COMPARING STUDENT PERCEPTIONS OF ACCOUNTABILITY, PREFERENCE FOR TEAM LEARNING, AND SATISFACTION IN TEAM-BASED LEARNING VERSUS PROBLEM-BASED LEARNING IN A U.S. INTELLIGENCE STUDIES PROGRAM

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ABSTRACT

Collaboration is a vital skill for intelligence practice, and optimizing team learning environments is one way to ensure students succeed as intelligence professionals. This research sought to understand what factors most effectively facilitate effective collaboration in team-based learning and problem-based pedagogies. Using the Team-Based Learning Student Assessment Instrument, the researchers asked students from two cohorts: problem-solving and team-based, to identify their preferences and recall from team-based and problem-based lessons. Both cohorts preferred team-based pedagogies and reported better recall from team-based pedagogies. The findings suggest that student engagement and collaboration skills can be cultivated in academic settings, especially team-based collaborative approaches.

Keywords*: intelligence education, problem-based learning, team-based learning, team satisfaction, team accountability*

INTRODUCTION

Collaboration and engagement are highly desirable skills in the intelligence community (George & Bruce, 2014; Office of the Director of National Intelligence [ODNI], 2008; 2010). Over a decade ago, the ODNI outlined a vision for organizations to "shift from the traditional emphasis on self-reliance toward more collaborative operations" that would "allow the community as a whole to perform routinely at levels unachievable in the past" (ODNI, 2008, p. 13). The vision focused on improving all aspects of collaboration across organizations, including building new platforms and mechanisms for communication and coordination. The goal was to enhance

information sharing and improve the final product by drawing from multiple perspectives and areas of expertise at every stage of the intelligence process. Intelligence Community Directive 610-3 (ODNI, 2010) codified part of this vision, committing two core competencies to collaboration (Table 1).

PROBLEM STATEMENT

The question is how to teach collaboration and build a collaborative mindset that appreciates the value that collaboration adds to the process. Research on engagement and collaboration drawn from samples within the intelligence community is limited. In one study of Intelligence Community (IC) personnel, Spracher (2009) assessed six skills of non-supervisory analysts: engagement and collaboration, critical thinking, personal leadership, and integrity, accountability for results, technical expertise, and communication. Of these skills, he found that new analysts in the IC were least prepared to engage and work collaboratively. While many factors likely influence why these skills were not observed, Jensen (2011) suggested that Engagement and Collaboration are challenging to teach in the classroom. Observing that little is known about teaching practices in intelligence studies education, Westbrooks (2016) interviewed faculty at the National Intelligence University to gain insight. He found that most approaches were instructor-centered, such as lectures or demonstrations. However, the faculty he interviewed acknowledged the value of student-centered approaches incorporating collaboration, such as simulations and group projects.

CONCEPTUAL FRAMEWORK

This study assumed that engagement and collaboration are central to effective team learning. This research compared student perceptions from team learning models, Team-Based Learning (TBL) and Problem-Based Learning (PBL), to understand student satisfaction with collaboration. TBL is an instructional strategy characterized by a three-phased approach: preparation, readiness assurance, and application (Michaelsen, Knight, & Fink, 2004). In the Preparation phase, students are responsible for learning the required material before class. In the Readiness phase, students take a brief recall test to ensure they are ready to learn. Upon completion, students take the same assessment as a team, which is permanent, which is the first collaborative learning moment. After the team assessment, the instructor provides immediate feedback on any ununderstood material. In the final Application phase, teams apply what they learned to a real-world problem, decide upon the best solution to the problem, and simultaneously report and then defend their solution to other teams. This process is repeated in five to seven modules during the semester. Peer evaluations and team contracts are also implemented.

PBL focuses on solving real-world problems using self-directed research and analysis (Steinemann, 2003). In this study's PBL classes, students begin the semester with a specific problem or requirement and use the intelligence process to address the need. Students are assigned to permanent teams based on topic preferences and skills, such as software proficiency. Students discuss their abilities and plan to work collaboratively to address the problem. Teams create a contract outlining individual expectations, timelines, methods to resolve conflicts, and consequences for breaking the agreement. Coursework comprises seven to ten

modules with assigned readings, lectures, writing assignments, and research tasks. The instructor meets with the teaching team to facilitate learning objectives. Upon completing the project, students deliver the product to their customers. Each student then completes an exit survey providing feedback about team performance and each member's participation.

