# Exploring the Effects of Team-Based Learning in a Preservice Reading Methods Course

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## Abstract

Teacher educators are tasked with preparing preservice teachers with both the content and pedagogical knowledge and skills to teach children to read. In this study we investigated the use of team-based learning (TBL) in a reading methods course as a framework for improving student learning outcomes. TBL is an instructional approach that has been used across a variety of fields in higher education but has only recently made its way into teacher preparation programs. Using mixed methods, we compared TBL to the traditional lecture to explore whether participation in TBL affected preservice elementary teachers' level of preparation for class, achievement of learning outcomes, and perceptions of TBL. Results showed no statistically significant differences in preparation or learning outcomes. Overall, preservice teachers reported that they liked several TBL components. Further research is required to determine whether TBL has an impact on learning outcomes after a longer period of implementation, over time, and/or on teaching behaviors.

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Teacher educators are tasked with preparing preservice teachers with both the content and pedagogical knowledge and skills to teach children to read. In this study we investigated the use of team-based learning (TBL) in a reading methods course as a framework for improving student learning outcomes. TBL is an instructional approach that has been used across a variety of fields in higher education but has only recently made its way into teacher preparation programs. Using mixed methods, we compared TBL to the traditional lecture to explore whether participation in TBL affected preservice elementary teachers' level of preparation for class, achievement of learning outcomes, and perceptions of TBL. Results showed no statistically significant differences in preparation or learning outcomes. Overall, preservice teachers reported that they liked several TBL components. Further research is required to determine whether TBL has an impact on learning outcomes after a longer period of implementation, over time, and/or on teaching behaviors.

## INTRODUCTION

As Louisa Moats (2020) stated, "the most fundamental responsibility of schools is teaching students to read" (p. 4). Ultimately, this responsibility falls on classroom teachers. Accomplishing such a task requires knowledge of the children and their characteristics, knowledge of how children learn to read, knowledge of and the ability to use evidence-based practices for teaching and assessing reading, the ability to problem solve when children are struggling to read, and a sense of efficacy for teaching children to read (Block & Mangieri, 2003; Griffith & Lacina, 2017; Kent et al., 2013; Shulman, 1987).

Literacy teacher educators are tasked with ensuring that preservice teachers have the necessary content knowledge to teach reading well and are able to implement common instructional routines, analyze data, make instructional decisions, and design lessons that target readers' areas of need. This means that the reading coursework and practicum experiences within the teacher preparation programs must provide adequate opportunities to build these skills and knowledge. Often the content of what literacy teacher educators should teach is clearly outlined by literacy organizations, such as the International Literacy Association, the National Council of Teachers of English, or the International Dyslexia Association. What is not as clear, however, is how reading methods courses should be structured so that preservice teachers gain the necessary content knowledge as well as the necessary skills to teach reading effectively. In this study, we reviewed literature about instructional frameworks that have been used within teacher preparation programs, including flipped learning, project-based learning, and jigsaw. Next, we examined an instructional framework that we believe ties together the strengths from each of the other frameworks to build content knowledge, pedagogical content knowledge, and decision-making skills.

## RESEARCH ON INSTRUCTIONAL FRAMEWORKS IN TEACHER EDUCATION

Through the scholarship of teaching and learning, a variety of instructional frameworks have been tested in higher education with the benefit of improving student learning (Huber & Morreale, 2002). Some examples of these frameworks include direct instruction, flipped learning, jigsaw, and problem-based learning. Below we review the scholarship of teaching and learning associated with each of these strategies.

### Direct Instruction

Rosenshine (1987) and Rosenshine and Stevens (1986) endorsed direct instruction as a "demonstrate-practice-feedback" model for teaching knowledge and skills and later added additional steps. Their revised model included reviewing previous material, presenting new material in small steps, providing guided practice, providing feedback, supervising independent practice, then reviewing weekly and monthly. However, this teaching strategy has been called passive, or teacher-centered, and it is associated with lower levels of student engagement during the presentation of new materials, which is often in the format of a lecture (Lim et al., 2021; Mazur, 2009). With this strategy, students usually learn by listening or observing, while the teacher lectures or demonstrates (Lim et al., 2021). On the other hand, collaborative learning strategies can promote student engagement through joint thinking that includes high-level processing and reasoning of the material through the discussion of divergent claims (Isohätälä et al., 2018).

