Project-Based, Asynchronous Collaborative Learning

William Hafner, Ph.D., Nova Southeastern University
Timothy J. Ellis, Ph.D., Nova Southeastern University

Abstract

The value of collaboration as a tool to promote learning is becoming increasingly more evident. Students engaged in collaborative efforts typically retain the information being learned longer by becoming more actively engaged in the learning activity. There is evidence that collaborative activities foster higher-order thinking skills such as analytical reasoning, synthesis, and evaluation. Furthermore, students work in an environment that better prepares them to meet the challenges inherent in succeeding in the workforce.

Constructivism in the form or project-based learning has likewise been shown to foster increased retention of material and greater depth of learning. When combined with collaborative assignments, students have demonstrated greater retention and enhanced capability of transferring concepts to practice.

Promoting collaboration in a classroom setting is difficult and often resisted by both teachers and students. This difficulty is magnified for courses offered in an online learning environment. Although there are a number of applications available to enable real-time communication, the immediacy and intimacy of person-to-person interaction is difficult to replace. The non-verbal cues that comprise a large part of everyday communication are largely lost through even the richest online environment. As a result, educators are faced with a dilemma: both students and academic institutions are flocking towards courses offered via an asynchronous learning network, but there is no clear understanding of how to foster collaboration, one of the most promising pedagogical tools.

Although asynchronous online environments certainly lack the intimacy and immediacy inherent in face-to-face settings and simulated to an extent by synchronous applications, meaningful collaborative assignments are still possible. The proposed paper will detail a five-step systems approach for fostering project-based, collaborative learning in an asynchronous learning environment. The steps will be illustrated with examples from a graduate-level course in multimedia systems in which asynchronous collaboration was a featured assignment.

1. Introduction

There are numerous challenges inherent in promoting learning, especially at the higher cognitive levels, in an asynchronous learning network. Project-based, team assignments have been successfully used in traditional classroom settings to foster a greater depth of learning. This type of assignment, however, is very difficult to plan, develop, and execute in an asynchronous learning environment. The goal of this paper is to present a systems approach to project-based team assignments that has been successfully implemented in a graduate school of computer and information sciences.

Following the discussion of the problems associated with implementing project-based team assignments in classes delivered in an asynchronous environment and the goals for this study, the benefits of both group and project-based learning will be explored. The methodology followed in incorporating project-based group assignments in a course offered in an entirely asynchronous environment will be detailed. A summary of the results of that methodology is then presented. The paper concludes with an analysis of the strengths and weaknesses of the approach followed and a discussion of implications for future research.

1.1 Problem Statement

The value of group work as a tool to promote learning is becoming increasingly more evident [1, 2]. Students engaged in group efforts typically retain the information being learned longer by becoming more actively engaged in the learning activity [3]. There is evidence that team activities foster higher-order thinking skills such as analytical reasoning, synthesis of multiple information streams into a whole that is indeed greater than the sum of its parts, and evaluation [4, 5]. Students are introduced to an environment that better prepares them to meet the challenges inherent in succeeding in the workforce by more closely paralleling life experiences [6, 7].

Promoting collaboration within a classroom setting is not easy. Many teachers are uncomfortable with collaborative learning, having never worked in the environment as either a student or instructor. Not only are the techniques

that enable collaborative learning foreign, many teachers are even unfamiliar with what types of learning outcomes could be facilitated in a collaborative environment [8]. Students, likewise, are often uncomfortable with collaborative learning activities. Students who have been successful in the more traditional, lecture-based environment frequently view collaborative assignments as a threat to their performance and, ultimately, their grade. Many students lack the social skills that are prerequisite to success in collaborative activities and, even for those who are socially adept, adapting to the new expectations and roles fostered by the environment can be threatening [9].

The problems associated with promoting a collaborative learning experience in an online course become magnified exponentially when the environment is limited to asynchronous interaction. The freedom from time and place constraints that attract many students to Web-based courses comes at a significant cost. Even the rather depersonalized, but still real-time communication possible in synchronous systems is, of course, not available in an asynchronous environment. As a result, educators are faced with a dilemma: both students and academic institutions are flocking towards courses offered via an asynchronous learning network, but collaboration, one of the most promising pedagogical tools, appears to be quite difficult in that environment.

