

Towards Active Team-Based Learning: An Online Instructional Strategy

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ABSTRACT

Team-based Learning (TBL) is a relatively new pedagogic approach to teaching that makes extensive use of intensive, interactive team activities in the classroom to deepen learning. To date, TBL has been deployed almost entirely in traditional on-campus classes. This paper outlines a strategy and preliminary framework to enhance team communication and strengthen group dynamics, leveraging online tools to support TBL techniques, empowering online students in active learning. It is vital to utilize technology effectively to structure the online classroom in a manner that best supports TBL's deep learning experiences. The major contributions of this research will be to extend techniques from TBL approaches to the online group-support environment and to describe effective technological support.

Keywords

Team-based learning, online instructional strategy, active learning, interaction.

INTRODUCTION

New instructional strategies are needed to increase active learning in an online classroom. Team-based learning (TBL) is an instructional strategy that provides teams with intensive small group interaction that deepens learning. Small groups and their potential to become a team have been gaining importance in both education and industry. TBL's strategy is for small groups to become teams through interaction.

Can computer-mediated communications in an online classroom be leveraged to achieve the intensive small group interaction of TBL from a face-to-face (FtF) classroom? A framework is proposed for applying online group-support strategies to TBL to empower online students in active learning. The framework leverages a combination of learning techniques with computer-mediated communication (CMC) technologies. The recommendations are based in part on findings from a graduate-level on-campus TBL course during the Fall 2004 semester. These have been enriched by observations from online collaborative learning studies.

The framework supports the online instructional strategy and includes learning techniques such as swift trust, readiness assessment tests (RAT) and electronic brainstorming, coupled with online learning tools such as Asynchronous Learning Network (ALN) WebBoard and WebCT systems, synchronous chats, and the simultaneous use of synchronous and ALN systems.

LITERATURE REVIEW

Team-based learning is an instructional strategy that leverages small-group learning to achieve increased effectiveness (Michaelsen, 2002). TBL adds levels of complexity to cooperative learning, a technique where organized small group activities depend on the social exchange of information between learners. Two key factors include: accountability at the individual level; and providing motivation toward the learning of others (Kluge, 1999). As research demonstrates, small group learning produces higher achievement, and healthier and more positive relationships among students, than competitive relationships or individual experiences (Johnson, 1992). Forming small groups for the duration of the course turns the learning experience into a process that improves the quantity and quality of the learning by leveraging long-term caring and peer relationships (Johnson, 1999).

The application of team-based learning in an online environment requires a balance of the learning technique and the CMC mediums. Coordination theory principles address how activities can be coordinated and how actors can work together harmoniously (Malone, 1990). Additionally, when actions necessitate working together, conflict as well as cooperation are included as a means to meet the overall objective, yet enhance the knowledge base of the team (Malone, Crowston, 1990).

TBL in itself is a series of processes that require coordination for a harmonious learning experience. CMC also involves the coordination of technologies based on the processes being executed. The parallel yet dependent actions between TBL and CMC require another level of coordination. The common problems identified by Malone are applicable to the tasks performed for active TBL. These include: the ability to divide goals into actions; the assignment of actions to groups or individuals; allocating resources among individuals; and the sharing of information to achieve the identified goal (Malone, Crowston, 1990).

HIGHLIGHTS OF TEAM-BASED LEARNING

Teams evolve through four essential procedures: team formation, student accountability; team assignments; and high quality feedback. The main emphasis on TBL is the organization around work units across the semester, consisting of 5-7 three phase sequences (Michaelsen, 2002). Each sequence should include preparation, application and assessment before moving to the next unit. The teams should be 5-8 members in size and remain intact for the duration of the semester. Teamwork should be in-class only to prevent unequal delegation of work among team members; learning comes primarily through the discourse in tackling a problem together (Michaelsen, 2002).