### Flipped Learning

Flipped learning is a pedagogical model that moves teacher-centered activities, such as the traditional lecture, outside of the classroom through videos and other digital formats reserving time inside the classroom for the application of content knowledge, often in the form of collaborative learning activities (Kozikoğlu, 2019). Kurt (2017) investigated the use of flipped learning compared to traditional lecture in a classroom management course with second-year students. 62 participants (mostly

female) were divided into two sections and assigned to experimental and control conditions. The experimental group received the flipped learning conditions, which consisted of video lectures and online quizzes that were viewed before class and face-to-face meetings with practice-based, interactive tasks completed in groups or pairs. The control group received traditional instruction, which consisted of assigned readings to be completed before class, and then in-class lectures using PowerPoint presentations. The findings showed that students in the flipped classroom reported higher levels of self-efficacy beliefs and better learning outcomes. In a meta-analysis, Låg and Sæl (2019) found that after searching eight electronic reference databases, their results indicated that flipped learning had a small effect size on the learning of students from all levels of education; however, the authors noted that if student preparation was tested, then the effect size for student learning might increase. Additionally, small effects on pass rates and student satisfaction were found. In a different meta-analysis, Kozikoğlu (2019) found that flipped learning had a positive impact on learning outcomes and that it reduced students' homework/task stress and anxiety levels.

While learning outcomes appear to be positive for flipped learning, studies show mixed results for student perceptions of flipped learning. Students in Kurt's (2017) study reported positive perceptions of the instructional approach. In a meta-analysis, Kozikoğlu (2019) found that teachers and students had positive views of flipped learning. However, in another meta-analysis, Låg and Sæl (2019) found a small effect size for student satisfaction.

## Jigsaw
Another collaborative learning strategy, jigsaw, involves breaking students into teams where they become an expert on an assigned segment of content (e.g., a chapter, a section of a chapter, an article). Each team should have as many members as there are segments of content. The teams then disperse into expert teams where each member has been assigned the same content segment to study. In the teams, members read and discuss their content segment. Finally, the expert teams disperse back to the jigsaw teams where they present what they learned from their content segment and learn from other group members. Wedman and colleagues (1996) investigated the use of the jigsaw team instructional framework on preservice teachers' knowledge of reading pedagogy. When compared to the group that received only traditional lectures and demonstrations, the jigsaw group performed about the same on a multiple-choice posttest but outperformed the comparison group on a written scenario analysis. Artut and Tarim (2007) investigated the effects of jigsaw on elementary preservice teachers in a math teaching methods course and found a positive effect size for learning outcomes, but Costouros (2020) found that using the jigsaw strategy in an introductory business class showed no differences in student grades.

The literature about the jigsaw strategy showed that students had mixed perceptions and concerns. Students in Costouros' (2020) study reported mixed experiences from their experience using jigsaw, but Artut and Tarimj (2007) reported positive student perceptions. Wedman and colleagues' study expressed concerns about trusting team-mates to learn and teach the material correctly and to complete their share of the work.

## Problem-based Learning
Problem-based learning (PBL) is an instructional framework that allows students to practice skills and gain knowledge through application to a real-world problem. This framework facilitates a theory to practice alignment, by providing students with opportunities to draw upon their content knowledge and pedagogical content knowledge to analyze and solve a problem (Hemker et al., 2017). Grigg and Lewis (2018) explored the benefits of preservice teachers, finding that preservice teachers reported benefits such as engagement, relevance to teacher training, and motivation. However, challenges were also reported, including the self-directed nature of the framework and time management. Hemker and colleagues (2017) evaluated the impact of PBL on preservice teachers' perceived learning success in seminars about educational assessment. They found that while 11 out of 16 students reported being content with their learning, five out of 16 reported learning too little. Barron and Wells (2013) described the use of PBL in a preservice reading methods course, where students worked in permanent teams and each team was provided with the same problem to solve and then present by the end of the semester. The preservice teachers were assigned articles to read and used a discussion portal to communicate about outside resources, notes, and comments. At the end of the study, teams of preservice teachers presented their final project and researchers scored it using a rubric. Their analysis showed that the preservice teachers were able to make connections between research and practice, understand the purpose of assessments, write thoughtfully, use academic language appropriately, and experience scenarios similar to those they may encounter when they become employed as teachers (Barron & Wells, 2013).

