Increasing Undergraduate Student Performance in Intelligence Analysis Courses Using Team-Based Learning

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ABSTRACT

Critical thinking is a highly desired skill of intelligence analysts, and fostering this skill is one goal of intelligence educators. Team-based learning (TBL) cultivates critical thinking and also provides structure for effective collaboration, a foundational component. This research addresses whether using TBL increases student performance in applied intelligence analysis courses by comparing the performance of students enrolled in TBL and non-TBL courses. A total of 384 assignments were gathered from students enrolled in an intelligence writing course or an intelligence analysis course between fall 2018 and spring 2019. The hypothesis that the TBL cohort would perform better was supported. One implication for intelligence education is that TBL is an effective method for fostering critical thinking skills and improving analytic performance on intelligence products.

Key Words: intelligence analysis, intelligence education, critical thinking, team-based learning, TBL

Critical thinking is a highly desirable skill for intelligence analysts. Moore (2010, p. 19) claims that "in the context of intelligence analysis, critical thinking becomes one of the most—if not *the* most—important skill of the analyst." Like many other experts, Clark (2010) suggests that many intelligence analysis failures can be linked to analysts' failure to evaluate the information objectively, which is an integral part of the critical thinking process. The intelligence community has made a concerted effort to improve its analysts' critical thinking, but it is difficult to measure the results of that effort. Furthermore, a clear path to developing critical thinking remains a significant struggle, not just in intelligence education but across disciplines.

More than three decades ago, Heuer (1999) explained the need for intelligence analysts to undergo training on the thinking processes involved in making judgments, including the impact of mindsets and biases. His critical work on the *Psychology of Intelligence Analysis* has been circulated widely among intelligence agencies. To help fill the training void, Heuer and Pherson (2011) compiled a reference guide called *Structural Analytic Techniques for Intelligence Analysis* that was intended to help analysts combat many barriers to critical thinking, many of which were outlined by Heuer's previous work and included techniques already being implemented. This guide to structural analytic techniques (SATs) is widely used in the intelligence community, primarily due to a training requirement mandated in the Intelligence Reform and Terrorism Prevention Act of 2004 that encourages sound analytic methods and tradecraft. To further guide analysts in applying critical thinking skills, Pherson and Pherson (2014) wrote *Critical Thinking for Strategic Intelligence*, a book that provides a series of questions and checklists to guide comprehensive thinking in all stages of the analytical process. This work also provides guidance on how SATs can be used throughout the analytical process.

The effectiveness of SATs on producing accurate intelligence and whether they actually reduce bias has not been well researched (Chang et al., 2017). In a systematic review of evaluative studies on SATs, Coulthart (2017) found that only six of twelve core SATs had evaluative studies associated with them,

and only three of those six techniques had been shown to be effective in improving intelligence analysis in some way; although, in aggregate, all six improved intelligence analysis about 65% of the time (p. 377). While improving intelligence analysis demonstrates the value of SATs more often than not, the sole reliance on SATs to increase critical thinking skills is risky.

Rather than focusing on the merits of SATs in increasing analytic rigor and accuracy, this study focuses on how teaching strategy might improve analytic performance by developing critical thinking skills. While all courses from which samples are drawn do implement SATs, this research addresses whether using TBL—a pedagogical strategy that is partly based on the application of critical thinking skills—increases students' performance on intelligence briefs and reports. One assumption of this research is that an increase in student performance is a good measure of critical thinking based on the nature of these types of assignments, which require analytic thinking or the ability to present evidence with limited bias.

TEAM-BASED LEARNING AND CRITICAL THINKING

Critical Thinking. Simply put, critical thinking is thinking about one's thinking, about the parts of thinking that make up the whole. Two leading experts in the field of critical thinking offer a more formal definition, which is "the art of analyzing and evaluating thinking with a view to improving it" (Paul & Elder, 2014, p. 2). They describe eight elements of thinking that one should analyze to improve thinking: purpose, questions, points of view, information, inferences, concepts, implications, and assumptions. This framework is just one of many that an instructor can implement when fostering critical thinking skills. The general value of Paul and Elder's framework is the provision of eight measurable components, even if assessing the extent to which each element occurs might be subjective.

TBL and Critical Thinking. While many teaching strategies are compatible with fostering critical thinking, this paper focuses on TBL, which is a pedagogical approach that focuses on the ability to articulate and defend one's thinking (Sweet & Michaelsen, 2012). Essentially, students are asked to think about their thinking. The facilitator's role is to help the student become aware of how well they are defending and analyzing their own thinking, highlighting any cognitive pitfalls in the process. Espey (2018) not only found that college students reported that TBL courses increased their critical thinking skills, they also believed these courses helped develop critical thinking skills better than in their lecture-based courses.