Although asynchronous online environments certainly lack the intimacy and immediacy inherent in face-to-face settings and simulated to an extent by synchronous applications, meaningful collaborative assignments are still possible [2]. Although tools ranging from threaded discussion boards and email to dedicated systems have been developed to promote asynchronous collaborative learning activities, the instructor is still faced with unanswered questions regarding how to plan and develop project-based team activities and effectively weave them into the fabric of the course.

1.2 Goals

The availability of tools to facilitate learning is not in itself adequate; the instructor must know how to effectively incorporate those tools in the design of the course [10]. The goal of this study was to develop and test a model for planning effective project-based, team assignments for delivery via an asynchronous learning network. Included in the definition of "effective" are:

1. Facilitating the attainment of the learning outcome for which the assignment was designed.
2. Providing the instructor with a means to monitor and evaluate team-based assignments.
3. Alleviating student anxiety regarding team-based assignments.

2. Background

The term and concept "learning" has a large number of definitions and interpretations. Some, for example, distinguish learning on the basis of level of cognitive engagement [11, 12, 13] while others focus on the type of activity in which the learner engages [14, 15], and still others on the learner's preferred approach to the task [16, 17]. For the purposes of this discussion, Mezirow's [18] classification of learning across three dimensions of reflection – content, process, and premise – seems particularly appropriate.

Content level reflection entails acquiring facts and building skills. This level of learning in, for example, a graduate course in multimedia systems, would include topics such as discussing the characteristics of various graphic file formats and video CODECs, and developing skills such as using authoring software to create a product that incorporates voice-over narration and streaming video. Didactic instruction supported by texts, guided laboratory sessions, and modeling has proven effective for promoting learning at the content reflection level.

Process level reflection entails developing problem solving ability. Learning at the process level of reflection in the multimedia systems course would include selecting the appropriate graphic file format or video CODEC to use in a given application. Inherent in that selection process would be an understanding of the strengths and weaknesses of each alternative and an in-depth appreciation of the requirements for the application.

Premise level reflection, the most cognitively demanding learning, entails an analysis and evaluation of the value and relevance of the subject matter. In the multimedia systems course, knowing when and why to use, or not use, voice over narration or streaming video – or any media enhancement at all – would be inherent in learning at the premise level of reflection.

The tools for promoting learning at the process and premise levels of reflection are neither clearly identified nor universally accepted; the specific tools to develop the necessary critical thinking and problem solving capabilities are not, unfortunately, easily identified. There are, however, some general goals for learning within this level of reflection, including organizing knowledge, building upon prior experiences, developing problem-solving strategies, and engaging in hindsight analysis [19].

Constructivism is a widely accepted learning theory that offers significant insight into the means of facilitating the development of the problem solving capacities inherent in process level reflection. Constructivism is a learner-centered approach that emphasizes the importance of the active involvement of the student in the building of knowledge by integrating new information with her or his existing experiences [20].

The theory underlying constructivism [21] focuses

more on the environment in which learning can occur than on any particular pedagogical technique. It is vital to create a context in which learning can occur [22]. For many college-level courses, that context often is problem-centered and activity-based. Multiple tools and resources that the learner can manipulate and use for exploration are important, as is support for reflection and self-assessment. In effect, the environment should provide a firm foundation for scaffolding learning through coaching, modeling, and a forum for sharing problem solving strategies.

The ability to accurately assess value and relevance is typically developed only over time and as a result of life experiences. This type of longitudinal learning is usually promoted through collaborative projects. The value of collaboration as a tool to promote rich learning opportunities is well recognized [3, 23, 24] as is the importance of reality-based projects [25]. A review of both undergraduate and graduate catalogs from schools offering technology-intensive curricula such as engineering, computer information systems, and computer science clearly establishes the importance of collaborative projects.

3. Methodology

A five-step model for planning and developing project-based team assignments for delivery via an asynchronous learning network was developed and implemented in a graduate level course in multimedia systems. The steps are summarized in the following discussion, supplemented by relevant artifacts from the multimedia systems course used as the pilot study for this project.