Responses to PBL have been mixed. Hemker and colleagues (2017) found that preservice teachers' expectations for PBL were not met and students rated the framework critically. The researchers suggested that a lack of familiarity with PBL, the absence of direct instruction, and the focus on independent learning may explain the critical ratings.

## Summary
In summary, a review of instructional frameworks in teaching methods courses shows that there are several options that appear to be at least as effective as traditional lecture regarding learning outcomes. While flipped learning showed a positive impact on learning outcomes and positive student perceptions, there was no clear framework for how the in-class activities should be organized or presented. This means that activities could be completed independently, rather than collaboratively, which would not facilitate the building of interpersonal skills. Jigsaw showed similar learning outcomes to lecture and provided a collaborative space, but student perceptions were mixed due to a lack of trust in team members to effectively teach the content. PBL showed a positive impact on learning outcomes and opportunities to work collaboratively with peers, but mixed student perceptions due to a lack of direct instruction.

## Team-Based Learning
Team-based learning (TBL) is an instructional approach that combines the strengths of the frameworks previously described, including a flipped model that provides direct instruction outside of class and a structured in-class activity design that provides opportunities for collaborative problem solving using the new

content and skills under the guidance of the instructor. Walker and colleagues (2017) proposed that the use of TBL with preservice teachers would provide them with opportunities to face problems similar to those they may face as teachers and to solve them with the support of a team with the guidance of an instructor. Brannan et al. (2019) outlined how TBL can be implemented in teacher preparation programs at the elementary and secondary levels. One study showed that preservice elementary teachers in a reading methods course that used TBL had about the same efficacy for literacy instruction as their peers in a traditional lecture version of the same course (Brannan, 2022). Although we were unable to locate any empirical research on the impact of TBL on learning outcomes in elementary teacher education courses, results from other fields, such as biology, nursing, and engineering, and one study (Parrish et al., 2021) from secondary math teacher education have linked TBL to increased student outcomes and increased course satisfaction. Results of these studies will be discussed following a brief overview of TBL.

TBL was developed by Larry Michaelsen to enhance the quality of learning through application of the concepts, rather than just learning about them (Michaelsen et al., 2004). Presently, TBL is widely used in higher education and especially throughout the medical sciences (Burgess et al., 2017), which, similar to education require candidates to have content knowledge and the ability to apply skills in clinical settings. TBL even boasts its own professional organization, the Team-Based Learning Collaborative (www.teambasedlearning.org).

One of the basic tenets of TBL is that students spend the entire semester working within the same team of students to solve significant, course-related problems during class time. The series of learning activities within TBL provides a framework to ensure students are ready for the problems they will be asked to solve, that they work together to solve realistic problems, that they build interdependency within teams, and that they are accountable for contributing to team activities (Michaelsen et al., 2004). In the following section, we describe the series of learning activities, or phases, that occur within the framework of TBL. Figure 1, created by the Brannan and colleagues (2019), illustrates the sequence of activities and how they are related. As shown, the knowledge and skills taught during the semester are grouped into modules. Each module consists of a preparation phase, the readiness assurance process (RAP), application activities, peer evaluation, and ongoing assessment.

## FRAMEWORK
### Preparation
The first phase of a module, or unit of instruction organized around a topic lasting one or more weeks, is preparation, which provides students with guidance and resources to gain the necessary skills and knowledge that will be needed during the module's application activities (Michaelsen, 2004). Similar to the flipped learning framework, preparation usually takes place outside of class. In a reading methods course, preparation might involve students reading assigned chapters or articles and/or viewing video lectures and samples of exemplary lessons. Preparation can be supported by having students complete a reading/viewing guide for assigned materials.