Preparation is accomplished through independent reading followed by the Readiness Assessment Test (RAT). The RAT is a two-step process with the student taking the exam individually followed by the team taking the same exam. The team has the opportunity to appeal any questions they deem ambiguous or unclear. Following the readiness exam, the application process is introduced with a few activities that increase in complexity proportionately for the unit. A post module assessment component is recommended before advancing to a new unit to measure learning outcome. Grading is an important part of the process both for the individual and the team. Peer evaluations provide additional motivation to participate.

TEAM-BASED LEARNING INSTRUCTIONAL STRATEGY

TBL in a FtF environment was introduced at a public university for the Fall 2004 semester. The graduate course was a FtF classroom setting, but also used a ALN WebBoard system for posting individual assignments. The first class introduced the TBL instructional strategy. The class was divided into 6 teams, each team containing five to six students, including one or two women per team and a student with a wireless laptop. The first team-building exercise was a negotiation session where students determined the grading weights for the course components.

The course was divided into six modules, for the 15 week semester, with no midterm or final. Two out-of-class individual article reviews were assigned. All team activities were conducted FtF in class, and did not span more than one class period. The iterative structure of each module began with the assignment of all reading materials. A considerable amount of reading material was assigned, but the module readiness assessment test was at the conceptual level and not-by-rote. Subsequently, team activities were assigned before moving onto the next module. After each activity, deliverables were reviewed and critiqued by the other teams. The premise was to deepen the learning and reinforce the objectives of the activity, while providing the instructor an opportunity to comment.

The instructor's role was that of a facilitator and there was no lecturing. Each class would begin with either the readiness test or a team activity. The administration and preparation on behalf of the instructor needed to be structured and well planned to ensure the learning objective was achieved. The instructor would circulate and observe each team's discussion, participating as a mentor when useful. An end-of-semester survey completed by individuals and teams measured motivation and perceived learning along with open-ended questions.

Unsolicited student comments throughout the semester, as well as mid-semester and end of semester evaluations, showed overwhelming enthusiasm for the TBL approach. The Student's Perceptions of TBL from the survey included:

Item	SA (1)	A (2)	N (3)	D (4)	SD (5)	Mean	S.D.	NR
I learned a great deal from my team.	48.3%	35.5%	9.8%	3.2%	3.2%	1.77	.99	31
TBL improved my ability to integrate concepts from different parts of the semester's materials.	30%	56.7%	6.7%	3.3%	3.3%	1.93	.91	30
Questionnaire Categories: SA=Strongly Agree; A=Agree; N=Neither Agree nor disagree (neutral); D=Disagree; SD=Strongly Disagree; S.D.=Standard Deviation; NR=Number of Responses								

The Fall '04 semester paralleled Michaelsen's book and recommendations where applicable to phase one of our study. The second phase is to adjust the FtF instructional strategy based on the findings from the end-of semester survey and semester observations for the Spring 2005 semester. The course content and modules themselves will not change so this variable will remain constant. The use of ALN Webboard system will be introduced for two reasons: to increase the amount of out-of-class

discussion, and as a means to measure the effectiveness of the discussion through the system. By introducing ALN with the established FtF teams, the team cohesion is constant and can be used as an indicator for measuring active learning via ALN.

PROPOSED ONLINE INSTRUCTIONAL STRATEGY AND FRAMEWORK

To introduce TBL in an ALN environment, a phased approach is being proposed that started in the Fall '04 FtF semester, followed by adjustments for the FtF Spring '05 class and subsequently introducing CMC tools and techniques online for the Fall '05 semester using ALN WebBoard or WebCT systems.