1. Develop Learning Outcomes. The planning process for any course must start with identifying learning outcomes. In order for collaborative learning activities to be meaningful, they must be associated with one or more appropriate learning outcomes. Examples of learning out-

By the end of the course, the student will be able to:

1. Plan, develop, and document a professional-grade multimedia product that can be used to educate, sell, or inform.
2. Work effectively as a member of a multimedia production team.
   a. Collaboratively develop a requirements document
   b. Collaboratively develop a production schedule
   c. Collaboratively develop a navigation map (system flowchart)
   d. Collaboratively develop storyboards
   e. Collectively produce a well-integrated, media-enhanced product
3. Identify and analyze the technological impediments to multimedia production and distribution.
4. Identify and discuss the technology underlying multimedia objects such as sound files, video files, and graphic files.
5. Identify and analyze the strengths and weaknesses of multimedia-enhanced products.
6. Evaluate and critique multimedia productions.
7. Analyze the current status of multimedia production and distribution systems and predict future advances and implementations.

Figure 1: Sample Learning Outcomes

Group Multimedia Project

1. A total of 90 points (45% of course grade) can be earned in this assignment.
2. The assignment will be completed by groups consisting of 3 to 4 students
   a. Groups will be organized during the third week of the term
   b. Each will have te following four (4) functions:
      - Project manager
      - Multimedia author
      - Designer
      - Subject matter expert (In the case of 3-member groups, this role will be divided among all members)
3. Refer to the Group Mechanics outline for an overview of roles, responsibilities, policies, and procedures.
4. You may develop your product using any authoring system you desire, including html, ToolBook, Visual Basic, PowerPoint, or Director.
5. One of the biggest challenges in developing multimedia products lies in problems with distribution. Often, products that work perfectly on the machine on which they were developed fail to run or perform erratically on other computers. You are responsible for developing products that are distribution-ready. For the purposes of this course, distribution-ready means submitted as a Web page.
   - The page must be loaded either on your server or on a special server available at SCIS.
   - If you do not have access to a Web server let the instructor know and directions will be given for accessing the server available for this class at SCIS.
   - Note: do not use your SCIS Unix account: the size of a multimedia product would exceed your memory **allocation.**
6. Your project should have a running length of approximately four (4) minutes, must be interactive, and must effectively incorporate at least three of the following elements: graphics, animations, pictures, sounds, or videos.
7. The topic of your project is open.
8. Your project may take the form of a training module, an advertising piece, or a marketing piece, delivered as a Web site.
9. As detailed in the Group Mechanics outline, you must submit the following deliverables via ESET
   - The url for your media-enriched Web site
   - Project schedule (Project manager only)
   - Navigation map (Author only)
   - Storyboards for each scene or screen (Designer only)
   - Requirements document (Subject matter expert)
   - Individual Collaboration Reflection (described below)

Collaboration Reflection

1. This assignment is actaully a component of the Group Multimedia Project (see Group Mechanics)
2. During the last week of the term you will be given a link to a questionnaire that will need to complete for this assignment.
3. The questionnaire will be in the form of a Web form.

Figure 2: Team Assignment

comes necessitating collaborative activities for the multimedia systems course include: 1) Collaboratively develop a project schedule, requirements document, navigation map, and storyboards to document a well-integrated, media-enhanced product; 2) Collectively produce the media-enhanced product. Figure 1 lists the learning outcomes developed for the multimedia systems class; item 2, in specific, focuses on the project-based group assignment.