### Readiness Assurance Process
The preparation phase is followed by the readiness assurance process (RAP), which ensures students have gained the necessary knowledge and skills needed from the preparation materials so that they can be successful with the application activities that follow. This process includes a readiness assurance test (RAT), most often in multiple-choice format, that assesses how well students grasped the knowledge and skills provided in the preparation phase (Michaelsen, 2004). The RAT is taken twice, once by individual students (iRAT) and again as a team (tRAT). During the tRAT, students receive immediate feedback on their performance, usually using a scratch-off answer sheet called an IF-AT form (Epstein Educational Enterprises, 2018) or other digital technology, such as InteDashboard™ (www.intedashboard.com). Team testing has been linked to higher test scores and content retention (Bloom, 2009). At the conclusion of the tRAT, each team is given an opportunity to file an appeal against any question on the test due to ambiguity or mistakes in the test to earn back their points. The final subcomponent of the RAP is a brief clarifying discussion lead by the instructor that addresses any confusing topics that were covered in the preparation phase or questions from the RAT. The data from the RAT provides a starting point for this discussion.

### Application Activities
Team application activities, the heart of TBL, follow the RAP as an opportunity for students to encounter realistic problems related to the content (Michaelsen, 2004). Activities usually follow a 4-S structure, meaning all teams receive the *same*, *significant* (realistic) problem to solve (Michaelsen & Sweet, 2011). The problem
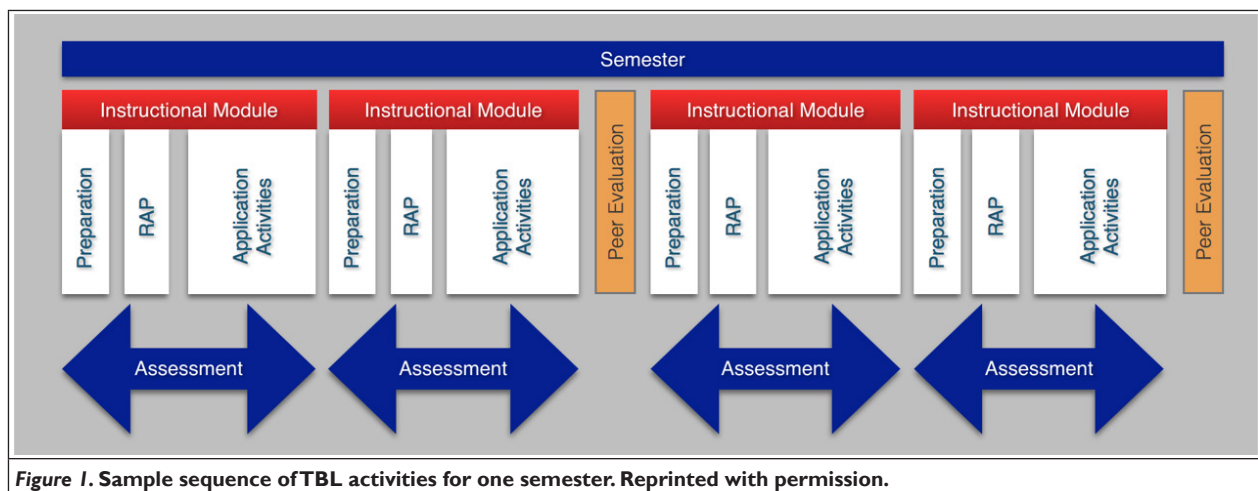


*Figure 1*. **Sample sequence of TBL activities for one semester. Reprinted with permission.**

requires that each team make a *specific* choice, then report it *simultaneously* to the class, at the signal of the instructor (Michaelsen & Sweet, 2011). Response formats may include multiple choice cards, responses recorded on small white boards, digital response formats, or gallery walks using sticky notes for responses. As the module progresses, the activities become more complex and may evolve to include the analysis of case studies (Gomez et al., 2010).

