or removing components.

<i>About the course</i>	General introductory description about the course.
<i>Articles</i>	Supplementary literature on course topics.
<i>Assignments</i>	Description of each assignment, requirements, when it is due, grading, etc.
<i>Audio</i>	Speech, music
<i>Calendar</i>	Calendar which shows important dates, such as start date, when sessions open and close, ...
<i>Curriculum</i>	References to text books and other study material.
<i>FAQ</i>	Frequently asked questions
<i>Grading</i>	Details about the grading system.
<i>Images</i>	Links to images
<i>Literature</i>	Literature which is useful but not compulsory.
<i>Other information</i>	Other information
<i>Software</i>	Details about which software to download, how to do it, and how to configure and test it.
<i>Tests</i>	Information about the compulsory tests included with each session.
<i>Videos</i>	Videos, animations.
<i>Virtual classroom</i>	Picture gallery of the students and the instructors.
<i>Web links</i>	References to web pages

Table 1. Optional information components for inclusion in the course.

Of the sixteen information components, the most used options are *About the course*, *Assignments*, *Calendar*, *Curriculum*, *Grading*, *Software* and *Tests*. The remaining options seem to be more useful in the context of a session. Hence, these options are also included in the sessions section.

The *Sessions section* should include the topic of the course organized in a logical sequence of sessions like a series of face-to-face lectures. The crucial decision is how many sessions should the course comprise and their sequencing. The number of sessions will depend of the topic and level of the course. Introductory level courses should have a smaller number of sessions than advanced courses. Each session can contain different components. The options are:

Assignments	Allowing the student to upload an assignment, and to view others' assignments
Audio	Links to audio files
Examples	Example applications to demonstrate session topics.
Images	Links to pictures and figures used in the current text.
Tests	Each session has a multiple choice test with randomly selected questions.
Text	A text where the session topic is described in detail. Usually based on a textbook chapter.
Videos	Videos, animations

Table 2. Optional session components to be separately included in each session.

Our experience so far is that most sessions can be successfully based on *texts*, *tests*, *assignments*, *examples*, and *images*. Two of the session components, *Assignments* and *Tests*, are particularly important because they require student reactions. The course system can automatically *administer the tests*, *check for correct answers*, *keep performance records for each student* and *grant or revoke individual access* to the next session. Similar to the Information components, the components of each session can be modified at a later stage. By means of a *control table*, the course instructor can *set the date* for the opening of the course and for general access to each session in order to restrict a rush through the course. The individual student's access to sessions can be made dependent on completed tests and/or assignments. Though sessions with speech, music, animation, or videos or any combinations from these, are possible, such components have only been used to a very small extent.

To compensate for the loss of face-to-face contact, several means for communicating with the instructor are available.

<i>Chats</i>	The <i>Chat</i> option can be opened and closed for chat sessions controlled by the instructor
<i>Discussion boards</i>	<i>Discussion boards</i> allows the instructor to open one or more topics for discussion.
<i>E-mail</i>	An embedded email component in case the user does not have her/his own email client.
<i>Messages</i>	A chronological message board, mainly used for announcements from the instructor.
<i>Progress report</i>	A reporting feature that permits each student to see his/her private progress status.
<i>Questions and answers</i>	Questions and answers enables public questions to and answers from the instructor.
<i>Sms</i>	<i>SMS</i> allows bilateral communication between student and instructor via mobile phones.

Table 3. Optional communication components to be included in the course.

Sms and E-mail are the two most popular tools, while chat and any kind of discussions have gone more or less unnoticed. Progress reports however are frequently looked up shortly after the session tests have been completed. Immediate access to updated progress reports seems to motivate our students to stay focused from day one and throughout the course. The embedded email tool is primitive and is recommended only for students without access to a email client on their computers.

The OCA model also includes a wide set of *tools for the instructor*. By means of these tools, the instructor can *register* students, *upload* pictures of herself and the students, *lookup* student data, create *multiple choice tests*, view *test results* and *assignment results*, *modify* student profiles, tables and test questions, *answer* public questions, *administer* chat sessions and discussion boards, *set* parameters in the course control table, etc.

