A Web-based Training Tool for Medical Dosimetrists

A. Boyer, J. Stringer, J. Kemp, P. Dev
Stanford University School of Medicine
Stanford, California
boyer@reyes.stanford.edu

The goal of this project is to develop and assess a nationally available web-based training tool for medical radiation dosimetrists. Medical dosimetrists are essential members of the radiation oncology team. As the practice of radiation oncology integrates more advanced technology that relies increasingly on computerization, the need has accelerated for trained medical dosimetrists skilled at utilizing this new technology. The program proposed here is in response to a shortage of dosimetrists that threatens to undermine the practice of radiation oncology in the United States. This shortage of trained specialists is stalling the implementation of technically advanced radiotherapy. In particular, there is a need for more medical dosimetrists in order to implement three-dimensional conformal radiation therapy and intensity-modulated radiation therapy. Clinical trials of radiation in combination with new pharmaceutical and biological agents will not be possible without a strong medical dosimetry component.

Individual medical physicists or dosimetrists acting as personal mentors train the overwhelming majority of dosimetrists informally. The economic constraints of the managed care environment are decreasing the discretionary time available to individual mentors. Training programs for medical dosimetrists have also been adversely affected by the economic reductions produced by managed care. It has become increasingly difficult to conduct independent training programs at the major academic cancer-care centers. The average pass rate of candidates taking the Medical Dosimetrists Certification Board exam has a negative slope.

A collaboration between SUMMIT (Stanford University Medical Media and Information Technologies), a research and development center at Stanford, and the Radiation Oncology Department at the Stanford University School of Medicine has initiated a project to create a web-based training tool for medical dosimetrists. Pooling training resources using the Internet can side-step redundant curriculum development and avoid using valuable human resources on lecturing to small classes of less than 5 students. The training material will originate with volunteer authors. By volunteering to develop a single module within a larger cooperative effort, skillful mentors can leverage time developing material in their area of expertise by a factor of about 20:1 to obtain access to a web-based tool that covers the entire medical dosimetry training curriculum. The intent is for the tool to be used by mentors who will be responsible for their own credentials and program structure.

Course Content. The tool will consist of up to 23 course modules based on the training recommendations of the AAMD Education Committee. Each module will consist of up to 30 training session's equivalent to conventional lectures. The training sessions will be assembled using the HyperText Markup Language (HTML). Each of the training sessions will consist of approximately 20 HTML pages in a path followed by approximately 20 self-test quiz questions using commercial software. Each module will be preceded by a pre-quiz consisting of approximately 20 questions, and will end with a final exam consisting of another approximately 50 questions. The goal of the project is to author up to 9,000 HTML pages and approximately 1000 questions during the 5 years of the grant. Each module will have a title and will contain a list of instructional objectives. The Stanford staff in collaboration with the authors will develop the titles and instructional objectives of the courses. The authors will be primarily responsible for developing the instructional objectives and exam questions. The authors will develop text and graphic using computers at their disposal in their respective institutions. The text and graphics will be uploaded to the course server over the Internet and converted to HTML pages by the SUMMIT personnel in the

appropriate course paths. The project manager will provide instructions to the authors on how the pages can be modified and will perform a final edit of each page after it has been authored.

Stanford Staff. The support staff required at Stanford includes Dr. Boyer, Director of the Radiation Oncology Radiation Physics Division and Director of the Dosimetry Training Program at Stanford, and Dr. Parvati Dev, the Director of SUMMIT (Dev, 1999). In order to complete the project, a project manager, a computer systems analyst, a web page editor, and part-time graduate students will be needed. An educational development specialist will be required to guide the formation of the curriculum and training material by serving as an Educational Consultant. A psychometric analyst will be required to guide the development of the student assessment and exam questions. Funding for this staff is being sought from the National Cancer Institute.