### Assessment and Peer Evaluation

Assessment and peer evaluation tie the modules together to ensure a smooth learning experience throughout the semester. Assessment, which may occur through graded application activities, exams, or projects, is used to evaluate students' progress throughout the course and guide instruction. Peer evaluation is a tool that helps to hold each team member accountable for their contribution to team activities. Peer evaluation often occurs at midterm and again at the end of the course (Cestone et al., 2008), although the frequency of peer evaluation is ultimately determined by the instructor. Peer evaluation can be implemented using a variety of methods, depending on the type of feedback desired by the course instructor (Szatkowski & Brannan, 2019).

### Outcomes of Team-Based Learning

TBL has been used across a variety of fields in higher education, including such disciplines as Biology, Organic Chemistry, Nursing, Pharmaceutical Education, Information Systems, and Engineering (Banfield et al., 2012; Bleske et al., 2016; Carmichael, 2009; Dinan & Frydrchowski, 1995; Drummond, 2012; Kreie et al., 2007; McInerney & Fink, 2003; Moore et al., 2015) and is recently being seen within the field of teacher education with preservice teachers (Brannan et al., 2019; Parrish et al., 2021) and in-service teachers (Walker, et al., 2017). Research throughout these fields has shown improvements in content knowledge, critical thinking skills, and student satisfaction with courses that use TBL (Carmichael, 2009; Styron & Styron, 2014).

### Learning Outcomes

The research about TBL has shown higher learning outcomes than traditional lecture, as measured by course grades and assessments. Bleske and colleagues (2016) compared TBL to traditional lecture in an elective therapeutics course using a randomized crossover model with a three-week course sequence. Their results showed significantly higher student assessment scores, that students favored TBL over lecture, and that students in the TBL format spent more time preparing for class (Bleske et al., 2016). Another group of researchers also compared TBL to the lecture format that was previously implemented in a pharmaceutical course (Letassy et al., 2008). They found that course grades were higher when using the TBL format and that they were able to predict course grades using individual readiness assurance tests and team contribution scores (peer evaluation) (Letassy et al., 2008). In an introductory biology course, Carmichael (2009) found that when comparing TBL to lecture, students in the TBL group outperformed the students in the lecture group on three exams throughout the semester. Furthermore, when looking at the grade distributions, students in the TBL group earned more As and Bs and fewer Ds and Fs than students in the lecture group (Carmichael, 2009).

### Student Satisfaction Outcomes

Student satisfaction with TBL has been reported across several disciplines, including secondary teacher education. Using TBL in an online secondary mathematics methods course, Parrish and colleagues (2021) reported positive student perceptions, citing team dynamics and increased learning as reoccurring themes. Huggins and Stamatel (2015) applied TBL to a sociology course and the students reported satisfaction with the format and described benefits, such as improvements in verbal expression and creative thinking, and stronger relationships with the course instructor. Vasan and colleagues (2009) implemented TBL in a gross anatomy course and found that regardless of performance, their students rated their perceptions of TBL positively. Furthermore, TBL was also shown to contribute to student retention in an information systems course (Kreie et al., 2010). Currey and colleagues (2015) investigated critical care nursing students' perceptions and experiences of TBL. The results of the extended response questionnaire completed by their students revealed several themes related to professional growth. One of the themes identified was learning effectiveness, along with the following subthemes: facilitating cooperative learning, improving understanding, supporting knowledge acquisition and retention, and relating to experience (Currey et al., 2015). Furthermore, findings from a study that crossed several disciplines, including chemistry, finance, geography, political science, and social work, showed that students preferred TBL to traditionally structured courses (Leisey et al., 2014). This evidence from several fields supports the hypothesis that students in teacher preparation programs may show positive perceptions toward TBL.

## PURPOSE AND SIGNIFICANCE OF THE STUDY

With the goal in mind of determining which instructional frameworks advance student learning (Cerbin, 2013), the purpose of this research study was to determine whether TBL impacted preservice elementary teachers' level of preparation and attainment of learning outcomes in a reading/literacy course. Additionally, we wanted to learn which components of TBL preservice teachers liked. The results of this study will inform the pedagogy of the field of reading teacher education. It may provide an alternative instructional approach for instructors who currently apply a different instructional framework in their reading methods courses. Additionally, this research will expand the interdisciplinary knowledge base of TBL to the teacher education field.