METHODOLOGY

This comparative study was conducted among Intelligence Studies majors at a four-year institution in the Great Lakes region. The TBL-SAI (Mennenga, 2012) survey was administered to two student cohorts, one group taught using PBL (n = 23) and one group taught using TBL (n = 15). An independent samples t-test was performed to analyze the data.

The TBL-SAI is a 33-item tool that evaluates student perceptions in three different areas: Accountability (student preparation and contribution to the team), Preference for Team Learning Over Traditional Lecture (student ability to recall material and student attention level in traditional lecture versus team learning environments), and Satisfaction with Team Learning (Table 2). This study also used an additional subscale variable: the ability to recall information created by Ibrahim (2020). Items were scored using a Likert scale from one to five (Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree). Eleven items that contained negative wording were inverted for scoring (Table 2). Because the TBL-SAI was explicitly created for TBL, thirteen questions use "team-based learning." In the non-TBL cohort, students were asked to refer to the type of team learning used in their class for this phrase.

FINDINGS

A Lavene's F-test was performed to test the assumption of homogeneity of variances across all subscale variables and was satisfied. When all 33 items in the TBL-SAI were compared, the TBL cohort (n = 15) was associated with higher scores *(*M = 131.0, SD = 10.6) than the PBL cohort (n = 23) scores (M = 120.4, SD = 12.2), $t(36) = 2.7$, $p < .01$. The means for both were higher than the neutral score of 99 out of 165 proposed by Mennenga (2012), as satisfaction was 13% (for PBL) and 19% (for TBL) higher than neutral.

No statistically significant differences were found for Accountability measures. Outcomes for Preference for Team Learning Over Traditional Lecture showed a statistically significant ($t(36) = 2.3$, $p < .05$) higher score for the TBL cohort (M = 60.1, SD = 6.0) compared to the PBL cohort (M = 54.7, SD = 7.6). When isolating the items for Team Learning Preference for Information Recall, there was a significant difference ($t(36) = p < .04$), with the TBL scores (M = 14.3), SD = 2.5) greater than PBL (M = 12.5, SD = 2.7). Finally, there was also a difference in Satisfaction with Team Learning (t (36) = 6.2, $p < .01$), with the TBL cohort (M = 38.6, SD = 4.4) greater than PBL (M = 32.4, SD = 6.28).

CONCLUSION

Overall, TBL students reported higher scores than PBL students, but both cohorts reported relatively high satisfaction with team learning. Both the PBL and TBL cohorts preferred team learning to lectures, although TBL students' higher preference for team learning over lectures was higher than PBL students. Both cohorts reported better recall of information with team learning than lecture, but the TBL cohort reported stronger recall than PBL students.

High TBL-SAI Scores

The total average scores for each cohort were higher than the neutral, meaning the commonly accepted notion that students dislike teamwork was invalid. A reason for high satisfaction could be that students in this program viewed their projects differently than typical TBL students, who are medical students. Intelligence studies students present their final products to customers or to potential employers, while medical students do not usually deliver their solutions to an immediate customer.

Accountability

While this study found no difference in accountability for the two cohorts, past research has suggested that TBL should increase accountability (see Sharma, et al., 2017; Stein, Colyer, & Manning, 2016). No difference was observed because both cohorts use peer evaluations and contracts, which promote accountability. Furthermore, knowing what traits intelligence studies students possess when entering the program would reveal whether these types of students tend to have high degrees of accountability (Vedel, 2016).

Satisfaction

Students reported more satisfaction with TBL than PBL. This might be because students can compare their performance with the team's during readiness. Research has shown that TBL teams most often outperform their best-performing member (Watson, Michaelsen, & Black, 1989; Watson, Michaelsen, & Sharp, 1991). As a result, students might be more satisfied because they can immediately observe the value of teams. TBL also incorporates immediate feedback on application exercises, allowing individuals to test their team's performance and how each member's input added value to the collaborative process.

