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ABSTRACT

This case study covers the process of developing a computer-assisted tutorial on how to write a research paper for returning adults at a community college. This paper discusses the need for faculty development and technical support for instructors who want to implement technology into their classrooms. Preliminary stages of the tutorial development are described, and results of a needs assessment, conducted by administering a survey to students in several first year courses at the community college, are presented. Suggestions about design and development of computer-assisted instruction (CAI) for faculty who are novices to computer technology are also provided. Suggestions include: analyze the instruction, learners, and context; after thoroughly researching the options, use a very friendly development package; learn the basic of the technology before planning the specifics of a project; insist on technical support; and work on it a little every day or at least a few times a week. (AEF)

Developing a Computer Assisted Tutorial: A Beginner's Experience

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This case study covers the process of developing a tutorial on how to write a research paper for returning adults at a community college. This paper discusses the need for faculty development and technical support for instructors who want to implement technology into their classrooms. We also provide some suggestions about design and development of CAI for faculty who are novices to computer technology.

INTRODUCTION

Administrators at all levels of instruction are encouraging faculty to attend professional development opportunities, and the administration at the community college where Julia Harbeck taught English was no different. Encouraged by presenters at regional conferences who said, "I can do it; You can too," she got the idea to develop a computer assisted instructional unit on "How to Write the Research Paper" for freshman and returning adults. Surely teachers presenting at conferences and exhibiting their knowledge at workshops couldn't be that much more intelligent than she, besides, she had received a grant to develop this product over the summer. Three whole months! What could go wrong?

You can fill in the blanks; everything went wrong, the software was out of date, the only computer which ran the authoring program needed more memory, and the person who was supposed to provide technical support was unavailable. Now a full-time doctoral student, Julia is well into the second year of working on this project, most recently with the help of excellent co-developers, Maurya Schweizer and Nathan Pienkowski who are also doctoral students in instructional technology at Virginia Tech. One of Maurya's areas of expertise is in web design and graphics; Nathan is accomplished in data base development, and Julia is the SME or Subject Matter Expert. Nathan built a data base using C++ so that we could have corrective feedback for the questions, and Maurya and Julia put all of the content previously developed into a web based design.

What we have learned from this experience is that it is absolutely essential for administrators, faculty members, and grant providers to realize that incorporating technology into the classroom takes an inordinate amount of time, planning, and technical as well as administrative support. Faculty can't be expected to attend a few computer workshops, continue teaching a full load, advise, sit on committees, and, at the same time, become proficient in developing and using computers in their classes. Incorporating technology into our curricula is not a one-time occasion. Since the learning curve for most types of technology involving computers is a sharp one for the experienced and inexperienced alike, developing and using computer technology is a life-long, recursive process.

In spite of sounding like cynics, be assured that we wouldn't be pursuing careers in instructional technology if we didn't believe that incorporating technology into the classroom was not worthwhile; however, those trying to implement it need support in terms of release time and technical assistance. Obviously, this support costs money, but if administrators want to invest in technology and have their investment pay off, they have to allow teachers the time and the opportunity to fully develop their technological competence. Faculty members who integrate

technology into their courses need to be aware of the joys and pitfalls of this experience; it is gratifying to develop a product that meets an instructional need as well as to feel a sense of accomplishment. However, you need to be aware of the challenges of working with technology particularly in developing your own computer assisted tutorial.

What follows is a brief discussion of the journey of a technologically naïve teacher trying to develop a computer assisted tutorial for freshman English students. A computer assisted tutorial is the use of any computer application to present material to a student working alone or in a small group independent of time and space constraints. This paper will cover the process of developing a tutorial, why computer assisted instruction (CAI) was chosen as a delivery medium, problems and solutions, and recommendations for administrators and teachers alike.

