DESIGNING ONLINE LESSONS FOR WEB-BASED COURSE DELIVERY

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ABSTRACT

The design of online course materials needs to balance intellectual property protection with the use of the materials. This article describes an evaluation of online lessons produced as HTML pages using two different versions of the Microsoft PowerPoint software. A survey conducted of participants using these materials revealed a number of positive outcomes including a high level of satisfaction with the overall lesson content and presentation. However, participants were not satisfied with the ability to obtain printed copies for their studying requirements. These results are important to other developers in selecting the technology utilized to create online materials with the desired work factor level for intellectual property protection.

Keywords: Intellectual property protection, printing online material, PowerPoint presentations, online lesson content, HTML from PowerPoint

INTRODUCTION

The design and delivery of online course materials needs to include the important dimension of intellectual property protection (Ko and Rossen, 2001, chap. 8). A persistent fear among instructors is that some enterprising student, other educator, or other individual accessing a web site will steal an instructor's intellectual property. This fear is well founded in the fact that the practice of reproducing study guides by individuals other than the instructor and selling them has been going on for a long time before the advent of online courses. However, with online, it is significantly easier to acquire and reproduce electronic copies of an instructor's materials. For some instructors, intellectual property rights may not be a concern because they are willing to freely distribute their online materials, whereas for other instructors, the protection of their intellectual property is an important concern. Ko and Rossen (2001, p. 188-190) present several technological methods used in protecting intellectual property. These include password protection of the course web site, use of Adobe Acrobat to limit use, and the conversion into a streaming video format. Although the use of Acrobat or streaming video does not prevent unauthorized use, they increase the work factor required to reproduce and modify those materials. **Work factor** is the is amount of effort required to reproduce the same content in a form that can be readily modified or otherwise used in a flexible way in a similar presentation of the content. A low work factor provides a low level of intellectual property protection, whereas a high work factor is viewed as furnishing a high level of protection. For example, a Microsoft PowerPoint (PPT) presentation has a very low work factor if its slides can be copied and then each of the objects on the slide selected and modified. The same PPT slide saved and secured in Acrobat has a very high work factor if only the slide image can be displayed with no printing, copying, or other selection allowed. If that content were to be used in a flexible manner, then the entire slide image would need to be recreated. Here the work factor is similar to printed material, which usually requires more work than merely coping a file that can be edited directly.

This research effort focuses on the creation and use of online course materials where an instructor has a high level of concern with intellectual property rights and the online content is derived from PPT presentations that support the delivery model presented by Hayen, Holmes and Cappel (2000). This desire to protect intellectual property can affect some of the elements of the usability of the online course materials. In particular, the ability of students to obtain printed, hard copy output for use in studying may vary with the technological alternative selected for the online materials. This effort compares two different online HTML formats produced from PPT presentations and the ability of the students to obtain printed copies of these materials. Participants' perceptions are reported concerning the utility of the alternative HTML formats in meeting study needs. The remainder of this paper addresses details of the course environment, the lesson formats, and the evaluation by the student participants.

COURSE ENVIRONMENT

The comparison of online course materials was carried out in a graduate level ABAP Programming course, which fits within the educational framework formulated by Hayen, Holmes and Cappel (1999). The Advanced Business Application Programming (ABAP) language is a special purpose language created by SAP AG for use in the development of the application components of the SAP R/3 System, which is enterprise software (ES) also known as enterprise resource planning (ERP) software. SAP R/3 is the most widely used ES system (Gilbert, 2000). This software integrates the various transaction-oriented, core processes following "best of breed" business practices. SAP R/3 is configurable software, tailored to meet various business requirements. One of the tailoring activities is the creation of customer unique transactions and reports. These are accomplished using ABAP. SAP AG created a university alliance program (UAP) that provides the SAP R/3 software to colleges and universities for use in their educational programs. The UAP now has more than 100 member institutions in North America. ABAP for this graduate level course was provided under this UAP. The ABAP course selection for this research study occurred by default, because the online course materials had been developed initially under one HTML format and then, as part of a course updating process, were redeveloped under a different HTML format. However, the conceptual content from the first to the second development were very similar, mostly updating of a new user interface screen examples and online help hyperlinks, so that this comparison could be made without noteworthy conceptual content changes between these two formats. The content of the PPT lesson materials is a combination of unique instructor created content and copyrighted content made available for use from SAP AG under the UAP. As a result, a high work factor is required to protect this intellectual property.