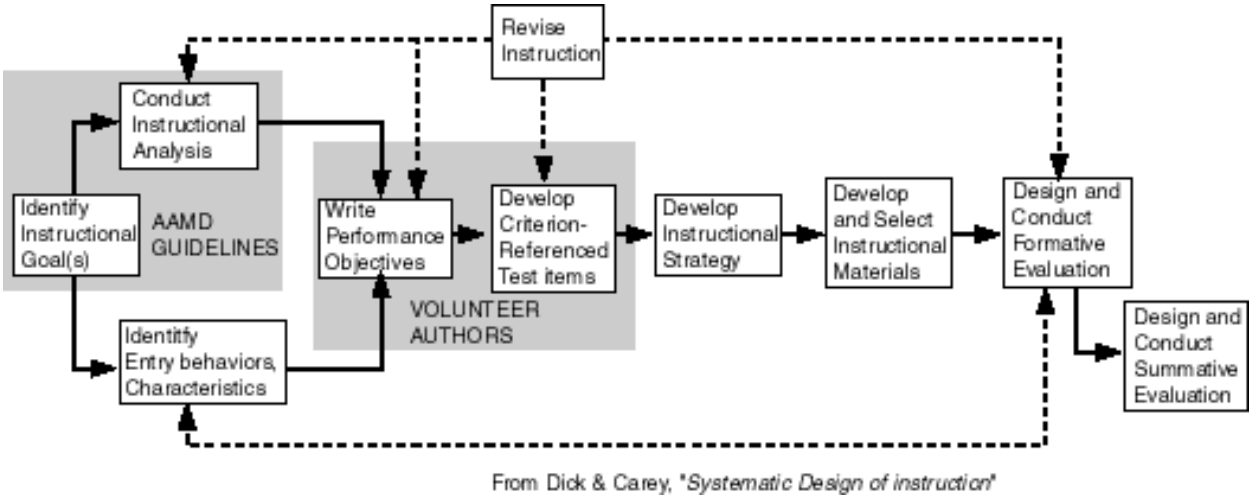

Figure 1. The Dick and Carey design model Systematic Design of Instruction (SDI).

Development Methodology. While the course relies on instructors from around the country to provide cutting-edge content and quizzes, its overall organizing principle will not rely on their individual instructional agendas. The training tool will strive to provide students with a unified teaching strategy regardless of the module originators. A student, for example, will be able to enter any module and feel completely at ease with the learning affordances; they will be able to navigate around the module, and they will know what is expected of them and what they will learn through the material. Toward this goal of continuity, we've selected the "Systematic Design of Instruction" (SDI) method as most appropriate for this course (Dick, 1985), the SDI is an industry standard for developing skills-based instructional materials (Carlton, 2000). The SDI process, as shown in the flow chart in Figure 1, advocates an iterative, student-centered and formatively assessed process broken into straightforward steps:

(1) Identify instructional goals

The instructional modules and their associated instructional objectives were derived from the recommendations of the American Association of Medical Dosimetry Curriculum Guide. The project will rely on input from the Education Committee of the AAMD, the Training and Practice of Medical Dosimetry Subcommittee of the AAPM, and the Education Committee and Workforce Committee of the ASTRO. Through these channels a curriculum will be developed that meets the needs of the radiation oncology community for trained medical dosimetrists. The instructional goals will be clarified and refined by the Education Consultant.

2) Conduct instructional analysis

The existing AAMD curriculum guidelines will be the starting point of this analysis. One thing our program does offer in this category is a framework for mentors to work within as they guide their Dosimetry students. With quizzes and modules designed to closely match the skill groupings required in Dosimetry certification, we feel the mentors can use the resource to analyze instructional needs in their

given context. We have designed and tested four separate and distinct evaluation tools:

- A survey of representative mentors and potential course authors about their teaching practices (n=11);
- An email survey of potential students for the class to uncover the study methods they employ to prepare for the Medical Dosimetrist Certification Exam (n=14);
- Formal, videotaped user testing with one-to-one feedback from post-doctoral researchers in radiation physics (n=3);
- A full-fledged pilot test of three modules in Anatomy, Radiation Physics, and Radiobiology with radiation therapists and potential dosimetry students (n=10).

Instructor Survey. This eight-question e-mail survey was sent to working radiation physicists and medical dosimetrists who are currently engaged in formal teaching duties, informal mentoring of dosimetry students or in the development of Dosimetry curriculum. They teach an average of 19.6 hours a month; 18% receive compensation specifically for teaching and 90% of respondents stated that they were currently instructing at least one dosimetry student, with the average number of students taught at 2.8. Professional associations figure prominently in this group with 64% belonging to the AAPM, 45% in the AAMD and 27% in ASTRO. They described their coworkers as including (on average) 3.7 medical physicists, 4.5 radiation oncologists, 1 radiation safety professional and 4.6 dosimetrists.