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PRELIMINARY STAGES

The tutorial we developed is designed to introduce students to the basics of writing the research paper. We chose the title "The Forest From the Trees" and followed through with the metaphor in the program because it describes how we see the research process, which involves creating one piece at a time to develop a whole. However, the title also applies to our journey in designing this tutorial; we took it one step at a time until we could see the completed work. The steps included: identifying a need, applying for and receiving a grant, researching and writing a sample paper, researching computer assisted instruction, surveying students, developing the tutorial, getting technical assistance, and disseminating the product. In order to have a better idea of what to propose it would probably have been better to research computer assisted instruction before applying for the grant.

Julia got the idea to develop this supplemental tutorial for writing a research paper one day while discussing the research paper project with her communication processes class. She stood at the podium and looked out over the faces in front of her. Sitting anxiously in the front row was Lori, a single mother of two, who was attending school on a grant from the federal government because she lost her job when her factory moved to Mexico after the North American Free Trade Act (NAFTA) was signed. Lori had gotten her GED a few years ago after having dropped out of school in the seventh grade. Sitting behind her was Courtney, an eighteen year old right out of high school who had written a research paper as a senior a few months before. Lori was terrified and Courtney was bored. In between these two sat the usual variety of students who had used footnotes twenty years before, endnotes ten years ago, those who hadn't been in a library since sixth grade, and those who were proficient with sophisticated electronic sources. How was the instructor going to challenge Courtney and assist Lori, as well as meet the needs of everyone else, when she was barely keeping up with teaching five classes, committee assignments, advising, and life in general? Julia had just returned from a conference on technology and had been trying to think of ways to incorporate technology into her classroom. A piece of software that could explain the basics of researching and developing a paper would be a nice start. She knew there were professional development grants available through her community college system, so she wrote a proposal and received a grant to work on the tutorial over the summer when she wasn't teaching any classes.

In the end, she decided to develop a tutorial that addresses the needs of the returning adult student, like Lori, who has little to no experience in research writing. The tutorial would discuss the basics of research, provide definitions for terms like *anthology, gazetteer,* and *index*, and supply a sample research paper. Because not all students need additional support, she also decided that the tutorial should be designed to supplement an instructor's presentation. Since she had had success using annotated and glossed sample research papers from various handbooks, she knew that she wanted to incorporate a hypertext version of such a paper in the tutorial. However, she was concerned about copyright issues, so Julia wrote her own research paper on a topic that she thought the students would be interested in and that would not be too quickly outdated. The topic she settled on was music and its affects on emotions. She realized from looking at other computerized tutorials that she needed to stay away from having too much text, otherwise the program would become an "electronic page turning exercise." If that was the case, it would make more sense to give the students a workbook. In fact, before she got too involved, she decided to research to see if there were benefits to using CAI rather than a textbook.

Although she could have had the students order a book on how to write the research paper, she was hesitant to do so because of the cost to the student and because the research unit was only one part of the entire two semester course. After reviewing the literature about CAI, she discovered some benefits to this form of information transmission over a traditional text or lecture approach. First, it is space and time independent. If the students can access the

program via the web or a disk, then they can go through it whenever it is convenient for them either at home or on a school computer. She was especially encouraged about the possibilities of interactivity that would individualize content for each learner's needs. The tutorial could be developed to branch to different sections of the program depending on the student's needs and responses to questions. For example, if a student has a problem identifying the main idea of an article in order to begin taking notes, the tutorial could route the user to another exercise on locating main ideas. For students like Lori, this type of instruction may be non-threatening because she doesn't have to raise her hand in class privately or ask the instructor what an annotated bibliography is or how to use boolean logic. Providing formative feedback to multiple choice questions is also a benefit of CAI. In addition to supporting the decision to use CAI, the research also identified some design models.

As a result of her research, Julia decided to follow the development model put forth by Dick and Carey (1996). Dick and Carey's (1996) approach is systematic and recursive. The first step is to assess needs and identify instructional goals. From there, the instructor performs an instructional analysis by examining the skills necessary to achieve the task. While conducting an instructional analysis, the teacher/developer should also analyze her learners and where they will be performing the learning task. Performance objectives are then written based on the instructional, learner, and context analysis. Assessment instruments should then be constructed based on the instructional goals. The next steps to Dick and Carey's (1996) system of design are to develop an instructional strategy and select instructional materials. The last two elements of a good design process involve conducting formative and summative evaluation. Feedback based on formative evaluation is used to revise the instruction; whereas, summative evaluation occurs once the program is completed and sent off to the user. At any time in the development process, the teacher/designer can revise and cycle back through the design model.

