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Promoting team interaction in the online classroom

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PROMOTING TEAM INTERACTION IN THE ONLINE CLASSROOM

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ABSTRACT

Team products tend to be of higher quality than those produced by individual efforts. Classes on campus take advantage of this phenomenon, teaching software engineering students how to produce software deliverables and products while working in teams. Online software engineering classes also require team projects, but they can be plagued with problems. While it is important to teach online students how to work in teams during the planning, design, and development of software products, many students dislike team projects when there is no face-to-face interaction. This paper discusses the issues associated with online teams and recommends some solutions for building positive team experiences in the online classroom. The topics include student fears, pedagogical concerns, asynchronous learning networks, effective communication, responsiveness, and the team formation.

Keywords: distance learning, distance education, online classes, virtual teams, teams, software engineering, software project management, interaction, user interface design, discussion board forums, asynchronous learning networks.

INTRODUCTION

Professors traditionally hear groans of dismay in response to the announcement that the course deliverables will include a team project. Students are sometimes reluctant to participate in team activities in classrooms that meet on campus. Imagine the increased anxiety and stress that students face when it comes to developing team projects for online classes. Fear can permeate the online course, and this fear can complicate classroom interaction, impairing the professor's ability to effectively teach and manage the course.

The fears that students experience are serious and must be addressed with sensitivity and communication. The fear of online teams is often based on the fact that good team dynamics are not easy to achieve even when the team meets regularly. The problem is compounded when the team does not meet physically.

Online classes incorporate students from diverse locations, cultural backgrounds, and interests. Foreign students and students from diverse sub-cultures do not necessarily communicate and structure their work activities in the same manner. How can we assemble these students into teams, get them to build good team relationships, help them learn how to manage conflict, and have them produce a good team product? And how will they accomplish all of these goals in a few weeks?

Team interaction should not be avoided despite the difficulties we face when managing teams. Instead, we need to identify strategies for taking advantage of teamwork and team synergy in the online classroom. This paper examines the problems with online team projects and suggests some solutions for improving the quality of online team interactions and projects.

The examples in this paper come from graduate software engineering classes that were taught by the author for Colorado Technical University's Online Studies in Software Project Management program. The classes discussed in this paper include four sessions of CS 640, Software Project Management and one session of CS 646, the Software/Human Interface. These classes lasted five and one-half weeks, and by necessity required team formation to be complete by week two.

The Online Studies classes use the Blackboard course tool as the presentation mechanism; all of the course materials are in text, slides, and graphics. Team communications were posted on a team discussion board forum, and each team's posts were visible to the entire class.

The Software Project Management classes were comprised of a maximum of 15 students per online session. Team size included 2-4 team members. The size corresponded to the scope and requirements for each project. The Software/Human Interface design class was a hybrid course with 20 students, meeting part-time in the classroom and the team meetings were conducted online.

The Benefits of Online Teams

Before we attempt to improve online team building activities, we need to make sure that the struggle is worth the effort. It takes work on the part of the professor to assign and manage these teams while ensuring that each student has good exposure to the course material and is able to meet the course objectives.

Graddol feels that computer-mediated communication provides a forum for open and equal discussion of topics, far better than face-to-face communication provides (Graddol, 1989). When teams meet physically, the rules of polite behavior and social constraints are stronger than they are in online communications. Does this suggest that online teams will produce better results? Not necessarily, but online team interactions do tend to draw out the quiet team members, those who rarely speak up when sitting in the traditional classroom. Online team interactions provide students with the distance to speak freely.

The benefits of team products are found in an examination of the software industry. Many software engineering activities benefit from team development. The quality of these products is often far superior to those that are produced by individuals. Software products are often too complex to be developed by a talented individual. Lastly, the results of team efforts often include exposure to diverse approaches, an examination of alternatives, and solutions that are often better than an individual's effort.

Before we can achieve these benefits, pedagogical concerns and student fears need to be identified and addressed.