The TBL Model. TBL is small group learning in a flipped classroom. "Flipped" means that students prepare before class by doing pre-work, and class time is spent solving problems as teams. The TBL model, made popular by Larry Michaelsen, is a type of structured learning that uses "a specific sequence of activities and feedback designed to quickly change groups of individual students into high-performance learning teams" (Sweet and Michaelsen, 2012, p. 18). To begin, participants are given preparatory material, such as pre-reading or video clips, and then they take individual and team readiness assurance tests to demonstrate their understanding of that material. The facilitator provides immediate feedback on anything the teams did not understand. This process is different from traditional classes in which the instructor spends most of class time relaying the material, and students work on applying the material outside the class through homework.

After the readiness assurance tests, the class begins applying the material through a series of increasingly difficult 4-S (significant problem, same problem, specific choice, and simultaneous reporting) activities that simulate relevant and real-world problems (Michaelsen &Sweet, 2008). Each problem must be *significant*, emphasizing the relevancy of content presented in the preparatory material to real-world situations. All teams work on the *same* problem, which enables subsequent inter-team discussion and

debate. Students must be forced to make a *specific choice* from a range of options. In other words, the facilitator does not give open-ended questions. The team must discuss why they think what they think and take a position. Finally, all teams must report their answer *simultaneously*, without having the opportunity to be swayed by what other groups initially report. Once all teams report their answer, each team must defend their answer to the other teams.

Most of class time is used completing 4-S activities, which is when critical thinking is most easily assessed, and the facilitator can formally or informally gauge critical thinking. For example, a facilitator might use Paul and Elder's (2014) framework to help a student break down their thinking into component parts The facilitator would assess how the participants defend their answer or oppose other answers, using any of the relevant elements of critical thinking, such as defending their interpretation of the question, acknowledging various points of view, assessing the information they used to come to their conclusion, incorporating core concepts, and identifying any assumptions or implications. The facilitator can even recommend techniques, such as an SAT, to mitigate cognitive barriers. During this process, grading is not contingent on the correct answer. Instead, the facilitator assesses how well each team articulates and defends their decision in such a way that a reasonable person could see their logic. Of course, as in intelligence analysis, the correct answer is important, but failure to analyze information correctly or assess a problem's component parts can lead to errors that might result in incorrect conclusions or unrecognized risk for decision makers. For this reason, attention must be devoted to enhancing the analytic process.

TBL and Collaboration. Collaboration is central to TBL and developing critical thinking skills. The power in collaborative learning comes from communicating and defending one's ideas publicly with people who have different perspectives in order to accomplish an objective, in this case, making a decision. This interaction and working in teams, if formed and managed effectively, can improve problem-solving abilities over time. In fact, TBL research has shown that teams outperform their best-performing member most of the time (Michaelsen et al., 1991).

The success of the TBL method is drawn from research focused on making groups more effective, from motivating factors to maximizing on participants' experiences (Sweet & Michealsen, 2007). Some people do not enjoy teamwork, usually citing the freeloader problem, personality clashes, or simply the idea that they might perform better as an individual. The TBL model alleviates many of these issues and maximizes the value of collaborative work (Sibley & Ostafichuk, 2014). For example, TBL offers structure for accountability, like readiness tests, contracts, and peer evaluations. Students have even self-reported greater accountability in TBL when compared to lecture-based sessions (Faezi et al., 2018). The strategic selection of diverse, permanent teams is crucial (Sibley & Ostafichuk, 2014; Sweet & Michaelsen, 2012), especially for generating ideas. Watson et al. (1993) found that while less diverse teams took less time to become effective, identify the correct problem, and offer a quality solution, more diversity generated more perspectives on and solutions for a problem over the long term. In other words, while diversity is more advantageous to problem solving, the benefit is only reaped over time. Furthermore, newer teams do not benefit from their members' knowledge as much as experienced groups (Watson et al., 1991).

While not the central focus of this paper, the ability to work collaboratively is another highly desirable skill of intelligence analysts (George & Bruce, 2014; Office of the Director of National Intelligence [ODNI], 2010; ODNI, 2015), although one for which Spracher (2009) found new analysts were least prepared. In 2015, ODNI outlined a vision for organizations to "shift from the traditional emphasis on self-reliance toward more collaborative operations" in order to "perform routinely at levels unachievable in the past." As with critical thinking, the use of Structured Analytic Techniques has been one way that the community has tried to enable collaboration and mitigate the challenges inherent in group work

(Pherson & Heuer, 2014). The use of TBL in intelligence education could be another way to strengthen the collaboration skills of the future intelligence workforce.