TBL Events (Phased from FtF to Distance Learning)

TBL Event	Recommended	FTF Fall 2004 (Phase 1-actual)	FTF Spring 2005 (Phase 2-in progress)	ODL Fall 2005 (Phase 3-proposed)
Course Structure				
Instructor Lecturing	Discouraged	No lecturing all semester.	Remain the same.	Remain the same.
Readiness Assessment Process	At the start of each module: 5-7 modules per semester.	6 modules, each team can ask one question about module materials, individual exam (iRAT) followed by team exam (tRAT)	Remain the same.	Remain the same, but moved online. These are now open-book, by necessity. iRATs will be timed.
Exams	Test to determine what students learned.	No additional exams	End-of-Module test (for prior module) in class at the start of the next module.	Online, open-book, timed end-of-module test.
Assignments In-class and Out-of-class	Out-of-class not recommended.	Always in-class; no team assignments outside of class	2 out-of-class ALN assignments.	2-3 activities per week increasing in difficulty within a module.
Grading	Exams, assignments and certain in-class team activities should be graded.	Class determined grade weightings of all exams/tests, assignments and activities.	Remain the same.	Remain the same.
Team Formation				
Team Size	5-7	6 teams of 5-6 students each.	8 teams of 6 students each.	Teams of 5-7, depending on class size.
Team Arrangement	Do not change groups during the semester.	Same all semester, sat in same location with team all semester.	Remain the same	Remain the same
Team Roles	No assigned roles.	Roles not assigned, attendance was high	Roles not assigned, attendance is high to date	No assigned roles proposed
Team Composition	Not specified.	2 groups w/2 women 3 groups w/1 woman 1 group w/4 women	Women divided equally among groups.	Women divided equally among groups
Team Diversity	Recommended that diverse groups are formed randomly.	Students were grouped randomly based on 2 major criteria: whether they had work experience and access to a laptop for internet access.	Remain the same, with 2 laptops per team (one for each side of the table where they are sitting).	Work experience will be considered.
Team Building	Achieved through initial tRAT, team exercise to determine grade weights and choose a team name.	As recommended.	Remain the same.	Remain the same to promote swift-trust.

Table 1. TBL Events (Phased from FtF to Distance Learning)

TBL Events (Phased from FtF to Distance Learning) continued

TBL Event	Recommended	FTF Fall 2004 (Phase 1-actual)	FTF Spring 2005 (Phase 2-in progress)	ODL Fall 2005 (Phase 3-proposed)
Ongoing Iterative Process – Per Module				
Preparation	Pre-module assessment (Readiness Assessment Process); 5-7 modules per semester.	Multiple choice individual exams, followed by same exam as a team (scratch cards used).	Remain the same.	Remain the same. Use WebCT for timed iRAT. tRAT application for scratch cards (if possible).
Application	Application activities; increase degree of difficulty with each activity.	Several in-class activities per module; no activity would span across weeks. Modules last 2-3 weeks @ 2-5 activities per week.	Same as F'04, but introduce 2 activities on WebBoard for the semester.	Use electronic brainstorming to ensure preparedness to compensate for FTF.
Assessment	Post Module Assessment.	Not used.	End-of-module test introduced to measure learning outcome.	Needed to measure learning outcome.
Evaluations				
Peer Evaluation	Initial evaluation 1/3 into semester that does not count; Evaluation at end of semester that does count.	As recommended.	Remain the same.	Remain the same.
Team Process Evaluation	At same time as peer evaluations; for team-building, do not count.	As recommended.	Remain the same.	Remain the same.
Course Survey	Not mentioned.	End of semester.	3 times during the semester (after each ALN team assignment) and at the end of the semester.	At same time as peer evaluations.

Table 1. TBL Events (Phased from FtF to Distance Learning), continued

The instructional strategy for TBL in an ALN environment requires coordination among and between the activities and CMC tools used for each activity. The subdividing of actions and interdependencies of the activities within the modules also emphasize why coordination theory complements our proposed framework (Malone, Crowston, 1990). The following individual and collaborative learning activities comprise the TBL:

- 1) Team-building activities
- 2) Assigned readings
- 3) Readiness assessment
 - a. Individual readiness test
 - b. Team readiness test
- 4) Team activities
 - a. Electronic brainstorming
 - b. Team collaborative activity
- 5) Classroom activity review
- 6) Peer evaluation
- 7) End-of-semester survey.