Roles and Responsibilities

1. Project Manager
   a. Overall responsibility for the quality and timeliness of product development
   b. Manages development lifecycle, setting a timeline and enforcing due-dates
   c. Coordinates interaction among group members
   d. Coordinates the efforts of the team, to develop, publish, and maintain the project schedule.
   e. Posts the preliminary version of the project schedule.
   f. Posts updated versions of the project schedule in the appropriate thread of the team's discussion forum area as necessary
   g. Submits the final version of the project schedule, updated to reflect the actual product development.
2. Author
   a. Assembles the multimedia product using an authoring system
   b. Coordinates the efforts of the team to develop, publish, and maintain product navigation map
   c. Produces the product in finished, distribution-ready form
   d. Posts the preliminary version of the navigation map .
   e. Posts updated versions of the navigation map in the appropriate thread of the team's discussion forum area as necessary
   f. Submits the final version of the navigation map.
3. Designer
   a. Designs the products screen layout and user interface
   b. Responsible for screen for quality and appropriateness all media elements located or developed for the product
   c. Coordinates the efforts of the team to develop, publish, and maintain the storyboards for each scene/screen.
   d. Posts the preliminary version of all storyboards.
   e. Posts updated versions of the storyboards in the appropriate thread of the team's discussion forum area as necessary
   f. Submits the final version of the storyboards
4. Subject Matter Expert
   a. Ensures the accuracy and completeness of the content of the project
   b. Responsible for ensuring against copyright infringement
   c. Provides the Designer with a screen-by-screen or scene-by-scene description of the project
   d. Coordinates the efforts of the team to develop, publish, and maintain the requirements document
   e. Posts the preliminary version of all requirements document.
   f. Posts updated versions of the requirements document in the appropriate thread of the team's discussion forum area as necessary
   g. Submits the final version of the requirements document.
5. Shared responsibilities
   a. The team as a whole is responsible for developing all four documents: project schedule, navigation map, storyboards, and requirements document.
   b. Identification of the topic for the media-enhanced product
   c. Analysis of the problem that the multimedia-enhanced product will address
   d. Overall design of the product, including the type of flow
   e. "Look and feel" of the product
   f. Types of media elements to be included
   g. Locating or creating the necessary media elements such as pictures, graphics, audio files, or videos necessary for the product

Figure 3: Roles & Responsibilities

2. Match Assignments to Learning Outcomes. Again, as with any course, assignments must be designed to promote attainment of learning outcomes. For the multimedia systems course, five assignment deliverables were indicated: a media enhanced product, and four associated planning documents – project schedule, requirements document, navigation map, and storyboards. Figure 2 details the specifics of the project-based, team assignment.

3. Determine Team Composition. For collaborative assignments, it is important to identify the appropriate team composition, including the number of participants, the appropriate roles, and both the role-specific and shared responsibilities. For the multimedia systems course, four roles were indicated for the collaborative assignment: project manager, author, designer, and subject matter expert. Figure 3 details the specifics for each of the roles identified and the shared responsibilities by all team members.

4. Establish Communication Pathways. The nature of the communication pathways is directly related to the assignment structure. The collaborative project entailed five deliverables: requirements document, project schedule, navigation map, storyboards, and the final, media-enhanced product. Six discussion threads – one per deliverable, plus a general communication thread – for each team were indicated. Although students were not prohibited from using synchronous communications tools (chat sessions, conference calls, etc.) or other asynchronous instruments (email), they were strongly encouraged, through the evaluation criteria discussed below, to focus their communication in the threaded discussion forums established for each team.

5. Evaluation. One of the biggest concerns regarding collaborative activities for both students and teachers is evaluation. Even in face-to-face settings it is difficult to identify and appropriately address problems such as "free-loaders" and "dictators" in a group. In an unconstrained setting such as an asynchronous learning network, in which students are separated by both time and place and the instructor has only indirect contact, fair and accurate evaluation is indeed troublesome. To address this concern, the evaluation of the collaborative assignment included both group and individual factors. Figure 4 details the criteria used for student evaluation in the multimedia systems course.

4. Results

The model described above was used in three sections of a graduate-level course in multimedia systems that was

Grading Criteria

1. Each student will be evaluated on the basis of the work of the team as a whole (55% of assignment grade)
   a. The team as a whole will be evaluated on the basis of the quality of the final product produced
   b. Included in the assessment of the final product will be:
      i. Quality of media elements
      ii. Effective integration of media elements
      iii. Effective interactivity
      iv. Synthesis of media elements to improve communication
2. Each student will also be evaluated on her or his individual work as a member of the team, including:
   a. Performance in assigned role as shown by the item of documentation for which she or he was responsible (15% of assignment grade)
      i. Project Manager: project schedule
      ii. Author: navigation map
      iii. Designer: storyboards
      iv. Subject Matter Expert: requirements document
   b. The Collaboration Reflection (15% of assignment grade)
      i. Analyze the contributions each member of the team (including yourself) made to the team effort
      ii. Assess the overall value of the group experience
   c. The instructor's assessment of the students participation on the team, as measured by her or his contributions to the team discussion forum threads (15% of assignment grade)