METHODOLOGY

This study focuses on whether the emphasis on critical thinking during TBL instruction improves student performance on intelligence reports and briefs completed in those same classes since enhanced critical thinking will be measured by the student's performance on assignments. The hypothesis is that student performance on intelligence products will be higher in TBL classes.

To assess whether TBL increased student performance on intelligence products, assignments were collected from students enrolled in either an Intelligence Writing or an Intelligence Analysis course. A total of 383 assignments were graded, including 233 Situational Reports (SitReps) (109 Non-TBL; 124 TBL) and 151 Intelligence Briefs (Intel Briefs) (72 Non-TBL; 79 TBL). Of the two sections offered for each course, each course had one section that was facilitated using active learning and the other section was facilitated using TBL. Two blind graders, including the instructor, assessed each assignment. The average score for each student's assignment was used in a t-test to measure if a difference in means existed.

RESULTS

The hypothesis that the TBL cohort would perform better was supported. First, an F-Test for Two-Sample variances was applied and showed unequal variances. Then, a T-Test for unequal variances was applied to see if a difference in mean scores occurred between the TBL and non-TBL cohorts. The results showed the TBL cohort performed significantly better than the non-TBL cohort on both SitReps ($p<0.001$) and Intel Briefs ($p=0.015$). Specifically, there was a significant difference in the Intel Brief scores for the TBL cohort ($M=27.85$, $SD=6.37$) and the non-TBL cohort ($M=26.85$, $SD=8.90$); $t(140)=2.20$, $p=0.015$. Second, there was a significant difference in the SitRep scores for the TBL cohort ($M=18.69$, $SD=2.24$) and the non-TBL cohort ($M=17.79$, $SD=4.36$); $t(193)=-3.74$, $p<0.001$. This suggests that TBL does increase performance on intelligence products.

LIMITATIONS AND IMPLICATIONS FOR INTELLIGENCE EDUCATION

A key assumption of this research was that better intelligence products are tied to better critical thinking skills. In other words, increased student performance on this type of assignment would indicate increased critical thinking skills. While this assumption might not be true, student performance on analytic products did increase when teaching strategy was changed to TBL, which emphasizes critical thinking. Specifically, students were able to use better judgment and they were also able to clearly convey evidence with reduced bias. Ultimately, this research demonstrates that TBL is an effective approach for increasing critical thinking, which is necessary for increased analytic performance.

This study had two limitations. First, while grading was blind, one grader was the instructor for all courses and still remembered many students and their topics. This may have resulted in unintended bias while grading the reports and briefs. Second, the grading focused solely on reports and briefs, which are always assigned in these courses; however, other assignments, the number of assignments, and how grading was performed on other assignments varied. For example, in one section, the instructor assigned a Strengths, Weaknesses, Opportunities, and Threats analysis that was pass/fail. In another section, that assignment was graded more rigorously. In yet another section, that assignment did not exist. Students

might have exerted more or less effort into a SitRep or Intel Brief based on how many other assignments they had due or how much effort would be required to complete all assignments.

An alternative reason student performance may have increased could have been due to the instructor's compatibility with the TBL strategy. While all classes were taught in an active learning environment, the instructor's preference for TBL might have impacted student performance. Inversely, an instructor who does not prefer TBL or is not a strong facilitator may not see an improvement in performance.

TBL is one of many effective teaching strategies that foster the critical thinking and collaborative skills desired of intelligence analysts. The primary appeal of TBL is that it focuses on assessing and improving critical thinking, shifting attention from the correct answer to the process by which an answer is selected. This process is highly compatible with the techniques and critical thinking guidance already taught in the intelligence community and other intelligence education circles. If professors are comfortable teaching active learning, then using the TBL model to applied intelligence courses could enhance students' ability to analyze and break down problems that mimic situations they might confront in the real world. With practice, this skill would translate to solving problems in the intelligence environment.

TBL also provides a structure for instructors to foster collaboration, another competency desired of intelligence analysts and a possible shortcoming of current intelligence education and the intelligence workforce. Many instructors integrate collaboration as part of the coursework, but teaching how to collaborate is important. Whether using TBL or another collaborative model, TBL offers founded guidance on how to set teams up for success and develop interpersonal skills that will allow them to effectively shift from individual to collaborative work.

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