WEB LESSON FORMATS

The content pages for the online course lessons were generated directly from PPT97 and PPT2000 presentations as HTML web pages with their related components. PPT97 produces a single web page for each PPT slide, whereas PPT2000 produces a single frame set into which different web pages from each PPT slide are displayed. For the PPT2000 frame, the slide image appears in one pane of the frame set, while the notes section of the slide appears in a separate pane. Both PPT97 and PPT2000 provide web pages with button control objects for the display of either the next or previous slide in the presentation. Figure 1 illustrates the slide image

displayed with the PPT97 web page. The image is a single *.GIF file, which presents a high work factor for its flexible use. This page can be scrolled to display the notes section of the PPT slide as shown in Figure 2. Figures 1 and 2 illustrate the fundamental design selected for the online lesson presentation. Typically, each slide consists of a diagram that depicts the idea being presented together with a notes section that provides a narrative description related to the diagram. In a restricted fashion, this emulates an instructor lead, classroom presentation where the instructor displays the diagram and then lectures about the diagram's content. Since this is a single web page, it is easily selected for printing as a single printed page that consists of both the illustration and the notes. One limitation of PPT97 in creating these HTML pages is that much of the formatting of the notes section is lost when the HTML pages are generated. This required the manual access and editing of the notes, which was done using Microsoft FrontPage 98. On the other hand, PPT2000 retains this formatting and eliminates the need for these manual edits.