Team Building Activities

At the start of the semester, leveraging CMC tools for a task-based activity should encourage frequent information exchange, allowing team members to reflect on the comments of others and encouraging an information rich response. Establishing trust early is vital for team success. "Swift trust" is a demonstrated technique developed by Meyerson et al. (1996) for temporary teams who form around a clear purpose, with a common task and a finite life span (Meyerson, Weick, Kramer, 1996; Coppola, Hiltz, Rotter, 2004).

Teams are formed for a 15 week semester, limiting time to establish trust and familiarity. The dynamics of swift trust reinforce a high level of activity to overcome preconceived perceptions that are based on past personal and professional stereotypes (Coppola, Hiltz, Rotter, 2004). This entrusted action is the stepping stone to engage a new team in the active learning process. Developing an activity that is task based, but leverages the need for social communication and introduction should maintain and also strengthen trusts (Jarvenpaa, Knoll, Leidner, 2001).

Assigned Readings

At the start of each module, weekly ALN WebBoard discussions will be held within the assigned teams. The premise of the weekly discussions is to help you think through the articles you are reading.

Readiness Assessment Tests

Upon completion of the assigned readings, a timed test in WebCT will be administered to each student. Several versions of test with the same questions in differing sequences will be available. To minimize cheating and encourage preparedness (Michaelsen, Fink, Knight, 2002).

Synchronous discussion is important for the team RAT. A timed test in WebCT will be administered parallel to the discussion and a designee for the team will input the answers. The time allowance will be greater than for the individual test because discussion time is needed. Arriving at an answer other than an answer selected by a teammate during the individual test must be explained in at least three sentences. This will ensure an understanding of question and answer and circumvent the ability to simply look up the answer in advance. To appeal a question, the team must provide five to ten supporting sentences to ensure a concise and well thought out rebuttal. Students build cases with convincing evidence to persuade the teacher to award credit for an answer missed by the group on the test (Michaelsen, Fink, Knight, 2002).

Effective Team Activities

Each team activity should begin with electronic brainstorming to stimulate even discussion and initiate the information exchange process. The promotion of group cohesiveness is realized through effective activities, which foster rich discussion and engage the team members in both argumentation and cooperation. This medium encourages quieter members to contribute and decreases the potential for more assertive members to take charge (Michaelsen, Fink, Knight, 2002). Group support tools such as voting and list-making will help structure discourse. Teams can coordinate their preferred mode to communicate and decide whether to use ALN, synchronous chat or a combination of both for team activities. This should complement the initial team formation and allow for a working pattern each team can establish. The complexity of each subsequent activity for a module will be adjusted based on observations made by the instructor.

Class Activities Review

Upon completion of a team activity, students should review the other teams' deliverable and provide feedback to generate discussion. ALN WebBoard will be used during this activity to generate threaded discussions across the online classroom.

Peer Evaluations and End-of-Semester Survey

Peer evaluations are conducted using CMC tools three times a semester, as incentive for students to participate in team activities. End-of-semester surveys will use survey response software to allow the instructor to adjust the course tests and team activities.

ONLINE TBL FRAMEWORK

The proposed online TBL framework encompasses a combination of the above mentioned learning techniques coupled with online learning tools such as ALN WebBoard and WebCT systems, synchronous chats and simultaneous use of synchronous and ALN systems.