### Research Questions

1. **How does TBL impact the learning outcomes of students in a reading methods course?**

2. **How does TBL impact students' preparation for class in a reading methods course?**

3. **What are preservice literacy teachers' perceptions of TBL?**

## METHODOLOGY

A multi-methods approach was used to address the research questions of this study. The quantitative portion of the study used a quasi-experimental nonequivalent control group design to investigate impacts on student learning outcomes and preparation. The qualitative data were collected from students' written responses to an end of course survey. These data were used to investigate trends in students' responses to completing a course that uses team-based learning.

The study took place using two sections of a reading education methods course during the same semester. The treatment was applied for three weeks during an instructional unit focusing on reading assessment. Both sections met with the same professor, one day per week for two hours and fifteen minutes. One section of the course was designated as the TBL group (n=24), and the other section was designated as the lecture group (n=12). A discrepancy in the number of participants in each group exists due to the second section being made available for registration once the first section was filled.

### Participants

Participants included 36 undergraduate preservice teachers who enrolled in a reading methods course at a university in the Southeastern United States. In addition to the coursework, all participants completed a field experience course in an assigned elementary classroom, where they completed observations of reading instruction, practiced teaching various components of reading, and provided reading intervention to a struggling reader. All preservice teachers enrolled in the course agreed to participate in the study.

### Instruments

#### Reading assessment test.

A ten-question, paper-based test was developed by the researchers to assess whether the learning outcomes were met for the module used in the study. It consisted of nine multiple-choice items and one labeling item. Questions 1-6 reflected Bloom's (1956) Knowledge and Application level, while question questions 7-10 required higher-order thinking skills, such as analyzing reading assessment data to make decisions about follow-up instruction. The Reading Assessment Test was administered as the pretest and posttest.

#### Readiness assurance test (RAT).

To assess students' preparation for class, a ten-question, paper-based test was developed that was aligned with the learning outcomes for the preparation phase, which was completed in the online learning management system. The multiple-choice items included information from the assigned readings and a video lecture listed in the online learning management system. Students in the TBL group used this test as their individual and team RAT, while the lecture group completed the quiz individually. Both groups completed this assessment in class.

#### End of course survey.

A digital questionnaire was created using Google Forms and was linked to a QR code in the presentation for the last class meeting. The questionnaire consisted of three open-ended questions, asking students to list three things they liked about the course, two things they would change, and one lingering question. For

the purposes of this research, only the responses to the first question were analyzed.

### Procedures

#### Pretest

Before the classes began for the semester, the students in both sections of the course attended a program orientation, where the researchers gained informed consent and administered the pretest (reading assessment test). On the first day of class, the professor provided an overview of the format of the course, reviewed the syllabus, and provided the TBL group with a demonstration of the readiness assurance process.

#### Preparation and Readiness Assurance

In preparation for the second week of class, participants accessed the online lesson for the week to review the lesson objectives, complete the assigned readings, and view the provided video lecture. At the beginning of the second class-meeting, participants in both groups individually completed the RAT, a 10-item multiple-choice test, which was based on the information presented in their readings and presentation. Following the individual test, the TBL group completed the same test again with their team. Brief supplemental readings and a presentation were assigned prior to week three, but no readiness assurance process followed, since the prerequisite knowledge and skills had already been assessed.

#### Application Activities

During weeks two and three, the TBL group engaged in team application activities while the lecture group listened to the instructor lecture on the same topics that were covered by the TBL group's application activities. Figures 2 and 3 are samples of multiple-choice questions that were presented to the TBL group during the reading assessment module used in this study. Prior to this activity, students were introduced to Mrs. Martinez, a hypothetical second-grade teacher, asked to align learning objectives to a reading test given by Mrs. Martinez, and then asked to complete an item-analysis chart by using Mrs. Martinez's whole-class test data to record the percentage correct for each test item and each student. For the question shown in Figure 2, teams were asked to make a choice, then upon the signal of the instructor, held up an alphabet card to represent their team's choice. For the activity in Figure 3, students were provided with time to make a list of students for each skill on a small whiteboard, then upon the signal of the instructor, held up the team whiteboard. For both activities, each team presented their choice simultaneously and then described their rationale for that choice. The instructor facilitated the teams' decision making by asking additional probing questions and proposing various options until a consensus was reached.



