Structured Collaboration in e-Learning

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ABSTRACT
In this paper we explore the use of structured synchronous collaboration in e-Learning. Although there is much interest recently on integrating collaboration tools in e-Learning environments, not much has been mentioned about the effects of structured versus unstructured collaboration. Here, through a simple prototype, we find that potential users of e-Learning platforms really liked the integration of collaboration tools in the environment and more specifically, liked the structured collaboration. Whether or not users liking the structured collaboration can lead to increased motivation to use the platform, or ultimately lead to increased learning, are still left as open questions. However, the answers appear to be “yes” and “yes”, as users of the prototype have suggested that the structure in collaboration leads to focus on the learning materials, while delegating the task of structuring communications to the platform.

Author Keywords
Structure, Collaboration, e-Learning, Synchronous, Communication, Distance Learning, Instant Messaging.

ACM Classification Keywords
H.5.3. Group and Organization Interfaces.

INTRODUCTION
In this paper we explore the use of structured synchronous collaboration in e-Learning. Here, we define e-Learning as distance education with a teacher and multiple students, and collaboration as any interaction between people.

Recently, there has been a surge of interest in the integration of collaboration tools in e-Learning environments. This is because classical learning theories, theories that were derived from observations of traditional classrooms, suggest that collaboration among classmates and interactions between the teacher and students can lead to increased learning.

Thus, in response to the surge of interest, e-learning platforms are beginning to integrate collaboration tools in e-Learning environments. However, oftentimes the design of the integration is left at the stage of “just-put-it-in-there.” The premise is that by the simple inclusion of collaboration tools, such as chats and discussion boards, students will begin to talk with each other and with the teacher, thereby forming this wonderful learning community.

Yet, observations from chat programs such as MSN Messenger and the various online PHPBB discussion boards suggest that perhaps it is not as simple as that. Lively discussions and the use of the program seem to be highly associated with the strength of moderation. Structure seems to lead to a more favorable learning environment.

This then leads to the question whether or not structured collaboration in e-Learning is more favorable than unstructured collaboration in e-Learning. In this paper, we begin to explore this topic by looking at how the users like the structure. Although our main interest is in the effects of structured collaboration in e-Learning on student performance, we suspect that only by studying the intermediate variables such as “like” and “use” will we find any significant results.

LITERATURE REVIEW
Before beginning the design of our user interface, we studied a few previous research conducted in the field of collaborative e-Learning [1][2][3][4].

The research papers and the textbook present studies on the challenging aspects of distance learning instruction, an environment that is characterized by the lack of a physical classroom and where teacher-student and student-student interactions are often lacking as well. To facilitate collaboration, a discussion forum may be created to answer the students’ questions and to follow-up to others’ answers. It is found that the students will actively take part in these asynchronous discussions. However, student activity in synchronous collaborative environments is another story.

When students participate in an online training course, do they perceive the presence of other students and instructor in the online classroom? Does this perception positively
The use of this “rough” look for the prototype is deliberate, in that we wish for the users to not comment on how the prototype looks, but how they like the functions, in this case the structured collaboration.

Teaching Phase
The teaching phase is the first phase of a typical e-Learning curriculum, where the teacher simply teaches and answers questions that may arise from the lecture. Particularly, in the user studies we developed a hypothetical e-Learning curriculum focused on teaching Microsoft Movie Maker to a group of novice students.

Workspace
Please refer to figure 1 for an example of a student’s workspace during the Teaching Phase. Here, imagination has to be used to pretend that the two computer screens form one single computer screen that the student sees. The reason why two computer screens are used is because so the Wizard of Oz can control computer 1, to simulate the teacher’s reaction to the student’s questions, while the student can control computer 2 and type in his or her questions.

To explain further the workspace, on computer 1, there are three windows. The first window is labeled Teacher Video, and is where a live feed of the teacher’s computer screen, in this case a view of the teacher’s Microsoft Movie Maker application, is displayed for the student to see. So as the teacher is lecturing, the student can see exactly what the teacher is doing on the teacher’s computer. Below the Teacher Video window is a Status window, where if the teacher is answering a student’s question, that question appears in the Status window. This is so that when the teacher is answering a question all students can focus on that question. Lastly, the Text Box is where the student may type in notes.

On computer 2, the Practice Space is where the student may practice and work with his or her own copy of the application, in this case Microsoft Movie Maker. Then, the Communication Bar on the right is where the student may ask questions during lecture. In the Communication Bar, there are icons of the teacher and all the students. If another student has asked a question, the question will appear below that student’s icon. Further, those students with questions will have their icons appear near the top of the order.

The task of asking a question can be done by the following procedure. First, the student will check all the icons to see if the question has already been asked. If so, the student can type in a follow-up question by first clicking on the question (which is below the icon of the other student that is asking the question) and then typing in the follow-up question. Alternatively, if the question has not been asked before, the student can click on the teacher’s icon and then type in his or her question. Notice that this is where structured collaboration comes in, where instead of the chat-like session where the focus is on the bottom-most message (resulting in a lot of repeated questions), here there is a protocol that the student goes through to ask a question.