The goal of this survey was to uncover perceived gaps in Medical Dosimetrist training programs and curriculum, to isolate existing training methods and materials and to gauge the need for additional training resources in the field. We found that the group was very enthusiastic about Web lessons with 90% agreeing or mostly agreeing with the statement, "An Web-based course in Dosimetry would help my students."

Perhaps most importantly, we found which materials are currently employed in teaching medical dosimetry. The chart in Figure 2 shows how different materials instructors utilize now. We used this information to alter the materials presented in a pilot of the tools.

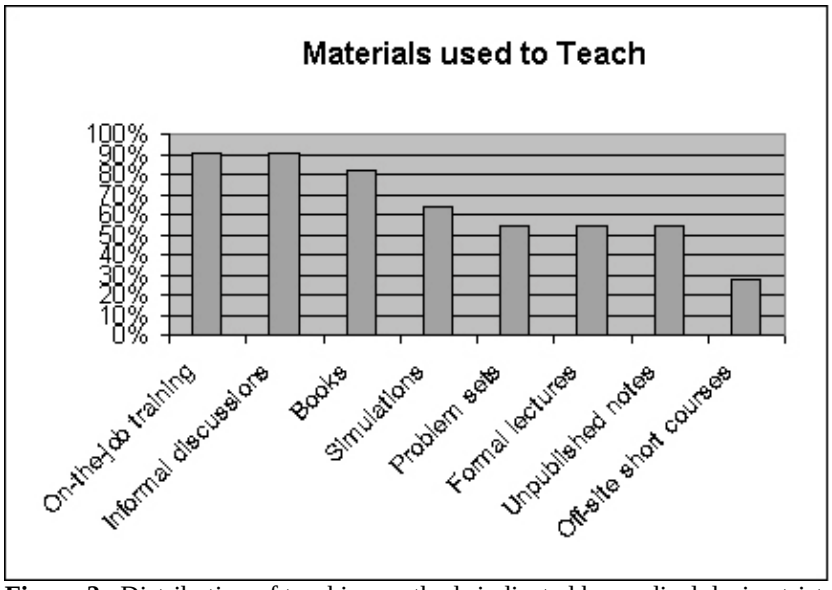

Figure 2. Distribution of teaching methods indicated by medical dosimetrist mentors derived from the survey.

The following are examples of comments made by the domain experts surveyed in response to a question about what makes the course good:

"CONTENT: The wording of the lectures is clear, easy to follow and presented in sufficient detail without run-on sentences, grammatical or spelling errors. All terms and symbols are defined. Diagrams and drawings are plentiful, well presented in color, detailed, large enough to read comfortably and simple to understand. Material is presented in multiple formats with sound, text, diagrams, etc. Links to additional materials are provided.
NAVIGATION: The course is easy to navigate with plenty of convenient interactive features. Exercises have convenient links to lectures for review. The web site is available to view at all times and loads quickly on a 56k modem.
QUIZZES: Quiz questions and answers are factually correct, closely match the material presented and are questions that will be encountered on the Dosimetry exam. Sufficient review is offered before taking a quiz."

3) Identify entry behaviors and learner characteristics

We sent an email survey to 14 potential dosimetry students. The purpose of this survey was to understand the learning context of medical dosimetry students, to gauge their ability and enthusiasm to benefit from an on-line mode of learning, and to isolate the methods and materials they currently use to train. We found that 38.5% had used the Internet to research work-related topics and that 57% have Internet access directly to their desk with only 7% having no access at their desk or home. In short, these students are fully connected to the Internet and technically prepared to enjoy the benefits of distance learning resources. In fact, while none of the students had taken an Internet course, 36% had participated in a correspondence course.

The survey respondents averaged 26.4 months of on the job training or formal training. Of this group, seven are currently radiation therapists, five are serving as uncertified dosimetrists, one is a medical physics resident and one respondent classified himself as a "student extern." These students reported spending an average of 82.8 hours a month in formal and informal dosimetry training. None has passed the MCDB exam, though 64% plan on sitting for the exam in June, 2001 or June, 2002. They come from very small student cohorts, averaging a little more than four dosimetry students in training at their locations. Their training mentors and are likewise a small group of professionals (averages given): Medical physicists: 6.7; Radiation Oncologists: 8.5; Radiation Safety professionals: 1.1; Medical Dosimetrists: 5.6; Other: 1.8.

Student Study Materials			
92.9%	On-the-job training	64.3%	Formal lectures
85.7%	Books	57.1%	Problem sets
78.6%	simulation	50.0%	Unpublished notes
78.6%	Informal discussions	28.6%	Off-site short courses

Table III. Results of student survey.