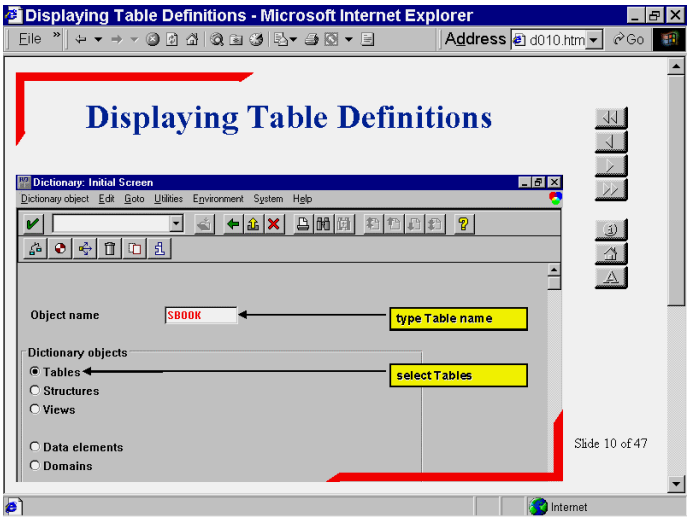

Figure 1. Image from PPT97

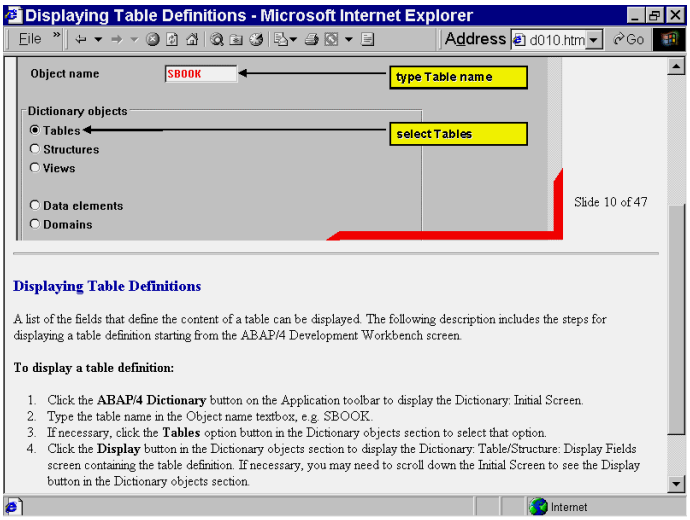

Figure 2. Notes from PPT97

Figure 3 portrays the slide image within the frameset produced by creating these HTML pages from PPT2000. With this frameset, an Outline of the available web pages can be optionally displayed in the left pane that provides direct navigation to a slide. Similarly the Notes pane can be optionally displayed. The frameset provides increased flexibility in viewing a slide that is not provided by the direct web page generation from PPT97. With the PPT2000 generated HTML, the image is often a collection of several *.GIF, *.WMZ, *.XML files. Here, the user is not involved directly with specifying the interrelated components of the web page. Those individual components exhibit a high work factor because they are very difficult to modify without making the changes in the PPT2000 file and then regenerating the HTML web pages.

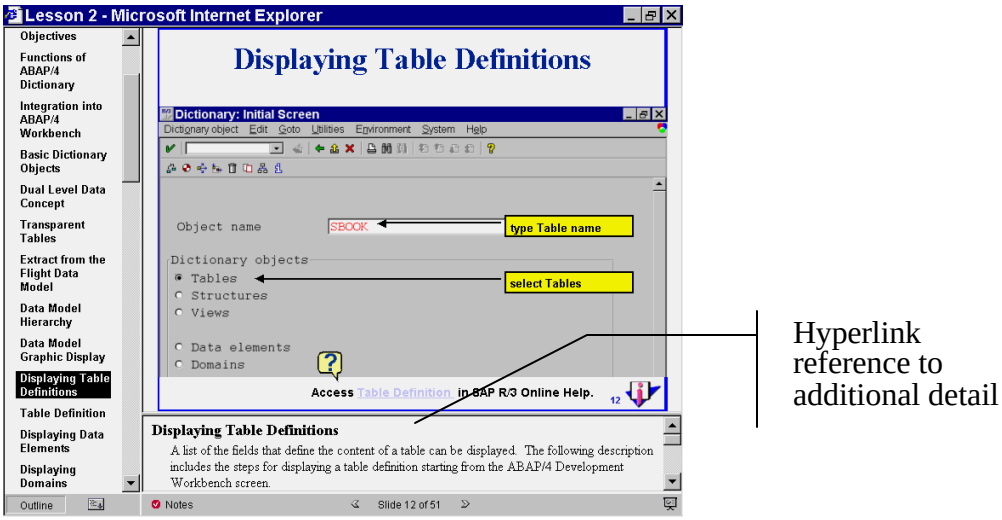

Figure 3. Frame from PPT2000

ONLINE LESSON EVALUATION

A survey was conducted to evaluate the utility of using the alternative web page formats for the lessons. Forty-eight students completed the survey. The survey contained 17 items. The first fourteen were answered using a seven-point scale, where 7 indicated "extremely satisfied" or "strongly agree," 4 "don't know/no opinion" and 1 "extremely dissatisfied" or "strongly disagree." The survey also contained three demographic questions, which indicate that nearly two-thirds of the participants were between 25 and 30 years of age, as might be accepted for a graduate level course, with 23% less than 25 and 13% over 35. Male participants outnumbered females 60% to 40%. The survey's 17 primary items are grouped into four general categories:

Item	Category
1, 2	Overall indications of satisfaction
3 – 8, 14	Presentation of content
9 - 13	Printing of lessons for studying
15 – 17	Demographic data

To minimize response bias, some questions were negatively stated. For example, question 13 was worded, "Printing the online lessons before I study the ABAP Programming concepts is a

waste of my time that would better be used if a printed copy was already available for me to study." The manner in which questions such as this are stated is considered in the presentation of this analysis. The 14 questionnaire items appear in Figure 4.

