1. A brief summary of the Masters’ project

1.1 Goal of the project:
- The purpose of this Web-based course is to present dynamic representations of the sub-atomic, molecular and biochemical processes involved in Dosimetry toward the goal of educating adult students who may only have access to static diagrams of these highly dynamic interactions.
- It is these gaps in skills mastery and conceptual understanding that this online course aims at filling.

1.2 Learners:
- Dosimetrists who need to brush up on their skills or Radiation Therapists who are looking to step into a role of greater responsibility.

(A point to note: there are very few dosimetrists in the US, there’s only one expert in Stanford. This might be a point to consider during the design study)

1.3 Summary of the learning problem
- Dosimetrists and Radiation therapists have difficulty creating mental representations of complex systems.
- A number of potential students surveyed displayed vague understandings of fundamental concepts required to pass the exam and function at a higher level in radiation therapy. Failure to understand these processes makes it difficult for clinical personnel to solve problems that come up in the treatment process.

1.4 The analysis of the learning problem
- The author thinks the solution (to solve the learning problem) is to offer animations and dynamic simulations that the students can manipulate to learn.
- Previous solutions (current practice) to this learning problem have involved highly intricate diagrams (see figure 1) attempting to explain dynamic processes. Not only do these diagrams intimidate students, they lack the interactive features of animations and preclude the students' ability to manipulate the system directly to enhance their understanding.
1.5 Conceptual Framework


1.6 Three Different Ideas were explored for tackling the problem:

1) Community of practice facilitation with a messaging system

2) A test and placement system that would help students choose the most appropriate modules for their study regime.

3) Construct an online course using WebCT -- Dosimetry Online

   The author has chosen idea 3.

1.7 The Structure of “Dosimetry online”
The design is based on Tyler’s objective-based instructional design method

- To gather all the professionals in this field (top instructors around the whole country) to work as a community. 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 their single classrooms to a wide world of varying learning contexts.

- The online program will be working together with AAMD curriculum committee to create a detailed set of required skills and, through the MDCB exam, assessing each candidate's knowledge before granting certification.

- In this Dosimetry online community, there will be:
  1) **module author** – top instructors (in this field) around the country and each author is required to:
      - write detailed instructional objectives
      - Create criterion-referenced quiz items with project’s education consultants
  2) **mentor** -- mentors can use the resource to analyze instructional needs in their given context as they guide their Dosimetry students. He/she will be the focus of the learning relationship with the system as a handy supplement and organizing platform.
  3) **class administrators** -- to review quiz performance and correlate consistent shortcomings on post-module quizzes with gaps in learning objectives and materials
  4) project's education consultants – support
  5) project's technical consultants – support

1.8 The Design

Design Process

More design ideas were explored during the Design Review:

- Chat room and threaded message board to form a learning community
- Design the community with social context
- Connect to the professional association learners join
- Form online study group for the professional exam
- Conduct needs assessment to find out what learners really need

- Chat room and threaded message board to form a learning community
Features/Functionality

Since the online course is not available to review, the Flash file that explains how radiation destroys cancer cells is the main feature of this module.

- The animation made the presentation more interesting
- The course material was broken down to modules so learners have flexibility controlling progress

Design studies

The author conducted a revision of the design and an user interface testing.

Revision the design:
- Created a prototype of an online course shell with interactive animations
- Conducted beta testing - narrowed and refined the designs from the Prototype phase.
- Conducted pilot testing -- the course modules was placed into a Web course shell using WebCT and passwords were assigned to a set of 20 students.

User Interface testing:
- The designer interviewed 2 users for user interface test and videotaped the interview process
- The designer was assessing if the presentation helped the learners build their understanding of how radiation kills cancer cells
- Findings from design studies:
  – Sound file and text are not in sync
  – Navigation can be more streamlined. For example, can add standard fast forward and back buttons

2. An assessment of the most and least convincing parts of the project

2.1 Weaknesses:
1. lacking of sound learners problem analysis – learning preferences, learners characteristics etc: this will severely affect the effectiveness of the product since the learners will find their problems are not addressed by the product. In short, this might not be a ‘solution’ they need! After all, the course is designed for the learners, not for the designer.
2. As what Decker said, “How do you know you're not just imposing this community idea on an entire group of people that doesn't want to be a community?” – Decker” More thorough study and tremendous ground work are required to make this concept materialize – “That could take practically a
lifetime of work and then it might happen and it may not.” – Shelly. It can turn out to be a strong point also. Since if it works, it will a great job for the professionals in this field. There’s only one subject matter expert around (at Stanford), and not sure he’s supporting his idea