OBSERVED PROBLEMS

Time is limited in the online class, yet students need to learn to develop purposeful solutions that prepare them for real world software projects. Teams are a necessary evil in the business world, and are also prevalent in the software engineering classroom. Given the complexity of software engineering tasks and deliverables, it is unrealistic to expect a student to produce one or more software documents in a given term. The work is better partitioned across the team, with sections being assigned to each teammate for development, review, discussion, and integration into the team deliverable.

Online communication facilities make it easy for students to submit draft sections to the team for review and discussion. The question is whether these discussions benefit from open discussion, from a good examination of alternatives, and whether teammates feel comfortable presenting conflicting information and criticisms.

Online team meetings using the Blackboard course tool do not include non-verbal interaction, gesture, and facial expressions. The tone of voice is often not heard in online meetings, resulting in misunderstandings when sarcasm or humor is intended. These communication mechanisms often qualify what is said during the meeting and change the intent of the message.

Here are a few terms that are used throughout this paper. A post is a message on the discussion board. A discussion board is a bulletin board that has a series of forums or folders that organize each topic and hold a series of message threads. A thread has a message post and a series of replies to that post. Threaded discussions provide interaction and stimulate thought within the group, but do not require participants to be online at the same time, unlike the online chats. These discussion boards can be considered an asynchronous learning mechanism (Jaffee, 1998).

Message posts can be time consuming to read and require timely responses. A professor who attempts to answer every post and hold at least one online chat per week is often challenged to keep up with the daily information and interactions. Each class of 15 students can have as many as 80 posts a day in the 15-20 discussion board forums that are available. Students are also busy people who are often handling many priorities at once. What level of interaction and timely response is required for good team communications?

Pedagogical Issues

During the design of an online course, instructional designers define the requirements, deliverables, and objectives of the course. No matter how well these items are stated, there will always be a percentage of students who do not understand what is required.

Why is this true? Online classes are comprised of students from diverse physical, cultural, and ideological backgrounds. Each student interprets the course syllabus and requirements differently. Communications are often ambiguous (Hara and Kling, 2000), requiring interaction and context to make them meaningful.

Given this disparity in our student audience and the lack of face-to-face interaction, how do we clearly define the team deliverables, goals, and objectives so that teams can understand the requirements? One method is to state them as clearly as possible, then to reinforce these materials with an online discussion, one that encourages students to ask questions and to visualize the results of each deliverable. Message posts, announcements, and real-time online discussions, better known as online chats or virtual conferences, provide a mechanism for clarifying these requirements. Whichever method is employed, it is vital that responses to student queries be both timely and productive. Encourage discourse and present examples whenever possible.

The course materials will never be perfect for every student. Instead, it is important that they be clear, complete, and be reinforced by discussion and consensus among the class. In this sense, the professor's discussion of the course materials requires agreement from each student, building a student's confidence and reducing anxiety.

Student Fears

Do students experience fear when participating in online classes? Yes, students fear that they will not perform well in class, that they will not understand the material due to the lack of real-time interaction, and that they will look foolish in front of their peers (Hara and Kling, 2000). Some fear that they will fail to keep up with the course materials and will fall behind due to the lack of face-to-face prodding they receive in the traditional classroom.

Compound these fears with the natural fear of team participation and an even larger hurdle rises in the online classroom. How do we address and mitigate these fears?

Students traditionally dislike working in teams. It is not easy to build good team relationships and garner commitment from each participant. This problem increases when we distribute the work in the online classroom. The lack of face-to-face interaction in the virtual or online team makes it hard for some students to feel a connection with the team.

SOLUTIONS

Fear of online team projects is overcome with effective communication, responsiveness, and a good team composition. Why are all three required? It is not enough to communicate clearly and to use technology effectively. The timeliness of information is important for online team meetings to reduce frustration and fear that the other teammates will not participate equally. Students want answers from teammates and the professor as soon as possible, and often are more demanding than students in on campus classes when they need current information. Assembling a good team requires active participation and feedback from students during the team's formation.

Below is a table of roles and responsibilities that contribute to building successful online teams. This is by no means an exhaustive list, but one that is designed to stimulate thought and encourage discussion. If students understand their roles and responsibilities in both the online classroom and in the online team, it is considerably easier to ensure a positive online team experience.