Item	Question
1	Which of the following best describes your overall level of satisfaction with the online lessons that introduced you to ABAP Programming?
2	Which of the following best describes your overall level of satisfaction with the content of the online lessons in providing an introduction to the concepts and issues involved in ABAP Programming?
3	The online lessons are organized in a logical fashion.
4	The online lessons have been well prepared for this course.
5	The online lessons helped me learn how to write ABAP Programs.
6	The graphic illustrations used in the online lessons helped me understand ABAP Programming concepts presented in this course.
7	The hyperlinks to the additional information in the web-based SAP Online Help is useful in studying and learning the content of each lesson.
8	Lessons 1 thru 6 are presented in an older format as single web pages, whereas Lessons 1 thru 9 are presented in a newer format as a web page with frames where the main content with the graphical illustration is in one frame and notes are in another frame. The new format is easier for me to use (that is, a better format) than the old format.
9	Printing the lesson screens is important to me as part of studying the ABAP Programming concepts in each lesson.
10	My preference in using these online lessons is to print all the lesson screens before studying the content of the.
11	When I print the lesson material, the new format (Lessons 1 thru 9) is easier for me to print then the old format (Lessons 1 thru 6).
12	A printed copy of these online ABAP Programming lessons, that I could purchase and study, would be more useful to me than the online presentation of this course material.
13	Printing the online lessons before I study the ABAP Programming concepts is a waste of my time that would be better used if a printed copy was already available for me to study.
14	In the future, I would be interested in taking other courses that use a course format, which is similar to the format used with the ABAP Programming online lessons.

Figure 4. Online lessons assessment questions

Figure 5 presents the average response to questions 1 through 14. Overall, these responses indicate the participants were very satisfied with the web-based lessons in learning the concepts of ABAP programming, and that printing the lessons is important to them in studying the course material. As indicated in Figure 4, questions 8 and 11 did not receive as positive a response as the other items. Question 8 asked a comparative evaluation of the ease of use of the two web page formats. Less than half (42%) said they thought the new format was easier to use. A reason for this seems to be linked to the ability to print the new format material as part of their studying process. Question 11 specifically asked participants whether the new frames format was easier to print. Nearly two-thirds (65%) preferred the older (PPT97) format for printing. The reason for this seems to be the ability to readily print these as a single page. Question 14 asked participants whether they would be interested in taking other courses that used a similar format. Nearly three-fourths (73%) indicated their desire to takes course with a similar online course format. This is viewed as a positive reaction to the design of these online course materials. .

Table 1 presents the results to seven measures on the presentation of content. As indicated, all participants reported they were satisfied with the online lessons in learning about ABAP programming. Most of the respondents (88%) were satisfied in using the online materials to learn ABAP, and most (92%) were satisfied with the content of the online lessons. In addition,

most respondents (83%) were satisfied with the use of the illustrative images and that this helped them understand the course content. Most participants (81%) were satisfied with the hyperlinks to the web-based SAP Online Help as a learning support.