The students are very enthusiastic about an Internet option. 92% of the students surveyed agreed or mostly agreed with the statement, "A Web resource with prepared lessons on medical dosimetry would help me learn." When asked which materials they use to study, they answered in the order summarized in Table III.

These responses by the students were in rough agreement with the responses of the mentors although the students viewed on-the-job training as a more frequently used resource than did the mentors.

4) Write performance objectives

Every module author is required to create detailed instructional objectives for each portion of their material. This simple action is essential for students and their mentors who are time-strapped by work and need to gauge the content's relevance before committing to study it. Requiring authors to formulate these objectives also helps streamline their later work creating quizzes and organizing the material into a coherent whole.

5) Develop criterion-referenced exam items

Every model author will work with the project's education consultant and project manager to create quizzes that directly match the instructional objectives and presented material. Vague questions or items that fall outside the specific lesson will be trimmed and refocused to better assess learning by the education consultant. Exam question banks for each module will be reviewed by a panel of medical physicists and medical dosimetrists to test for content validity. The medical physicists will be drawn from the pool of oral examiners of the American Board of Radiology that examine in Therapeutic Radiological Physics. These panelists have the expertise and experience to evaluate the content validity of a question relative to competency. The panelists are sufficiently isolated from the Medical Dosimetrist Certification

Board to avoid conflicts of interest. A psychomatrician consultant will assess design validity. Performance statistics on exam questions will be acquired from the tool itself. The psychomatricain will use these statistics to assess the design validity of the modules and the exam questions associated with the modules.

6) Design an instructional strategy

The previous experience of SUMMIT with the Stanford Medical School curriculum, and our pilot testing confirm the position found in the medical training literature, that the most effective instructional strategy combines interactive on-line instruction with off-line interaction with mentors. The commercial software WebCT is being investigated as the means to deliver the on-line training modules. WebCT originated at the University of British Columbia (http://www.WebCT.com). Figure 3 shows a prototype page created by this software as it appears in the Anatomy prototype module. The authoring tools provide a means to upload HTML files for pages of didactic material. These pages can include graphic illustrations created as GIF or JPEG files. The pages can also contain links to other modules within the training program as well as links to other web sites. The HTML pages can be sequenced as instruction paths through an instructional module. The pages can be created with Microsoft Word and saved as HTML files. The tools for uploading the files provide for storing the pages in directories from which they can be drawn for creating the instructional paths. In addition to static graphics files, dynamic GIF files can be included to give the pages motion. WebCT is relatively easy to learn to use. Graphics files can be saved in directories and inserted into the HTML files as needed for illustrations. Graphics can be used for illustrations within text pages or as icons for navigating around the web site.

Figure 3. Example of an HTML page from the prototype Anatomy module implemented in the WebCT environment illustrating the navigation tools and the layout of text and graphics.

The authoring software also provides for practice quizzes. The modules will also contain practice quiz questions provided by this feature. The expected time spent by the student on a module will be up to approximately 40 minutes reading and interacting with the approximately 20 HTML pages that will constitute the didactic portion of the module, and up to 20 minutes taking the practice quiz. The practice quizzes will generally be composed as multiple-choice questions. If the student answers a question correctly, they will be given the next question in the sequence. If the student selects one of the distracters (see Figure 4), they will be offered a link back to the HTML page that contains the material that should allow them to answer the question correctly. After dismissing that page, the student will be allowed to attempt the question again (Boyer 1984). The exact answer to the question need not be found on the page. However, the underlying concept with which the student should be able to answer the question can be found on the page. After dismissing that page, the student will be allowed to attempt the question again. The student can practice the quizzes as often as they wish. By immediately repeating and reinforcing the lesson in the practice quiz, the students will be provided an enhanced learning experience.

Figure 4. Example of a quiz question with feedback to the appropriate didactic page. By pointing and clicking on "this section" the student

As modules are developed and placed on the Stanford University server, the modules will be password protected. Authors' passwords and student passwords and privileges will be maintained by systems analysts. By the time the tool is fully utilized, it is anticipated that approximately 400 passwords and accounts will be distributed and maintained.