In our situation, the needs and goals are to provide instruction to inexperienced returning adult students about how to write the research paper. The instructor examines the skills that go into writing a research paper. The learners are returning adult students, and the contexts are the school library, computer lab, home, or any place that the student could access the web. Assessment instruments are not emphasized since the tutorial was envisioned as a step-by-step guide for the students as they write their own papers. Assessment occurs when the students apply what they've covered in the tutorial and in the class to their own research activities. We have not arrived at the formative and summative evaluation stages in our work on the tutorial.

Whether or not practicing teachers can apply a design model like Dick and Carey's (1996) while developing their own instruction depends on the situation. Many teachers probably won't have time to follow through this design step-by-step. What is important, however, is that the instructor designing his/her own product at least carefully analyzes the instruction, learner, and context to ensure that the final product will be useful in their classrooms.

Although she had taught the research unit to college students for over twelve years, Julia decided to conduct a formal needs assessment by administering a survey to students in several first year courses at the community college where she taught. Table 1 and 2 summarize the results (see Appendix A for more information). When the survey was developed, Julia was still planning on designing the tutorial for all first year students rather than focusing on returning adults. Therefore, it was difficult to pinpoint the needs of the returning adult population based solely on the survey. For example, there were three students surveyed who had never written a research paper. It would have been useful to glean information about those particular students' needs to see if they were returning adults and, if so, to examine how they responded to questions on the survey. It was possible, however, to discern a few patterns from looking at the results, the most of important of which is that the majority of the students said they would use a sample research paper. The rest of the results fell in the mid-range of the Likert scale and didn't really help much in determining what areas to focus on in developing the tutorial.

Table 1: Percentage of students responding in each category of the Experience in Writing a Research Paper survey

Statement	Not at all 1	2	3	Very Much 4
Experience writing research papers.	2%	51%	38%	8%
Anxiety level associated with writing research papers.	8%	45%	36%	10%
Experience using parenthetical documentation	15%	34%	26%	24%
Problems choosing a topic	8%	55%	29%	8%

Table 1 continued

Statement	Not at all 1	2	3	Very Much 4
Difficulty conducting research in the library	27%	53%	19%	1%
Use of note cards	26%	41%	23%	11%
Difficulty organizing notes and developing a rough draft	26%	41%	34%	0%
Would you use a computerized tutorial about writing a research paper?	13%	41%	32%	15%
Would you use a correctly written research paper as a guide?	2%	21%	36%	41%

	1 year	2 years	3 years	4 years
# Years attending college	40%	49%	11%	2%
	1 paper	**2 papers**	**3 papers**	**4 papers**
# Papers to write fall '96	22	35	14	28

Table 2: Count of students responding in each category of the Experience in Writing a Research Paper survey

Statement	Not at all 1	2	3	Very Much 4
Experience writing research papers.	3	73	54	12
Anxiety level associated with writing research papers.	12	64	51	14
Experience using parenthetical documentation	21	49	37	35
Problems choosing a topic	12	78	42	11

Table 2 continued

Statement	Not at all 1	2	3	Very Much 4
Difficulty conducting research in the library	39	75	27	2
Use of note cards	37	58	33	15
Difficulty organizing notes and developing a rough draft	37	40	48	0
Would you use a computerized tutorial about writing a research paper?	18	58	45	21
Would you use a correctly written research paper as a guide?	3	30	51	58
	1 year	**2 years**	**3 years**	**4 years**
# Years attending college	56	66	16	3
	1 paper	**2 papers**	**3 papers**	**4 papers**
# Papers to write fall '96	30	48	19	39