Figure 4: Evaluation Criteria

offered over three consecutive 12-week terms. As described above in the Goals section, three elements of "effectiveness" were identified:

1. Facilitating the attainment of the learning outcome for which the assignment was designed.
2. Providing the instructor with a means to monitor and evaluate team-based assignments.
3. Alleviating student anxiety regarding team-based assignments.

The first two elements were assessed via an analysis of the grades earned and instructor interviews. The final element was assessed through an analysis of the student feedback in the Collaboration Reflection (Figure 5).

The course grades were analyzed by first determining the average grade received on the team assignment, and then comparing that grade with the grades received on the other elements in the course with the dual goals of determining the extent to which the learning outcomes for the assignment were met and how effectively the instructor was able to evaluate the assignment. As can be seen in Table 1, the average grade on the team-based project was quite high – 96% – strongly indicating attainment of learning outcomes for the course, an observation reinforced in the interview with the course instructor.

A statistically significant difference between the average grade received on the team-based project and the average grades received on the other grading elements in the course was noted (Table 1). An investigation of the grades

Table 1
Analysis of Course Grades

	Team-Based Project Grade	Average on Other Grades in Course	Course Grade
Averages	96%	79%	88%
Number of students			32
T-test: Group grade vs. non-group grade p =			0

on each element comprising the team-based project (Table 2) reveals that the three elements on which the students were evaluated as individuals – the item of documentation for which the student was responsible, the Collaboration

Table 2
Average Grades on Each Element of the Team-Based Assignment

Media Enhanced Product[1]	Required Documentation[2]	Collaboration Observed by Instructor[2]	Collaboration Reflection[2]
92%	99%	99%	99%

[1] Group graded – all members of the team received the same grade
[2] Individually graded, based upon individual student's work

Reflection, and the instructors assessment of the student's participation in the team activities – were minimally discriminatory, with averages of 99%. When coupled with the report from the instructor, these data indicate the granularity of the instruments for evaluating student collaboration was less than optimal.

A Collaboration Reflection (Figure 5) was collected from each student. The Collaboration Reflection was analyzed both quantitatively (Table 3) and qualitatively (Table 4) to gauge the student reaction to the assignment. The quantitative analysis indicates that the students were favorably disposed to the team-based assignment, felt their teams did function effectively in promoting attainment of the course learning outcomes and that the threaded discussion forum did serve as a viable tool for asynchronous col-

Table 3
Quantitative Analysis of Collaboration Reflection

	Positive		Neutral		Negative		Total
	#	%	#	%	#	%	
How well did your group work as a team?	24	77%	2	6%	5	16%	31
How well do you feel the learning outcome was met by this experience?	25	81%	3	10%	3	10%	31
How well did the structure provided in the assignment promote the development and growth of a multimedia production team?	14	45%	0	0%	17	55%	31
How well did the threaded discussion forum promote the work of your team?	22	71%	7	23%	2	6%	31

laboration. A need for more structure to the assignment was indicated by the majority of the students, however.

As seen in Table 4, four major themes were identified through the review of the comments on the Collaboration Reflection (Figure 5). The desire for greater structure was reinforced by the qualitative analysis. Interestingly, although the students predominately indicated satisfaction with the threaded discussion forum as a tool to promote collaboration, recording a 71% positive response on the quantitative question (Table 3), their comments on the qualitative questions strongly indicated the need for synchronous communication. The comments of the students did, however, support the indications from the quantitative analysis that the teams did in fact function as teams in promoting attainment of the course learning outcomes.