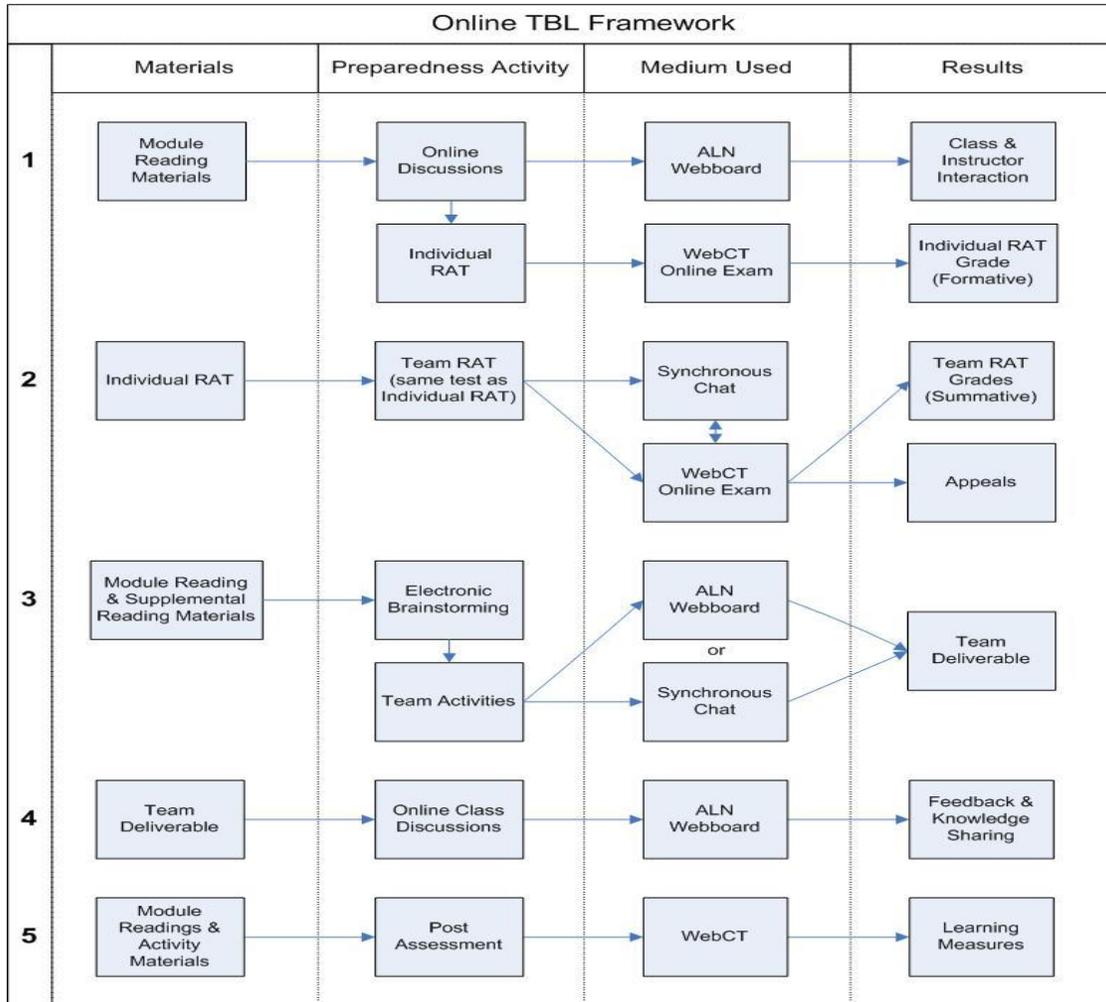


Figure 1. Online TBL Framework

CONTRIBUTIONS AND CONCLUSION

In Fall 2004, team cohesiveness and class attendance were high. There appeared to be a relatively even distribution of discussion amongst the team members. Because the RAT called for a consensus, each student’s input was solicited and time was taken to hear the reasons for any discrepancy from the majority (or all).

TBL contributes an approach to small-group learning that removes most of the disadvantages many instructors and students have found with traditional small-group work. This research contributes a strategy and staged approach to bring TBL to online learning, taking advantage of tools and techniques developed in group-support and ALN research.

The survey administered at semester end indicated a high-perception of learning and motivation. These findings have deemed TBL an approach for further investigation both in the FtF classroom and for online learning. The FtF course is being offered again for the Spring 2005 semester with minor adjustments based on feedback provided from the end-of-semester survey. TBL is being proposed for the Fall 2005 semester. Working in teams online in the FtF class has been introduced for a few assignments as a means to gauge the ALN process.

We believe TBL is a valuable approach to active learning, and look forward to the day when it can be used freely by online classes, and FtF classes can seamlessly incorporate online TBL activities when these are more effective.

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