Off-line interaction with mentors will consist of one-on-one oral exams given by the mentors to their students after the completion of each module. In such exams, the mentor can rapidly determine the student's weaknesses and use the exam time to do conduct mentoring by asking leading questions and clarifying inadequate perceptions or misconceptions. This method of integration with the web-based Internet modules will be evaluated in a distant-learning environment at the University of Wisconsin at La Crosse. The instruments described below will be used to assess the effectiveness of the off-line mentoring.

7 Develop and select instructional materials

Volunteers from the AAMD and the AAPM will author the modules. The first edition of the tool will be authored over three years. Approximately 20 authors will each be responsible for generating instructional material for approximately 150 HTML pages per year. The material will be drawn from the author's previous experience mentoring medical dosimetrists or from their background expertise as trained and practicing medical physicists and medical physicists. In addition, the full-time project manager at Stanford will spend an additional 2000 hours per year working on converting the material to HTML pages. Most frequently the project manager will communicate with the authors by telephone and email. Graduate students at SUMMIT will assist the project manager, especially when authors request graphics in the HTML pages. The graduate students will communicate with the authors by telephone and email.

By working with the project's project manager and education consultant, authors will be able to isolate those activities most translatable to online delivery. And, if they need additional assistance creating activities and lectures that work well online, that help will be available as well. One of the project's main strengths will be to give these top-flight instructors access to the newest technologies in medical pedagogy and to spread their best practices from mentoring single individuals or small classes to a wide world of varying learning contexts.

8) Design and conduct formative evaluations

The SDI method has very specific recommendations to improve instruction through early student involvement and monitoring. A formative evaluation evaluates the learning tools themselves in order to continuously improve and alter the course. We have demonstrated the use of formative evaluations in pilot studies. Using three sample modules, we've conducted user studies with novices and experts, small group evaluations and a fully formed pilot test with target students in the field. From these trials, we've altered key features we had falsely assumed would be embraced by students. The interface has been streamlined to ease navigation, quiz layouts and contents have been altered and refocused on students' needs. Continuing use of the formative evaluation tools will shown us which activities work best for these busy students and which modules need reworking to better fit their context. The amount of study time required for each module will be carefully monitored and student's comments used to counter previously held assumptions to make the class more useful.

<u>User-testing with experts</u>. Very early in the process of designing the pilot course modules, we conducted interviews with three post-doctoral students and asked them to work through early prototypes of sessions in the Anatomy, Radiation Physics, and Radiobiology modules. We recorded their initial impressions while they were using the WebCT sessions and sought to isolate any problems they had navigating the course. The problems uncovered were very useful in altering the form and function of the fully formed pilot modules. These three non-native speakers uncovered a wide range of problems. The problems discovered included navigation issues where the course module didn't have an overview screen to

facilitate quick reviews during lectures, confusing control buttons, and unclear intention for quiz submission buttons. We found where text was too small to read and where sound-clips failed to download as indicated in the lectures. We also found some exercise directions that were misleading to our expert users. Finally, we uncovered mistakes in fact and in grammar that were quickly altered and corrected.

Pilot test. A subset of ten dosimetry students from among the respondents to the email survey agree to sit for a pilot course over the Internet. They were issued user names and passwords and provided instructions on how to enter the class from remote computers. The home page of the Pilot is given in Figure 5. The pilot contained a single session from each of the prototype topic areas: Anatomy, Physics Fundamentals and Radiobiology. The students required about three hours to complete the sessions. In order to assess the learning transfer of such a brief set of material, we decided to use open essay-style questions to assess the shift in understanding facilitated by the course. Toward that goal, student answered two questions:

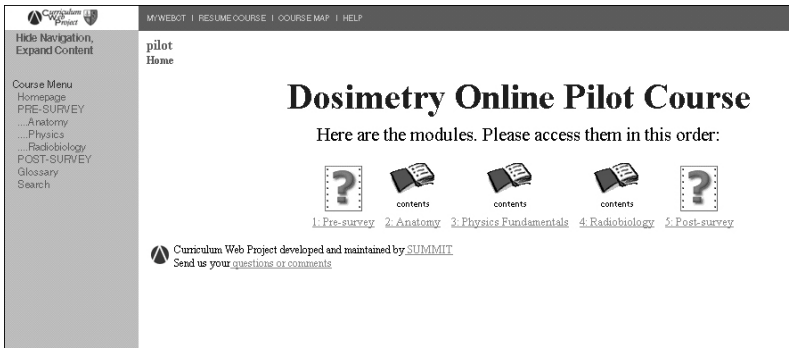

Figure 5. Home screen of the Pilot test of three prototype sessions out of the Tool.