The criterion for passing this test is at least 70% correct. What is the best decision for Mrs. Martinez's next step?

a.) reteach all of the skills to the whole class.
b.) reteach some skills to the whole class.
c.) reteach some skills to individual students.
d.) reteach some skills to small groups of students.

**Figure 2.** Sample Application Activity Question with a Specific Choice about Instructional Format

After reviewing the data, Mrs. Martinez decides to provide small group instruction. Which students would benefit the most from further instruction for each of the following?

    a. syllabication
    b. decoding words with vowel teams (i.e. bread, bait, about)

Record your answers on your team's whiteboard.

**Figure 3. Sample Application Activity with a Specific Choice about Differentiated Instruction**

## Posttest
At the end of week three, the last day of the module, both groups completed the posttest. Finally, the instructor provided a link to the questionnaire in Google Forms that asked students to list three things they liked about the course, two things they would change, and one lingering question.

## RESULTS
### Quantitative Results
Quantitative data were analyzed using SPSS Statistical Software. Due to the difference in group sizes, nonparametric tests were used to determine whether there were statistically significant differences between the TBL group and the lecture group.

### Student learning outcomes.
A Mann-Whitney $U$ test showed that the two groups (TBL and lecture) showed no statistically significant differences in knowledge of reading assessment ($Z = -.173$, $p = .86$) at the start of the research study. A second Mann-Whitney $U$ test analyzed the posttest scores and showed that after three weeks of TBL in a reading methods course, there was no statistically significant difference in student learning outcomes ($Z = -.837$, $p = .40$) between the two groups (TBL and lecture).

### Preparation.
A Mann-Whitney $U$ test was conducted to learn whether participating in a team-based learning format resulted in greater preparation when compared to participating in the lecture format, as measured by the iRAT (TBL group) and quiz (lecture group). The test showed that there was no statistically significant difference in preparation ($Z = -.337$, $p = .74$) between the two groups (TBL and lecture).

### Qualitative Results

#### Student Reactions.
A total of 23 preservice teachers from the TBL group responded to the end-of-course survey. We analyzed the TBL group's responses to the first question. A total of 65 items were listed as things students liked about the course. Preexisting codes, generated by the researchers based on key words associated with TBL, were used to code the students' responses. As other topics were introduced in the responses, new codes were created. Although the question was open to any feature of the course, the codes reflected our interest in components of TBL that students listed as something they liked. The codes included course format, readiness assurance process, application activities, teamwork, setting grade weights, and feedback. Of the 65 responses, 37 were coded

as components of TBL. Teamwork and application activities were reported most often as something students liked about the course, each with 12 responses. Table 1 describes how frequently each component was reported.

**Table 1. Components of Team-Based Learning that Students Liked**

| Component | Frequency |
|---|---|
| Teamwork | 12 |
| Application Activities | 12 |
| Course Format | 7 |
| Readiness Assurance Process | 3 |
| Feedback | 2 |
| Setting Grade Weights | 1 |
| Total | 37 |

*Note. There was a total of 65 items listed by students as things they liked about the course. The items listed here represent only those reported items that were coded as components of team-based learning.*

## DISCUSSION
When comparing the TBL group to the lecture group, we found no statistically significant differences in the learning outcomes. Huggins and Stamatel (2015) found similar results when they compared TBL to lecture in a sociology course and found no statistically significant difference in content knowledge. These findings suggest that when it comes to learning content, TBL and lecture may yield similar results. The learning outcomes for the two groups may also be similar because a direct instruction method was used during the preparation phase, where students learn the content before coming to class.