Table 4
Qualitative Analysis of Collaboration Reflection

Inadequate Structure: 11 comments
A required detailed weekly status report to the project manager from each team member to communicate their participation. 2. A required milestone report from the project manager to keep the team focused and on track.
I would have preferred more detailed instructions relative to the exact nature of work for the specific duties of the developer, author, designer, etc. Additionally, more examples or samples would have been helpful in being able to predict the best outcome possible for the type of project being worked on.
I feel as a team member that this project could have worked smoother had we been more knowledgeable of our individual responsibilities and tasks.
At a graduate level the amount of structure should have been fine. In the case of my team it was insufficient.
Need for synchronous capability: 15 comments
I seemed to be the only one that wanted to have a team meeting.
We did however use various means of communications, such as forums, E-mails, phone conversation, and Instant messaging chats. I think that as a group we found the instant messaging meetings to be the best long distance collaboration tool we could use.
I think that given the constraints and limitations of a distance learning online assignment, we functioned exceptionally well. It's just that I am very sure the experience would have been MUCH better if we were all in the same classroom and in the same city for personal collaboration.
There are real-time software programs that allow for the instantaneous group meetings, but it is difficult to establish times when members of the team are unable to find a meeting time.
Presence of group interactivity: 16 comments
The collaboration of the group was a wonderful experience and felt it was appropriate in nature. We worked well together and help each other through our various weaknesses. The use of email was quite helpful as well as the forum to discuss ideas, problems and solutions.
Collaborating with my team members brought forth an awareness of the various responsibilities within this process to include those required of the project manager, subject matter expert, project designer and project author.
My bonding process with my team allowed me the opportunity to expand my knowledge of multimedia, as well as develop a working environment where I was able to share a project with several talented individuals.
Group Didn't Work: 4 comments
My overall experience with this group has been nothing short of frustrating. Although I requested to be paired off with the members of my group, it was later learned that it would be a mistake that I would not soon recover from. As a result of request, I will forever hate the idea of being place in a team project.
If my experience is at all common, I would make group participation optional. Those who wish to work independently should be given that option. I knew within days of the team assignments that my teammates were unreliable and, had I been able to begin independent work then I would have had time to complete a project that I would have been proud of and from which I would have learned about multimedia production.
My suggestion is to not have team or group projects. It too difficult to trust someone that you don't know. And there is no way to accomodate for personalities clashes.

5. Conclusions

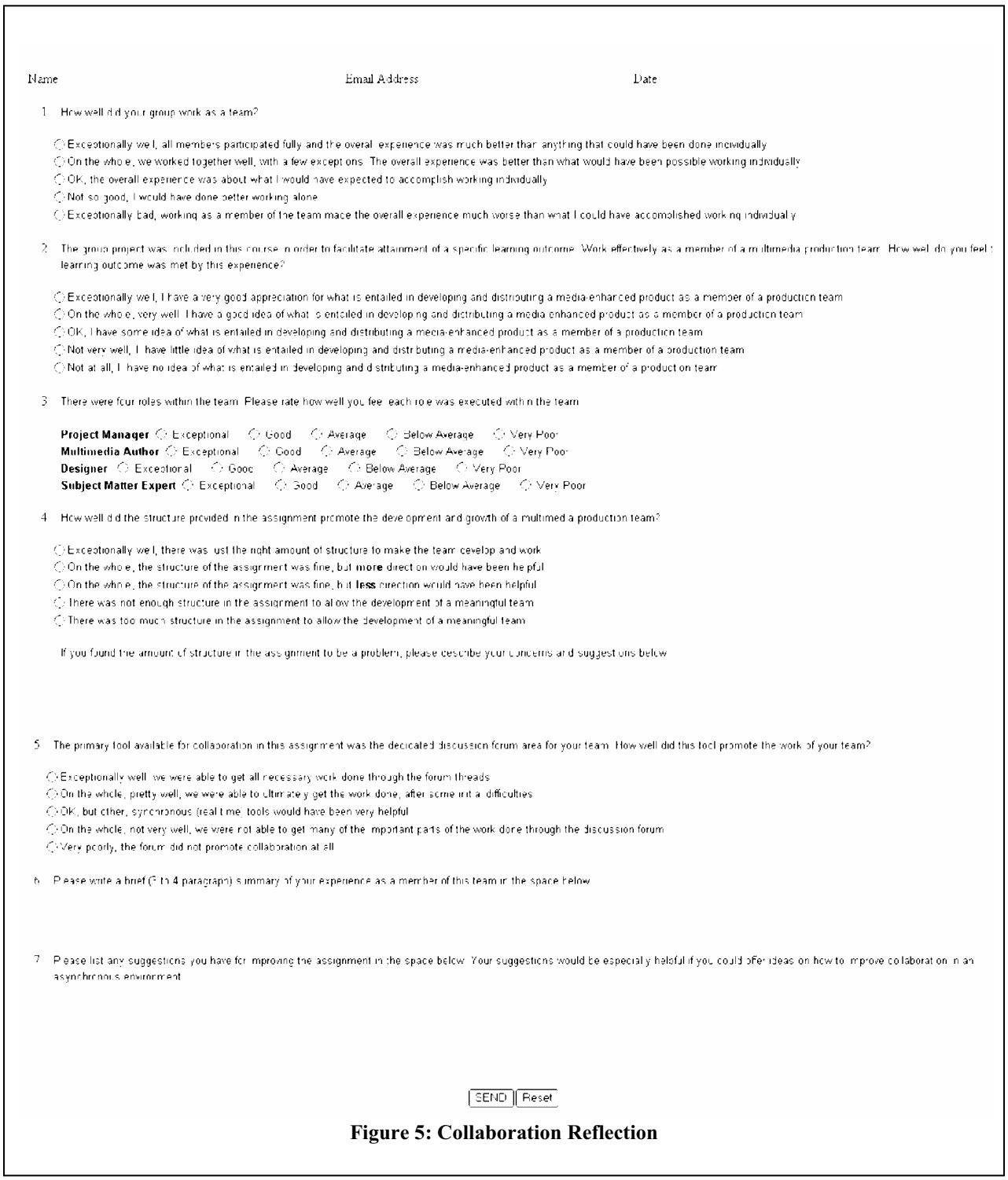
The goal of this study was to develop and test a model for planning project-based, team assignments for delivery via an asynchronous learning network. Three indicators of effectiveness were identified:

1. Facilitating the attainment of the learning outcome for which the assignment was designed.
2. Providing the instructor with a means to monitor and evaluate team-based assignments.
3. Alleviating student anxiety regarding team-based assignments.

The study presents mixed results regarding the attainment of this goal. On the positive side, the data collected supports the conclusion that the assignment as structured was effective in facilitating attainment of the identified learning outcomes and was viewed as a positive experience by the majority of the students, lending support to the first and third indicators. On the negative side, the

data suggest that the assignment was difficult for the instructor to monitor and evaluate and that for those students for whom the assignment "didn't work", the experience was markedly negative. In summary, indicator one appears to have been satisfied effectively by the project-based, asynchronous collaboration learning model tested. Indicatory three was at least partially satisfied, and indicator two does not appear to have been met.

Student anxiety in this team-based activity appeared to be related to two factors: the perception of inadequate structure for the assignment, and discomfort with a totally asynchronous environment (Table 4). This discomfort – especially that related to the structure – might well have been more directly associated with anxiety at having to



Name Email Address Date

1 How well did your group work as a team?

- Exceptionally well, all members participated fully and the overall experience was much better than anything that could have been done individually
- On the whole, we worked together well, with a few exceptions. The overall experience was better than what would have been possible working individually
- OK, the overall experience was about what I would have expected to accomplish working individually
- Not so good, I would have done better working alone
- Exceptionally bad, working as a member of the team made the overall experience much worse than what I could have accomplished working individually

2 The group project was included in this course in order to facilitate attainment of a specific learning outcome. Work effectively as a member of a multimedia production team. How well do you feel this learning outcome was met by this experience?

- Exceptionally well, I have a very good appreciation for what is entailed in developing and distributing a media-enhanced product as a member of a production team
- On the whole, very well. I have a good idea of what is entailed in developing and distributing a media enhanced product as a member of a production team
- OK, I have some idea of what is entailed in developing and distributing a media-enhanced product as a member of a production team
- Not very well, I have little idea of what is entailed in developing and distributing a media-enhanced product as a member of a production team
- Not at all, I have no idea of what is entailed in developing and distributing a media-enhanced product as a member of a production team

3 There were four roles within the team. Please rate how well you feel each role was executed within the team

Project Manager Exceptional Good Average Below Average Very Poor
Multimedia Author Exceptional Good Average Below Average Very Poor
Designer Exceptional Good Average Below Average Very Poor
Subject Matter Expert Exceptional Good Average Below Average Very Poor

4 How well did the structure provided in the assignment promote the development and growth of a multimedia production team?