"How does radiation harm tissue? What are the individual steps to this process? Take a few minutes to think of all you know about radiation's effect on tissue. Please be thorough."

"How are x-rays produced in radiation therapy? What are the individual steps to this process? Take a few minutes to think of all you know about x-ray production. Please be thorough."

Then, by comparing the pre-course answers and the post-course answers, and coding them for specificity, we saw a dramatic increase in understanding. On average, students were able to present 2.5 more discrete specific pieces of information.

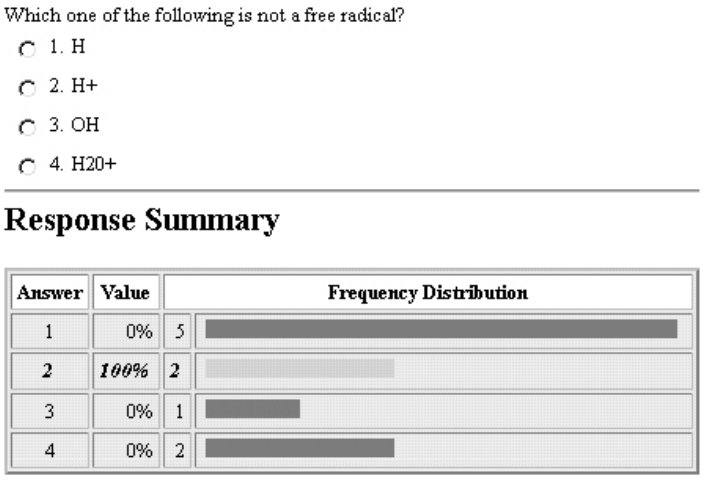

Figure 6. Post-Pilot survey screen showing analysis of students' scores.

By creating sample quizzes at the end of each module, we were able to assess not only the modules themselves, but also the mapping of the test questions and answers to the material. So, in other words, gaps in the module content, and likewise, improper test questions could be isolated and fixed for final course rollout. Figure 6 is an example of the screens we used to assess the efficacy of our module and quizzes. Notice that in this case the correct answer (answer #2) is not the one chosen by the majority of students (answer #1).

9) Design and conduct summative evaluation

Summative evaluation of the course will be achieved through a variety of metrics. Two types of evaluation tools will be integrated into the software development. One type of assessment will evaluate the performance of the students. A second type will evaluate the effectiveness of the CAI modules to improve their performance as in instructional tool. A summative evaluation of the learning tools assesses the effectiveness of the tools to train students to the instructional objectives. To date, we've completed an

initial pilot rollout of a sample portion of the course. In formative evaluations, students have been overwhelmingly positive, but near and distant transfer, exam pass rates and usability and learnability issues have not been quantified. A psychometric consultant will conduct quantitative summative evaluations of the course's learning effectiveness using the larger numbers of students and module statistics that will be available once the tools are complete and in use.

Student Assessment. The most common evaluation of the effectiveness of the course modules is to assess the students' pre-intervention knowledge with an examination and compare quantitatively their improvement as displayed in the post-intervention exam. These two instruments will be substantially similar, asking nearly identical questions to evaluate the learners' progression and gained competency through a given set of material. The authoring software also provides for the creation of exams. Two types of quizes are available, an ungraded practice quiz and a final graded exam. Exam questions can be multiple choice, single answer, or essay. As the students answer the questions, the software automatically grades the nonessay answers and keeps a score. The students are not informed whether they answer a question correctly or not. The scores are made available to mentors through password protected files. Students can be grouped according to their mentor. An example of an exam question is given in Figure 7.

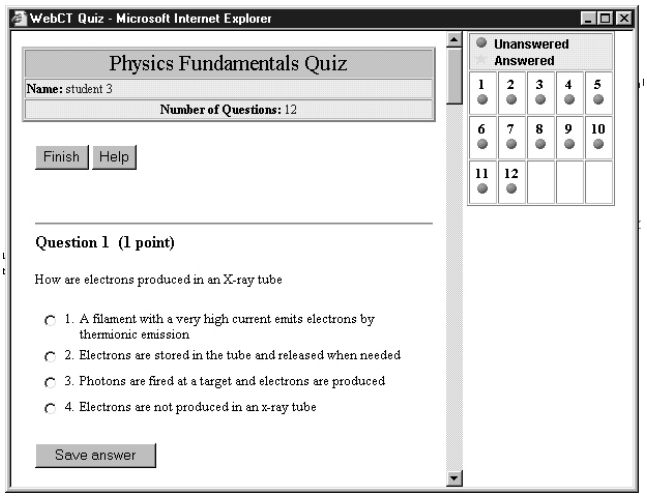

Figure 7. An example of a multiple choice quiz question that can be created by the webCT program.