Lastly, drawing from the feedback that we received from user studies, there are two more built-in controls. First, the student will have the option of minimizing either the Practice Space or the Communications Bar, or both. This is so that the student can focus on the teacher’s lecture. Second, on the Communication Bar, next to the teacher, are...
two buttons that asks the teacher to slow down or to repeat what he or she said. This is to compensate somewhat for the lack of gesture information that the teacher might receive from the student in a traditional classroom setting.

**Bimodal Presentation**
The lecture will be bimodal, in that audio and video will both be used. The student will hear the teacher’s voice though computer speakers and will see the teacher’s computer display through the Teacher Video window.

**Video Capture**
The video, along with the associated audio, will be automatically recorded as the teacher lectures. Further, algorithms will be used to automatically section the videos. These videos will be available for the students to view after the lecture, in the Practice Phase.

**Threaded Q&A**
The threaded Q&A has been discussed under the Workspace section, fourth paragraph.

**Practice Phase**
The practice phase is the second phase of a typical e-Learning curriculum, where the student simply practices in his or her Practice Space. Here, the student will have a chance to ask the teacher or other students questions if any question should come up during practice.

**Workspace**
Please refer to figure 2 for an example of a student’s workspace during the Practice Phase. Again, imagination has to be used to form a single student computer screen.

Here, in the Practice Phase, unlike the Teaching Phase, the left computer (computer 1) will be silent unless the student asks a question to another student or the teacher. The focus will then be on the Practice Space.

**Threaded Q&A**
Upon asking a question, which follows similar procedure as the Threaded Q&A in the Teaching Phase, the following occurs. First, the other student or the teacher to whom the question was asked will choose to respond. A copy of the Practice Space of the student who asked the question will appear, for both the student asking the question and for the person answering the question. The person answering the question can then work on the copy of the Practice Space, which both parties can see. Also, audio option will be turned on for both parties to communicate with each other.

We suspect that this use of a copy of the question generator’s Practice Space will be valuable, in that the question generator will see exactly what he or she needs to do, lessening the cognitive load required to translate the answer to his or her own Practice Space. This will be valuable for the answerer too, because he or she will know exactly what the question generator is referring to.

**EVALUATION**
Though we wanted to conduct our user study with more subjects, our initial evaluation is based on a limited set of learners. We are planning to conduct more user studies in future, as we incorporate more changes and continue to refine the design of the prototype.

**Plan**
We list the learner profiles, study setting, methodology, and findings of our study below.

**Learner Profile**
The learners for our evaluation were graduate students in the School of Education at Stanford University. They use the Internet for their learning needs and have used e-Learning courses as well as collaborative tools, such as chat, discussion forums, and Web broadcast.

**Setting**
The setting for the study was a classroom in the School of Education. We divided the study into sessions, a learner per session. In each session, the learners interacted with the two researchers, David and Deepak, in the classroom. Each session of the study lasted fifty minutes to an hour. The time allocated for pre-study interviews was fifteen minutes per student, the interaction of the users with the prototype was half an hour, and the post-study interviews was again fifteen minutes.

**Pre-Study Interviews**
We gave the learners a short questionnaire with a set of questions that identified their learning needs, their prevalent learning methods and practices, features of the e-Learning environment they are familiar with, and features of the collaborative tools they most frequently use.

**Methodology**
We constructed a prototype of our suggested design solution, using two adjacent computer screens and asked the users to pretend it’s a one screen, to evaluate the usability of the user interface. We also tried to find out if the application with the new features has the intended benefits for the users.

**Observations**
In future, we are planning to record on video the entire session when the users interact with the prototype. This will
help us watch the session multiple times in detail and analyze the users’ behavior and practices.

Post-Study Interviews
We gave the learners a questionnaire with several sets of questions on their experience with the prototype. Specifically, the questions asked them how easy do they think is the application to use, what features of the application did they find most useful, what features do they think should be added or removed or modified, and why. We took notes while talking to them, but we are planning to record on audio all sessions in future.

Findings
Based on our observations and interviews with the users, we have strong evidence that they like the user interface because of its simplicity and optional features that can be turned on/off. More importantly, the users really liked the structure, when comparing to another prototype involving only the Teacher Video window and a chat window. The lack of structure in chat, as it is not the normal protocol to check back in the history of the chat to see if the question has been asked before, seem to detract from the collaborative environment. However, we also identified areas that needed more work; for example, the users wanted a space on screen to take notes while watching the instructor’s video instead of switching between windows (which we integrated). They appreciated the natural and intuitive design of the interface, such as using pictures of the instructor and fellow learners attending the session as icons, which makes it easy and faster to click an icon and type a question in the text field.

Further Studies
Although a full summative assessment plan on comparing what the learners learned from the use of our prototype vs. the traditional collaborative e-learning environment would be helpful, it is not possible in the time frame of this project. Therefore, this evaluation plan focuses on determining if the learners like the structure provided by the current prototype.

CONCLUSION
The lack of interaction, specifically structured interaction, in synchronous e-learning environments led us to design the application that allows instructors and students to interact in an efficient and productive manner instead of using chats or discussion boards. We studied the extent of likeness and interest users showed when using a simple prototype of the application. We found that users liked the structure of the interface and they also suggested a few changes. The previous research conducted in this area do not emphasize on structured collaboration.

We plan to conduct further user studies after developing a working prototype of the application and testing it with several user groups with varied interests and experiences with online learning environments. This would allow us to make changes iteratively to the design and refine the design for further study.

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REFERENCES