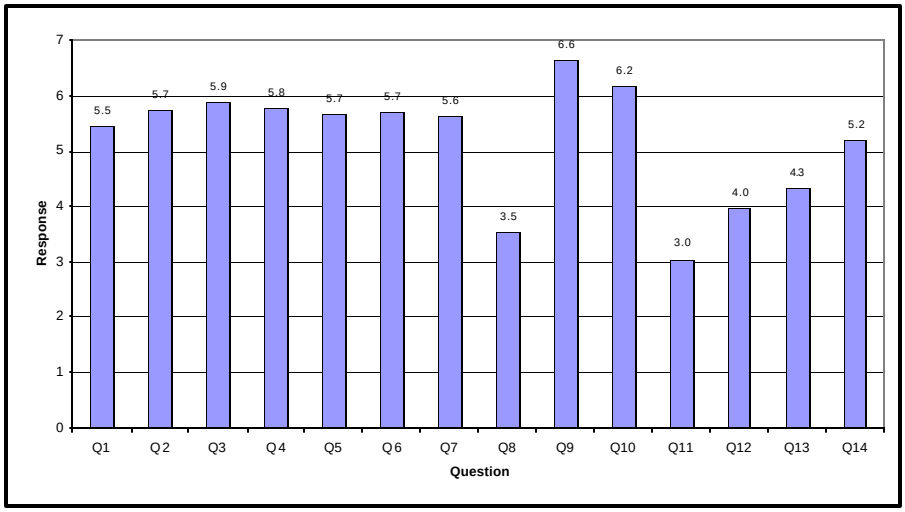

Figure 5. Mean Responses for Survey Items

Table 1. Presentation of content

Item (survey questions number)	Mean	StdDev	% Satisfied, % Agree	% Dissatisfied, % Disagree
Satisfaction with lessons in learning about ABAP Programming (1)	5.46	1.15	88%	10%
Satisfaction with content of online lessons (2)	5.73	1.09	92%	6%
Lesson organized in a logical fashion (3)	5.90	1.06	90%	6%
Lessons well prepared for course (4)	5.77	1.32	90%	10%
Lessons helped me learn how to write ABAP Programming (5)	5.67	1.29	88%	10%
Illustrations helped understand ABAP Programming concepts (6)	5.69	1.19	83%	6%
Hyperlinks to web-based SAP Online Help useful in learning lesson content (7)	5.63	1.31	81%	10%

Table 2 summarizes perceptions concerning the ability to print the lesson material. All respondents agreed that printing the lesson material is important in their studying of the lesson concepts. Although this is the electronic era, students still feel the need for hard copy when it comes to their longer term studying needs. Most respondents (85%) indicated their preference for printing all lesson screens before studying the course content. Half (50%) of the respondents felt that printing the lessons was a waste of their time; however, less than that (44%) indicated that purchasing a printed copy of these online course materials would more useful. Some of the difference in printing versus purchasing may be attributable to the difference in the out-of-pocket cost to the students for printing versus purchasing.

Table 2. Printing lesson material

Item (survey questions number)	Mean	StdDev	% Satisfied, % Agree	% Dissatisfied, % Disagree
Printing is important to me is studying lessons (9)	6.63	0.61	100%	0%
Prefer to print all lesson screens before studying (10)	6.17	1.19	85%	4%
Frames format is easier to print than single web page format (11)	3.04	2.41	31%	65%
Printed copy that is purchased is more useful than online course materials (12)	3.98	2.10	44%	42%
Printing is a waste of my time (13)	4.31	2.17	50%	35%

Additional feedback was also elicited from participants as open-ended questions. These comments provided some corroborating evidence of participants' satisfaction with the web-based online lessons. For example, one participant stated, "One of the most important benefits is that the lessons are well organized in a way that facilitates structured learning. Another very important benefit is the use of hyperlinks to access additional information." Several students also commented on the ease of access at anytime. Others commented on the idea that the new version should be made more printer-friendly with the ability to print an entire lesson with one command. And finally, another participant commented that, "Overall, I believe the online lessons are a valuable component of the course and aid significantly in learning the ABAP language."

SUMMARY AND CONCLUSION

Based on these results, the generation of HTML web pages from PPT presentations appears to be a promising method for delivering online course content that has a high work factor and provides some intellectual property protection. However, printing of online course material is an important and significant issue that needs to be carefully considered in the development and deployment of these materials. Acrobat is an important delivery technology that needs to be considered for this. Given the continual evolving of web-based delivery technologies, MIS researchers are encouraged to further investigate and search for the "best" balanced relationship among online course delivery, intellectual property protection, and ease of use associated with the printing of materials for longer term studying by students.

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