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IMPLEMENTING THE DESIGN

After spending a month or so gathering materials, writing the sample paper, and developing the content , Julia was ready to learn the technology. She had decided to use an authoring package called Authorware because a presenter at a conference had used it to develop a tutorial for his veterinary tech class. Authorware seemed to have the tools necessary to provide the interactivity and feedback that she wanted, and he had said that it was a fairly easy program to learn. In addition, and the resident computer expert at the community college said that she would be willing and available to teach the fledgling technologist how to use this program, and the school already had a copy of the program. Julia then took a week-long course in Authorware at Virginia Tech and discovered that the program was very difficult to learn. In fact, the instructor for this course said that Authorware had at least a six month learning curve. Undaunted, she traveled back to the community college eager to develop the tutorial. After weeks and weeks of attempts and failures as she sat alone in the computer lab, our instructor/designer realized that this was

no plug and play process.

Because of problems associated with Authorware, conflicting versions, memory and hardware requirements, and lack of technical support, the technology ended up driving the design rather than the design determining how the technology was utilized. The tutorial, which began on paper as an interactive, feedback-providing brainchild was quickly developing into an electronic page turning exercise. The instructor had good ideas and nice plans on paper, but she could not implement them with the technological constraints she was operating under.

In the meantime, Julia had been accepted and began attending Virginia Tech in the instructional technology program. After a good bit of time passed, including the deadline for the grant proposal and a humiliating presentation of the crippled tutorial, she finally got what she had needed all along, technical support through Maurya and Nathan.

Our first decision as a team was to scrap using Authorware for two reasons. First, none of us had the Authorware expertise to manipulate the software into doing what we needed, and, second, we could not give the product out to any schools that did not have access to the latest version of Authorware. Therefore, we decided to use the web development software Microsoft Frontpage, which would allow us to put the tutorial on the Internet where any school that had networked computers could access it. Even with the collaborators' help, the tutorial is still not quite as grand as envisioned, but it is not an electronic page turning device anymore either. Through this experience we have learned a lot about design and implementation of CAI, and we hope to apply what we've learned to other projects.

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SUGGESTIONS AND RECOMMENDATIONS

Here are a few suggestions for novice technologists who want to develop a computer assisted tutorial in their classroom: analyze the instruction, learners, and context; after thoroughly researching your options, use a very friendly development package; learn the basics of the technology before you start planning the specifics of a project; insist on technical support; and work on it a little bit every day or at least a few times a week.

Research all of the options that you have when choosing software development packages, or hardware options. Read articles by people who have used the programs, find out the learning curve, look at reviews, and contact help-desk technicians; if anyone knows whether or not a program is user friendly, they will. Make sure that you select a technology package that meets your needs, provides online help, documentation, and tutorials. Try and locate someone at your workplace who is familiar with the application you want to use and who has the time to work with you. You may also want to consider collaborating with one or more people since developing a tutorial often requires different areas of expertise. If you are very new to computer technology, you might want to start with a Microsoft PowerPoint project. Hyperstudio for Mac and PC is also a fairly simple but useful program. Currently, there are many products on the market for developing basic web pages.

In line with picking a technology that matches your level of experience, make sure your project matches your expertise. If you are a beginner, start simple. Trying to develop an entire tutorial on how to write the research paper was a mistake. Julia should have picked one area, for example, choosing a topic or locating sources, rather than address the complexities of writing a research paper from beginning to end. As a novice, make sure your project is simple and can be developed in a short amount of time so that you can experience success.

If you are integrating technology in your classroom in response to suggestions from administration or if you have a supportive administration, try and get some release time for your project. If your school has instructional technologists on staff, contact them and tell them what you want to do and ask for any assistance they can provide. If there isn't any technical support staff at your workplace, you may want to reconsider implementing technology until you can be assured of assistance. Finally, try and work on the project every day or at least a few times a week. With technology it is important to use it often in order to learn it, as well as to remember where you were and what you were doing the last time you sat down to work on your project.

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CONCLUSION

Developing your own computer assisted instructional tools, such as a tutorial, can be a rewarding and useful experience. If you take a few preliminary steps and have technical support, you can develop technology that will meet the needs of your students. Based on Julia's experiences analyze your instruction, learners, and context; start simple, and, most importantly, research the programming tools you plan to use!

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