In PBL courses, some students complained that some team members contributed disproportionately (Table 3). In TBL courses, at least two components prevented that problem. First, the instructor used random selection to determine which team member defend the team's solution, and the team lost points if that person could not answer. Another team member was not allowed to compensate. Students learned quickly to work together and understand the rationale behind each solution. Secondly, the team contract usually included a significant point deduction for not participating.

Preference for Team Learning Over Traditional Lecture

Both cohorts preferred team learning to lectures, but TBL had a higher preference. The flipped nature of TBL means few lectures occur during class except to provide feedback after the readiness assurance process and during applications when students need clarification on best solutions to a problem. PBL had more lecture components than TBL, and lectures were to introduce key concepts rather than provide clarification.

Preference for Team Learning for Information Recall

Both cohorts reported better recall with team learning than lecture, but recall was stronger for TBL students. The difference might be due to how TBL modules are structured, specifically the readiness process and students' time working on concepts. TBL is comprised of five to seven modules in which students complete a recall readiness test both as an individual and a team at the beginning of each module. In PBL, students had seven to ten modules with no recall test before application; instead, students were tested two-three times over the semester across several modules. In both models, teams spent several days applying concepts and creating products, but students spent more time in TBL courses with specific material due to the longer length of the modules. The one component both modules have in common was a cumulative application project at the end of the course that provided both cohorts an additional opportunity to revisit module material.

RECOMMENDATIONS

To increase positive experiences in teams, instructors should provide immediate feedback. In TBL, students were given immediate feedback multiple times per module during the readiness and application phases. While feedback occurred during PBL, the feedback was not usually immediate. Instead, feedback occurred after the instructor graded assignments, which took longer. Offering pre-tests based on the reading would also provide a way for students to receive immediate feedback on their recall of information. Giving immediate feedback more often during team projects could also provide insight to students about whether their collaborative practices are working. For example, students can observe whose experiences are not being considered or whose understanding dominates the process. They could also use this feedback to revisit the contract and reinforce expectations for better performance.

Another valuable mechanism to enhance satisfaction with collaboration is the team contract. Team contracts should focus on how to minimize unwanted behaviors and how to maximize each member's strengths. Comments 4 and 6 (Table 3) show how understanding strengths and weaknesses enhanced group work. One way to accomplish this is to have teams discuss their strengths at the beginning of the semester and codify how to work with these strengths and minimize barriers to success. For example, module one in the TBL course included a force field analysis on creating effective teams. Each team then used their findings and recommendations to create a team contract to minimize constraints and maximize drivers of success. Student contribution is more consistent if clear expectations and consequences are included in the team

contract. Comment 1 (Table 3) clearly portrays the problem when a contract does not exist or does not contain consequences for lack of participation. In contrast, Comment 7 conveys that unequal contributions occurred in other courses but not in TBL, although the student does not say the team contract prevented the problem.

The findings suggest that engagement and collaboration skills can be cultivated in an academic setting. The team learning environment matters, and teams cannot be expected to perform optimally if not provided immediate feedback to reinforce the value of collaboration and taught to utilize mechanisms that drive success. The main problem is transferring these mechanisms into the workplace, where peer evaluations, contracts, and immediate feedback are absent. If students are taught these skills in the education and training environments, the exposure may provide a foundation for them to instill good practices in the workplace.

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Table 1: Collaboration Core Competencies, adapted from ICD 610-03	
Core Competency	Description
Engagement and Collaboration	Intelligence Community personnel (IC) have a responsibility to share information and knowledge to achieve results, and in that regard are expected to recognize, value, build, and leverage diverse collaborative networks of coworkers, peers, customers, stakeholders, and teams within an and/or across the IC.
Building Professional/Technical Networks:	Building Professional/Technical Networks: Develops collaborative information and knowledge sharing networks and builds alliances with colleagues and counterparts within area of professional/technical expertise.

Table 2: All items from the TBL-SAI (Mennenga, 2012), with subscales identified as headers.