The exam questions can be entered (see Figure 8) and stored in a library of examination questions. The question library can be structured by learning material category. The bank of exam questions can be made quite large. A subset of questions can be organized into an exam. This exam can be activated in the program for a selected period of time and then automatically terminated. Rotating sets of questions can be made available to the students to make exchanging exam questions between student groups difficult.

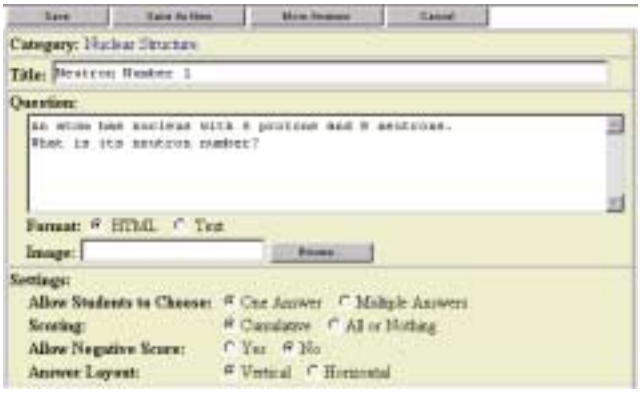

Figure 8. Screen that provides for input of exam questions.

The validity of the exam questions will be determined by using panels of domain experts. The panels will be drawn from the medical physicists who serve as oral examiners for the ABR or for the ABMP. Writers of the written exams will serve on the panels as well. In this manner, the content validity of exam questions will be maintained relative to the instructional objectives.

An Education Consultant will develop and oversee the use of the tools. The Consultant will provide two levels of support to the grant. First the Consultant will provide evaluation guidance concerning the analysis and assessment of the web-based distance-learning program. This will range from guidance concerning the pre- and post-test instruments, to analysis of web-based instruction and learning. In addition, the Consultant will provide direction for the projector director who will be providing day-to-day evaluative services throughout the year, including administering test instruments and collecting the results

associated with specific modules.

Validity of exam questions will be established by having all the questions scored by panels experienced at examination in the areas of each module. The panels will be drawn from the pools of oral examiners of the ABR and the ABMP.

A psychometric consultant to the project will assess the reliability of the exam questions. The consultant will analyze the scores of the pre-quizzes and post-quizzes along with survey responses. Using this data the consultant will provide an assessment of the reliability of the exam questions along with recommendations for improvements. The Stanford staff will provide feedback to the module authors over the course of the years between workshops and at the annual workshops.

Web-based learning environment evaluation instrument (WEBLEI). After viewing a substantial portion of the course material, students will complete a partial WEBLEI survey. The results of these surveys, both individually and in aggregate, will be analyzed by the PI and the educational assessment consultant and shared with the authors at the annual workshop. Chang (Chang 1999) developed the WEBLEI. Chang identified recent developments in assessing online curricula and created an instrument to measure instructional effectiveness. We've isolated two sections (roughly half of her measures) that deal specifically with issues encountered in our program. The two sections address students' overall satisfaction with course modules and deal with how the web-based learning materials are structured and organized, and whether the materials presented follow accepted instructional design standards, such as stating its purpose, describing its scope, incorporating interactivity, or providing a variety of formats to meet different learning styles.

(The following questions include a Likert scale with 5 response options of Almost Never, Seldom, Sometimes, Often, and Almost Always.)

Section 1: Satisfaction measures including enjoyment, confidence, accomplishments, success, frustration and tedium

- I felt a sense of satisfaction and achievement about this learning environment.
- I enjoy learning in this environment.
- I could learn more in this environment.
- The technology resources enhance learning.
- I was supported by positive attitude from my peers.
- I was able to access the materials without much difficulty.
- I had no difficulty using the technology.
- I am confident in using the technology.
- I have no problems going through the materials on my own.
- I was in control of my progress as I moved through the material.
- It was easy to move about in the material.
- The web-based learning environment held my interest throughout my course of study.
- I felt a sense of boredom towards the end of my course of study.
- I felt isolated towards the end of my course of study.