While our study did not investigate long-term knowledge retention, this is certainly an avenue for future research within teacher education. Research from the medical field has shown mixed results on the long-term effects of TBL. Emke and colleagues (2016) found large gains in short-term knowledge gains in their pre-clinical pediatrics curriculum, but they did not find a significant difference over time. On the other hand, Warrier and colleagues (2012) found that long-term examination scores improved significantly with TBL in their third-year pediatric curriculum.

We were unable to find any statistically significant differences in our students' preparation for class, as measured by the iRAT. This finding was surprising, since Bleske and colleagues (2016) found that students in their TBL group spent more time preparing for class. However, this result may have occurred because both groups knew they were required to complete the Readiness Assurance Test individually (an in-class quiz for the lecture group), based on their readings from outside of class. Furthermore, our measures of preparation differed from those of Blesk and colleagues (2016); we examined learning outcomes as opposed to time spent preparing for class.

The end-of-course survey was an open-ended electronic questionnaire that is routinely given to students in the course to provide formative information for future changes to the course. The survey simply asked students to list what they like about the course and did not require students to report components or characteristics of TBL and we used these responses to determine whether students like TBL components. When combing through the survey data, it was evident that there were several components of TBL that the preservice teachers enjoyed. The participants in the TBL group reported enjoying teamwork, the application activities, the course format, the Readiness Assurance Process, the immediate feedback, and being able to set their own

grade weights for the course. Positive student perceptions of instructor feedback were also reported by Leisey and colleagues (2014) in their study of TBL in several courses, including Chemistry, Finance, Geography, Political Science, and Social Work. While we did not find any statistically significant differences in the groups' preparation for class or learning outcomes, the questionnaire data revealed that the preservice teachers appreciated the collaborative structure and active learning components found within the TBL format. In reference to a gallery walk that was completed during one of the application activities, one student commented, "We were able to get up and move around, therefore I didn't get bored." Another student referenced the team discussions during application activities, saying they helped "build off of each other's strengths." Even though the quantitative data did not show significant differences in the learning, one student reported that she "learned more about teaching education in this course than any other." These perceptions of TBL are like those found by Leisey and colleagues (2014), where students reported positive feelings about team-work and increased learning. These volunteered responses suggest that many students favored the TBL framework as opposed to traditional lectures.

## CONCLUSIONS AND IMPLICATIONS

Teacher preparation programs are charged with preparing effective reading teachers who can meet the various needs of young learners. TBL provides an instructional framework that lends itself to training teacher candidates who know possess content knowledge and skills, are able to collaborate with colleagues, and apply knowledge of literacy content and pedagogy for decision-making. Although our study only examined TBL over the course of three weeks, when it comes to preparation for class and learning outcomes, we can conclude that TBL is about as effective as lecture. We can also conclude that the students enjoyed several of the components of TBL, such as working with a team and solving application activities. Our findings provide evidence that TBL may provide an equally effective alternative to the traditional lecture format in teacher preparation courses.

### Recommendations for Future Research

Given the relatively nonexistent literature about TBL and elementary teacher preparation, there are several areas for future research. For example, future research might explore the effects of TBL on long-term learning outcomes, teaching performance, teaching efficacy, and learning outcomes within the higher levels of Bloom's taxonomy (Bloom, 1956). Additionally, given the similarities between the two groups using the iRAT and quiz during the preparation phase, new measures could be explored for determining differences in preparation for class, such as the amount of time students report spending in preparation for class. This research study was conducted over a very short time period, so we suggest investigating the impact of TBL over the course of a semester.

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**Figure 1**

*Sample sequence of TBL activities for one semester. Reprinted with permission.*

**Figure 2**

*Sample Application Activity Question with a Specific Choice about Instructional Format*

Figure 3. Sample Application Activity with a Specific Choice about Differentiated Instruction

| | |
|---|---|
| Teamwork | |
| Application Activities | |
| Course Format | |
| Readiness Assurance Process | |
| Feedback | |
| Setting Grade Weights | |
| Total | |

Note. There was a total of 65 items listed by students as things they liked about the course. The items listed here represent only those reported items that were coded as components of team-based learning.

Table 1. Components of Team-Based Learning that Students Liked

| Component | Frequency |
|---|---|