Accountability

1. I spend time studying before class in order to be more prepared.
2. I feel I have to prepare for this class in order to do well.
3. I contribute to my team members' learning.
4. My contribution to the team is not important. *(Inverted)*
5. My team members expect me to assist them in their learning.
6. I am accountable for my team's learning.
7. I am proud of my ability to assist my team in their learning.
8. I need to contribute to the team's learning.

Preference for Team Learning Over Traditional Lecture

9. During traditional lecture, I often find myself thinking of non-related things.
10. I am easily distracted during traditional lecture.
11. I am easily distracted during team-based learning activities. *(Inverted)*
12. I am more likely to fall asleep during lecture than during classes to use team-based learning activities.
13. I get bored during team-based learning activities. *(Inverted)*
14. I talk about non-related things during team-based learning activities. *(Inverted)*
15. I easily remember what I learn when working in a team.
16. I remember material better when the instructor lectures about it. *(Inverted)*
17. Team-based learning activities help me recall past information.
18. It is easier to study for tests when the instructor has lectured over the material. *(Inverted)*
19. I remember information longer when I go over it with team members during the GRATs used in team-based learning.
20. I remember material better after the application exercises used in team-based learning.
21. I can easily remember material from lecture. *(Inverted)*
22. After working with my team members, I find it difficult to remember what we talked about during class. *(Inverted)*
23. I do better on exams when we use team-based learning to cover the material.
24. After listening to lecture, I find it difficult to remember what the instructor talked about during class.

Satisfaction With Team Learning

25. I enjoy team-based learning activities.
26. I learn better in a team setting.
27. I think team-based learning activities are an effective approach to learning.
28. I do not like to work in teams. *(Inverted)*
29. Team-based learning activities are fun.
30. Team-based learning activities are a waste of time. *(Inverted)*
31. I think team-based learning helped me improve my grade.
32. I have a positive attitude towards team-based learning activities.
33. I have had a good experience with team-based learning.

Preference for Team Learning for Information Recall

- I easily remember what I learn when working in a team (#15).
- I remember material better when the instructor lectures about it. (#16; *Inverted)*
- Team-based learning activities help me recall past information (#17).
- It is easier to study for tests when the instructor has lectured over the material (#18).

Table 3: Selected submission for the open-response comments from PBL and TBL students
Open-Response Comments for PBL
1. The majority of my team learning experiences have been good, however, on the rare occasions where someone is difficult, or the entire group is difficult, there is not much to do to fix this. One person almost always gets stuck doing more work than others, and often students try to handle things on their own and this results in more work for one person. My best recommendation is to have a clear way that students can voice their concerns of a group because the process is sometimes unclear.
2. I think team…learning can be incredibly successful in a student's learning path if they are with other students who prepare and work the same as them. If someone is paired with other student's that are lackadaisical and do not care about their grades, it can ruin the experience for students who do care about their grades and learning the material. I also think that I have enjoyed my times in a group-based learning scenario when I was able to select the group. This makes it easier for me so I know that those people will complete their work and put in just as much effort as me.
3. With team projects, stronger students are often forced to do extra work to make up for the lackluster efforts or subpar contributions from other students in the group. This has NOT been the case for me in...[this course]...but it has happened to me many times during other classes.
4. For me, it really depends who is on your team and who is willing to put in the effort. Choosing your own team members creates a much more educational experience because you already feel comfortable with those peers and can communicate properly. When put into randomized teams, I often find myself doing most of the work by myself because there is a strong lack of communication amongst team members, as we do not know each other well and do not fully understand each other's strengths and weaknesses.
5. I used to dislike group work until I realized how important it is to learn how to work in a team setting. All of my intel based team work taught me how to utilize the strengths of each member in order to supplement the final product.
Open-Response Comments for TBL
6. The team setup for the Communicating intelligence class was the best team experience I have had.
7. I definitely enjoy team activities; however, sometimes I find it difficult to work with certain people who may not have the same attitude about team learning as I do. For example some people do not pull their weight in team settings. I got to experience a great team setting in my communicating intel class, but mainly because my teammates were amazing at collaborating and working together!
8. I found it very helpful to learn material when able to confer with teammates in group-based learning. I do think the class was well balanced between lectures and group activities
9. I like how not everything was team based. In some of my other classes, I was really stressed working in teams because every project we did was with teams and no one really did their part