Student Participation	Team Interaction	Professor's Feedback
Willing to participate	Willing to contribute	Responsive
Posts and corresponds often	Responsive	Mentors
Reads the team posts	Creative thinking	Fosters open communications
Provides polite feedback	Open to new ideas	Defines Requirements
Contributes to the team	Has clear objectives & goals	Connects with students
Is not afraid to ask questions	Asks questions	Stimulates creativity
Accepts the team goals	Can obtain answers quickly	Provides examples
Accepts a portion of the work	Develops a draft project	Reassures students
Drafts sections of the work	Respects for other teammates	Puts the material into context
Incorporates changes	Builds to consensus	Keeps the team on track
Draws conclusions	Able to divide the work	Adapts to changing needs
Develops status briefing	Able to integrate the sections	Manages team conflict
Posts the deliverables	Integrates the status briefing	Provides project feedback

Figure 1. Roles and Responsibilities for Promoting Teams in the Online Classroom

Effective Communication

How do we foster good team relationships, keep the team stimulated, and enjoy the benefits of team productivity in the online classroom? If we say that effective communication is the answer, then the trick is in defining what this means and understanding how to achieve it.

Good communication is productive. Each party needs to respond for a dialogue to be meaningful and to result in information. Online classes take advantage of asynchronous learning networks (Jaffee, 1998), using the discussion board to post team messages, draft sections of the team project, and classroom discussions that may be read at the student's convenience. Team meetings do not require attendees to be present, but to digest the team inputs and respond to them.

Online chats provide the real-time interface that some students desire to feel comfortable working in the team. The problem with online chats is that they require each teammate to be online at a particular time, contrary to the goals of asynchronous learning (Jaffee, 1998). The advantage of these virtual conferences is that attendees can get acquainted, bond over common issues, and have brainstorming sessions.

At least one member of each team usually has questions about the team deliverables. While teammates can discuss these requirements amongst themselves on the team discussion board or in their online chats, confirmation from the professor is often required. No matter

how clearly one tries to describe the course deliverables, assignments, and objectives, there is always room for interpretation and misunderstanding.

Promoting effective communication is not easy when the students are from different countries. Over 30% of the students in two sections of the Software Project Management and Software/Human Interface classes were from diverse countries and cultures. Despite the complexity added by considering multicultural issues and English as a second language, U.S. students also face similar problems when it comes to understanding online classroom requirements. The United States is comprised of people from diverse sub-cultures and it becomes increasingly difficult to characterize and communicate with the student population.

Communication is a two-way process. Students are presented with a course syllabus, course assignments, course documents, and discussion board forums and topics. Amidst this flood of information, the students reviews the course materials, responds to discussion board questions, and posts team messages, uploads draft versions of the project sections, and queries the professor for clarification of the course material and requirements.

The student demonstrates understanding of objectives via a variety of course deliverables, research papers, exams, and projects. The team plans, designs, develops, and reviews team products to ensure that they are ready for delivery. The professor provides guidance on course deliverables and objectives, then mentors the class, answering questions, clarifying points that are confusing, and providing feedback. The professor reviews the student and team correspondence, both in the online discussion forums and within email messages.

The static nature of these asynchronous dialogues, as they are time-independent interactions, sometimes stifles progress and the stimulation of new ideas. The use of online chats helps students to gain real-time interaction and to connect better with the professor and with their teammates. Ideas tend to get stimulated and flow faster during these chats, as the discussion is often fast-paced and not judgmental.

Chats can employ a variety of mechanisms to keep them focused and productive. An agenda of topics is helpful. Restricting the floor to the designated speaker tends to stifle chat discussion, and is recommended only during large chat conferences.

Responsiveness

Time management is a requirement for the online professor. It is tempting to spend an inordinate amount of time providing considerable detail to each student's post. Yet increased and frequent interaction with the professor tends to stimulate a better learning experience for students (Shale and Garrison, 1990).

Students need feedback and confirmation that recognizes their efforts and rewards them with either information and/or participation points. Team satisfaction increases with increases in responsiveness in communications (Fulford and Zhang, 1993). The trick is to

respond effectively while minimizing the time it takes to respond to each student and team. Luckily, message threads can continue the discussion, permitting each teammate to contribute ideas and questions, clarifying concepts as the thread reaches its conclusion.