In short, A more thorough study and tremendous ground work are required to make this concept materialize, which can take an impractical amount of time and resources

2.2 Strengths:
1. A sound learning problem addressed:
   The project addresses the issue of fragmented knowledge and lack of coherent conception

2. Good effort in making the flash animation:
   The animation enables the learners to visualize the abstract concept "How does radiation treatment kill cancer cells?"

3. A good vision of the project:
   We think that the author has the vision of integrating the professionals in this field to work as a community.

3. A prospectus for next steps on the project

From the designer…

- make the system more hands-on where students could alter various aspects of the system and change the model. This more manipulative method would lead to an even deeper understanding of the system.

- continue to refine the user interface. The existing module is basically linear--as in a slide show. If I gave the student control of the system and enabled them to view the entire three-part interaction at once and at different scales, this too would lead to deeper understanding.

- create a template to allow rapid development of modules like this that cover other parts of the class.

From the reviewers…

The big picture is to re-visit the goals and structure of the plan. If the goal is clear to get the community to support and be involved, then
• Get a more thorough learner’s needs analysis to ensure that this is what the whole community needed.
• If this is what the community wanted, then
  - adjusted to the need and build a system (as planned by the designer) to create a module which is well-done and self-contained, to serve as the prototype of the online program.
  - Conduct another round of pilot run and address on its effectiveness.
  - Make contact and connection with the relevant people and organization in this field. Using this prototype to sell your concept
  - Then it will be your life-time career in pursuing this goal…. 
Some succinct comments during the design review with Jeremy:

**Decker:** How do you know you're not just imposing this community idea on an entire group of people that doesn't want to be a community?

**Decker:** You know in one way, Jeremy, the problem you're addressing is an example of a very wide-spread problem faced by people who use technology to support the technical professions, which is that most of them have a very clear idea of what they are doing. In Biology One there is syllabus of biology curriculum and problem sets that are important. And they're pedagogical strategy is the old fashioned one: students listen, they do some labs and they just don't pay much attention to pedagogy'so the question is why are you choosing to do your masters project to fight this? To put in something that sort of introduces, at the very least, a flavor of a different pedagogical approach?

Are you putting in something that's alien? I mean, I can remember one of the mathematics professors who got really excited about a new way of teaching calculus and they spent years working on it and had a course going on here at Stanford and everything was wonderful, except the rest of the faculty members in the department said this isn't really math the way we want it taught. And the guy had to move out of the Math department into the Electrical Engineering department'so there's a kind of political/cultural/pedagogical issue here. Do you want to tangle with it? Are you aware of it? Where's it fit in?

**Shelly:** I think Decker makes a good point about trying to do something through a community that is not in its practices now. That could take practically a lifetime of work and then it might happen and it may not. If you want to stick with that, I would find a place that you have a little leverage. If you are going to pick something to introduce that is a transition area so its not off the charts; that it is something that's not it's the logical next step: don't go too far out. Because you don't have to.

**Hunter:** The question I kind of came in with about your project was that given you wanted to focus on the community aspect, then are there specific areas of the content that are driving how you develop your community? So, for example, when I go through and learn statistics, what's worked best for me is to go through problems on my own, not with a group: so if you're studying for the MCATS, it seems like a lot more rote drill and practice, and I don't know if the content of this really lends itself well to community. So if I were in your shoes, the way that I might sort of adhere to Decker's suggestion (I'm still parsing that) would be to do a needs assessment of what this community is actually after. In doing that, I might go in with some suggestions.

Because I think it would be a mistake to assume that they would necessarily, deliberately, and systematically have thought through what does our community need? They may have and you may come up with some new ideas that are very appealing to them... So I think while you're doing that, maybe checking in with the learners in this environment might be worthwhile. First get a feel for what they're coming up with. And then throw out some probes and say, so, if I did this kind of thing, how would it work out?