Developing an OCA course.

The first step in developing an OCA course is to make some preliminary preparations of the course content. The preparations imply writing general information about the course, dividing the topic into a sequence of sessions, writing the session texts, designing the illustrations and examples, developing tests and assignments as well as associated audio and video files. Text should be prepared as .html files, illustrations as .jpg/.gif files. Standard sound and video files can be used.

The second step is concerned with the creation of the course *infrastructure*. The infrastructure consists of a parent directory with subdirectories for each of the courses the developer works on. Each course directory requires a unique directory name, and contains sub directories for each of the modules selected for that course. The remaining structure is created automatically and needs no further input. Hence, the only information which is required by OCA to generate the course infrastructure is collected by the form in Fig. 1.

Name of course directory:

Mark which sections you want:

Information Yes No

Sessions Yes No

Communication Yes No

How many sessions do you want:

Figure 1: The Initialize infrastructure form.

In the third step, if you have decided to include the information section in the course, you will be asked to select information components. The user interface is similar to the one in Fig. 1, and the options are similar to those listed in Tab. 1.

In step four, you will select components for each session. Depending on the number of sessions that you entered in the infrastructure form, the session form will be redisplayed once for each session.

Assignments:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Examples:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Images:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Sounds:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Tests:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Text:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Videos:	<input type="radio"/> Yes	<input checked="" type="radio"/> No

Figure 2: Optional session components to be selected.

A session can contain any combination of these components. In most regular courses, *Text* will be included. In special applications, for example containing reading assignments and tests, text may not be included. You can choose different components for each session, and the infrastructure of each session can be modified later if there should be a need.

Finally, in step five, the tools for the Communications section between the instructor, course system and the students has to be set up.

Chat session:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Discussion boards:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Email contact with instructor	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Message board:	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Progress report	<input type="radio"/> Yes	<input checked="" type="radio"/> No
Questions/answers to/from instructor:	<input type="radio"/> Yes	<input checked="" type="radio"/> No

Figure 3: Optional communication components to be selected.

The communication components do not require any drafting, but correspond to standard components which can easily be added or removed from the structure at a later stage.

After each infrastructure selection, the system will confirm which components have been added to the infrastructure. At the end, the system has to adjust the navigation menu of the system created, and a final message will confirm that the infrastructure is created and the necessary adjustments completed.

Uploading content

Unless the developer decides to make modifications to the infrastructure, time has come to populate the course components. For each section, and for every component, one or more files must be prepared at your local computer and uploaded to the OCA server. All contents need not be created within one work session on the course.

Previews and modifications.

After a course has been successfully initialized, it can be previewed at any stage of development, i.e. displayed just as it would have appeared for users at that particular stage of development. In previewing, it is important to have the 2 dimensions in mind: the *infrastructure* and the *content*. After preview of the course, there may be a need for modifying the course infrastructure and/or the content with corresponding adjustments in navigation frame and different menus. Whole modules may be added to or removed from the infrastructure and so may single, module components. Except for the *Communication* components which have no input from the developer, most components can be modified. For some components, for example *Information components*, *Session texts*, *images* and *examples*, new versions can be uploaded directly and replace the old version

Summary of OCA Best Practices.

- Be prepared to spend time on course preparations, evaluation of assignments, and for attending to E-mail and sms requests from the students.
- The information section should contain general information components only. Contextual information components, such as images, articles and literature should be placed in their respective sessions.
- Introductory courses for undergraduate students should have a smaller number of sessions, (≤ 10), and offer more time on each session than more advanced and higher level courses, (10-15 sessions, 1 per week).
- Regular assignments and tests are well received by the students. They require student reactions and keep the students focused throughout the course.
- Individual progress reports along with information about the grading system are motivating because the students are kept informed about their current credit status and the grade they have earned.
- Sms and E-mail are the two most popular communication tools. Chat and discussion boards seem to be avoided by many students.

Future work

New courses are currently being developed by OCA support. All use of the OCA is being logged. It is hoped that at some future time and based on the recorded data, OCA can be analysed, evaluated and further improved.

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