These discussion board forums provide a record of team activities and a central repository for the project sections as they progress from a draft to final format. There is less concern about where project deliverables reside and whether they may be lost when they are accessible online. Also, each team can review the draft projects of the other teams, gaining ideas and insight from their alternative approaches to the problem.

Team Formation

Developing an effective team for a short duration, online class is never easy. It is possible to list the names and notify them of their teammates, but this method rarely ensures that the team will produce a good product.

The Software Project Management class includes a variety of discussion board forums. Some are designed to garner background information from the students. Each time a course is offered, it needs to meet the needs of the class. Another forum asks students for online chat availability times. The remaining forums are divided into three categories: Discussion Questions, Deliverables, and Team Discussions. Let us look at the Team Discussion forums in greater detail.

In the last Software Project Management class, students were permitted to post their project topics in a forum, then to select teammates based on their mutual interests. This method seems to work better than assigning teams.

In the first online course offering of Software Project Management, teams were assigned when students failed to select teammates by week two. Four teammates per team were selected, based on the professor's familiarity with each student's research habits, leadership abilities, and personalities. Despite this information, the results were less than favorable. One of the five teams struggled to complete the project, due to the withdrawal of two of the team members in the fourth week of class. Two of the teams worked smoothly, but the remaining two teams seemed to be uncomfortable with their team composition and the quality of their work.

Future sessions of Software Project Management required the students to form teams by week two as a part of the participation requirement for the course. Rewarding students for selecting their teammates seemed to work much better than assigning students to teams. Students were told (with a certain degree of humor) that they could move to a new team if a different project topic or set of teammates was desired. Providing students with options alleviated some of the anxiety during team formation.

CLASSROOM OBSERVATIONS

The next step was to provide detailed information concerning the project and to require teams to assign sections to each teammate. While some teams prefer to work on a little of every section, as was noted in the Software/Human Interface design class, the teams in the Software Project Management classes desired specific section assignments.

Specific assignments for each team member provide responsibility and accountability that is measurable, helping the team visualize the overall product as it is being developed. It is easy to tell what remains to be produced and by whom when the work assignments are clear.

Only one out of nineteen project teams in four online sessions of the Software Project Management class had serious problems, requiring intervention and guidance from the professor to complete the project. In this instance, two of the four teammates were unable to complete the course due to personal matters, and the team was re-oriented and brought back on track with assistance from the professor.

It is said that we learn more from our failures than from our successes (Unsworth, 1997). This team experience was not considered a failure, but a triumph, for the remaining team members who pulled the project together and delivered it on time against considerable adversity.

None of the project teams in the Software/Human Interface design section required serious intervention. This particular course offering was a hybrid course, one that met one evening in class to cover the lecture material and the bulk of the team activities were handled online. Team discussions and deliverables were posted and reviewed by each team member. The professor acknowledged these posts, but offered suggestions only when feedback was requested or to keep the team focused on the project's deliverables and deadline.

During the project presentations the last night of class, each team confirmed that the team project was both rewarding and fun. The team project provided them with an opportunity to design and evaluate their user interfaces. During the course of the project, they employed a novel user interface design process, set quantifiable usability goals, and learned to measure usability in a series of three usability evaluations. The process required the coordination of 3-4 team members to effectively test and measure the usability of the interface. Without the opportunity to use the process and actually perform usability evaluations, students would have been unable to make decisions about its effectiveness.

CONCLUSION

Software products benefit from team participation in their development. Fostering good team relationships can be accomplished through the use of effective communication, responsive teammates, and a good team composition.

There are issues that have not been discussed in this paper. Managing team conflicts, stimulating conflicting opinions, consensus building, and time management techniques are also important facets of team interaction.

The future offers increased opportunities to work online. Software professionals will work from locations other than the office. Fostering effective team building skills in online students will be of service to them in their professional and research pursuits. While the task may seem arduous, the benefits far outweigh the disadvantages.

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