Section 2: Information structure and design

- The learning objectives are clearly stated in each lesson.
- The scope of the lesson is clearly stated.
- The organization of each lesson is easy to follow.
- The structure keeps me focused on what is to be learned.
- Expectations of assignments are clearly stated in my subject.
- Activities are planned carefully.
- The subject content is appropriate for delivery on the Web.
- There is a logical sequence of presentation of the subject content.
- The presentation of the subject content is clear.

- The quiz in the web-based materials enhances my learning process.
- The material shows evidence of originality and creativity in the visual design and layout.
- The graphics used in the material are appropriate.
- The colors used in the material are appropriate.
- The multimedia technology (e.g. animation, graphics, sound, video) contributes to the affective appeal of the material.
- The links provided in the material are clearly visible and logical.
- The links provided are relevant and appropriate to the document.
- The links provided are reliable i.e. no inactive links.
- The 'Help' system included in the material is context-sensitive.
- The web-based learning approach can substitute traditional classroom approach.
- The web-based learning approach can be used to supplement traditional classroom approach.

The responses will be acquired and analyzed by Internet tools and the results made available to the psychomatrician and the education consultant. They will in turn make recommendations for refinements of the tool to the Stanford staff and the authors that will be presented to the authors at annual workshops.

Workshop. Workshops will be held during two days preceding or following the annual AAMD national meeting. The authors committed to carry out the authoring tasks and invited instructors will attend the workshops. Using funding provided by The American Association of Physicists in Medicine and the American Society of Therapeutic Radiologists, a pilot workshop was held June 23-24, 2000. A summary of the pilot workshop is listed in Figure 9. The attendees received lectures on educational principles, principles of CAI development, the goals of the project, and specific instruction on the use of the CAI authoring tool. A previously developed prototype CAI module in dosimetry was used to illustrate the use of the authoring tool and the implementation of the goals of this project. Upon receiving funding, this project will hold an inaugural workshop at which authors will finalize their instructional objectives and other arrangements with SUMMIT to develop the medical dosimetry courses. Thereafter annual workshops will to evaluate the program and refine the modules available on the server at Stanford. Using data derived from assessment instruments within the tool itself, the PI and Co-PI will provide an annual report on the tool giving the number of students and mentors that have used the tool in the last year, statistics on student log-on time, anonymous summaries of test results, and summaries of the assessment instruments built into the tool. Recommendations will be made to improve specific modules.

Day 1		Day 2	
8:00-8:30	AAMD Task Group 3	8:00-8:30	Today's Goals
8:30-9:30	AAMD Guidelines	8:30-9:30	Existing Program I
9:30-10:00	The Web-based CAI Proposal	9:30-10:00	Existing Program II
10:00-10:15	Coffee Break	10:00-10:15	Coffee Break
10:15-10:45	Education Principles	10:15-10:45	Existing Program III
10:45-11:15	Teaching with the Web	10:45-11:15	Existing Program IV
11:15-12:00	Introduction to WebCT	11:15-11:45	Existing Program V
12:00-1:00	Lunch Break	11:45-1:00	Lunch Break
1:00-2:00	Introduction to HTML	1:00-2:00	Treatment Planning
2:00-3:00	HTML Pages For Teaching	2:00-3:00	Developing Practicums
3:00-3:15	Coffee Break	3:00-3:15	Coffee Break
3:15-4:15	Writing Exams	3:15-4:15	Commitment To Modules
4:15-5:00	Dosimetrists Exam Files	4:15-4:30	Closing Remarks

Figure 9. Outline of the first pilot workshop on the tool.

Conclusions. This tool will provide a needed service to the radiation oncology sector of the national health services system by developing a flexible, curriculum-driven program aimed at developing and sustaining an innovative educational approach that ultimately will have an impact on reducing cancer incidence, mortality

and morbidity, as well as on improving the quality of life of cancer patients. The annual infusion of an adequate number of well-trained medical dosimetrists into the radiation oncology work force will constitute a significant contribution to improvement of health for everyone. Dosimetrists and medical physicists who have an interest in contributing material to the tool, or who would like to use the tool to train medical dosimetrists, are invited to contact Dr. Boyer at Stanford University School of Medicine (boyer@reyes.stanford.edu).

Prototype Web Site:

www.summit.stanford.edu/boyer.html
username: medos password: medos

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