- Exceptionally well, there was just the right amount of structure to make the team develop and work
- On the whole, the structure of the assignment was fine, but **more** direction would have been helpful
- On the whole, the structure of the assignment was fine, but **less** direction would have been helpful
- There was not enough structure in the assignment to allow the development of a meaningful team
- There was too much structure in the assignment to allow the development of a meaningful team

If you found the amount of structure in the assignment to be a problem, please describe your concerns and suggestions below

5 The primary tool available for collaboration in this assignment was the dedicated discussion forum area for your team. How well did this tool promote the work of your team?

- Exceptionally well, we were able to get all necessary work done through the forum threads
- On the whole, pretty well, we were able to ultimately get the work done, after some initial difficulties
- OK, but other, synchronous (real time) tools would have been very helpful
- On the whole, not very well, we were not able to get many of the important parts of the work done through the discussion forum
- Very poorly, the forum did not promote collaboration at all

6 Please write a brief (3 to 4 paragraph) summary of your experience as a member of this team in the space below

7 Please list any suggestions you have for improving the assignment in the space below. Your suggestions would be especially helpful if you could offer ideas on how to improve collaboration in an asynchronous environment

SEND Reset

Figure 5: Collaboration Reflection

function at a higher cognitive level. The learning outcomes that were to be facilitated by this assignment were cognitively demanding.

The difficulty in meeting the goal in terms of the second indicator – providing the instructor with a means to monitor and evaluate team-based assignments – appears to be a function of two factors. The instructor reported difficulty in effectively evaluating a part of the project documentation such as the project schedule in isolation. The instructor also indicated it was hard to accurately evaluate each individual's collaborative contributions without going into a detailed discourse analysis of the discussion forum.

This type of assignment presents a rather elevated risk-reward profile, illustrated in Figure 6. The benefits appear to be significant: students are able to work as members of a project team using primarily asynchronous tools for collaboration. True team interactions and processes do appear to grow during this activity and online students are afforded the opportunity of experiencing a learning environment that more closely parallels the reality of the workplace. The level of effort required by both the instructor and the student should not be ignored, however. Assessment of the assignment is difficult and time consuming. Managing group-breakdowns such as withdrawals from the class and interpersonal conflicts can be quite challenging. Perhaps most significantly, the assignment presumes a level of sophistication and competence on the part of the students. The following observation by one of the less satisfied participants best illustrates this point: "At a graduate level the amount of structure should have been fine. In the case of my team it was insufficient." The impact of marginally qualified, socially inept, or distracted students is quite difficult to predict and manage.

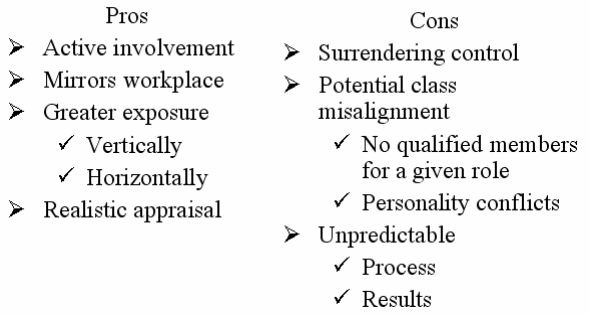


Figure 6: Risk-Value Analysis

5.1 Implications for Future Studies

The benefits associated with the task-based, team assignments certainly warrant further investigation into how to effectively integrate them into courses delivered via asynchronous learning networks. A number of topics for further research are suggested by the results of this study.

1. How can the tools available in an asynchronous environment be utilized to alleviate the often frustrated desire for synchronous communication?
2. How can instructors more effectively evaluate the participation of students in their role as a team member?
3. What is the proper balance between structure and freedom for teams to exercise initiative?

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