The Effects of Didactic Instruction on the Rate of Preservice Teachers' Low-and High-Level Questions

Monica Lewis

Follow this and additional works at: https://digitalcommons.usu.edu/etd

Part of the Education Commons

Recommended Citation
Lewis, Monica, "The Effects of Didactic Instruction on the Rate of Preservice Teachers' Low-and High-Level Questions" (2016). All Graduate Theses and Dissertations. 4916.
https://digitalcommons.usu.edu/etd/4916
THE EFFECTS OF DIDACTIC INSTRUCTION ON THE RATE OF PRESERVICE
TEACHERS’ LOW- AND HIGH-LEVEL QUESTIONS

by

Monica Lewis

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Special Education

Approved:

Benjamin Lignugaris/Kraft, Ph.D.
Major Professor

Charles L. Salzberg, Ph.D.
Committee Member

Nancy Glomb, Ph.D.
Committee Member

Mark R. McLellan, Ph.D.
Vice President for Research and
Dean of the School of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

2016
ABSTRACT

The Effects of Didactic Instruction on the Rate of Preservice Teachers’ Low- and High-Level Questions

by

Monica Lewis, Master of Science
Utah State University, 2016

Major Professor: Benjamin Lignugaris/Kraft, Ph.D.
Department: Special Education and Rehabilitation

Questioning is an instructional strategy that serves many purposes for teachers and students. The purpose of this study is to evaluate the questioning sequence of moving from low- to high-level questions to support students’ reading text-based comprehension. After engaging in didactic instruction and practice in the TeachLivE™ Lab, teacher participants implemented low- and high-level question sequences during reading instruction with elementary students. Teacher performance was measured as a rate of question sequences in a multiple baseline design across two participants. Students’ verbal responses were assessed based on how they related a personal experience back to the text. Based on the findings, teachers effectively improved the use of questioning sequences. This instructional practice made a significant impact on low performing students. Overall students increased the quantity of c-units and accuracy.
PUBLIC ABSTRACT

The Effects of Didactic Instruction on the Rate of Preservice Teachers’ Low and High-Level Questions

by

Monica Lewis

Developing a teacher’s ability to ask meaningful questions is a simple, effective way to influence learning outcomes. Questions serve as a beneficial instructional strategy, allowing teachers to facilitate student learning opportunities through engagement, and by reinforcing understanding, promoting higher levels of thinking, and providing feedback.

This study evaluated the use of questioning sequence, moving from low- to high-level questions, to support students’ reading comprehension. After engaging in instruction and practice in the TeachLivE™ Lab, two teacher participants implemented low- and high-level question sequences during reading instruction with elementary students. The study measured teacher performance as a rate of question sequences before and after instruction. Students’ verbal responses were assessed based on how they related a personal experience back to the text.

Based on the findings, teachers effectively improved the use of questioning sequences after instruction. This instructional practice made a significant impact on low performing students. Overall students increased the quantity of c-units (statement containing a subject and predicate) and accuracy (representing information from the story correctly).
ACKNOWLEDGMENTS

Over the past 15 years, I sought opportunities to further my professional knowledge as an educator. Working toward my Master’s degree afforded me the chance to enhance my pedagogy and rediscover the satisfaction of academic achievement.

I am blessed to have the support and love of my parents. They encourage me to remain focused and calm when it is challenging to keep up with life’s demands. My husband’s support, especially in helping me find uninterrupted moments to write, is amazing. My son, Ridgely, continually brought me joy and laughter to help me remain motivated. Throughout the final steps, Shannon Harris patiently guided me through the process. Her kindness, organization, and encouragement are outstanding and I have learned so much from her. I also extend my appreciation to Ben Lignugaris/Kraft, who challenged me to strive for higher levels of excellence. His instruction, supervision, and feedback continue to deepen my knowledge as an educator.

Monica L. Lewis
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Total and Low- to High-Level Questions</td>
<td>53</td>
</tr>
<tr>
<td>Rate of High-Level with Supporting Low-Level Questions</td>
<td>55</td>
</tr>
<tr>
<td>Social Validity Data</td>
<td>55</td>
</tr>
<tr>
<td>V. DISCUSSION</td>
<td>59</td>
</tr>
<tr>
<td>Effects on Quantity of C-Units and Accuracy of Comprehension</td>
<td>59</td>
</tr>
<tr>
<td>Effects of Teacher Performance to Utilize Question Sequences</td>
<td>59</td>
</tr>
<tr>
<td>Limitations</td>
<td>60</td>
</tr>
<tr>
<td>Future Research</td>
<td>62</td>
</tr>
<tr>
<td>Practical Implications for Using This Intervention in General Education Classrooms</td>
<td>63</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>65</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>69</td>
</tr>
<tr>
<td>Appendix A: Student Consent Form</td>
<td>70</td>
</tr>
<tr>
<td>Appendix B: Lexile Scores for Narrative Stories</td>
<td>74</td>
</tr>
<tr>
<td>Appendix C: Scoring Guide</td>
<td>76</td>
</tr>
<tr>
<td>Appendix D: Student Comprehension Measure Example</td>
<td>81</td>
</tr>
<tr>
<td>Appendix E: Student Comprehension Measure Scoring Rubric</td>
<td>83</td>
</tr>
<tr>
<td>Appendix F: Social Validity Questionnaire: Teacher Participants</td>
<td>87</td>
</tr>
<tr>
<td>Appendix G: Social Validity Questionnaire: Student Participants</td>
<td>89</td>
</tr>
<tr>
<td>Appendix H: Feedback Checklist</td>
<td>91</td>
</tr>
<tr>
<td>Appendix I: Fidelity of Feedback for Participants TeachLivETM Lab</td>
<td>93</td>
</tr>
<tr>
<td>Appendix J: Didactic Instruction</td>
<td>95</td>
</tr>
<tr>
<td>Appendix K: Didactic Instruction Questioning Note Guide</td>
<td>100</td>
</tr>
<tr>
<td>Appendix L: Didactic Instruction Fidelity Checklist</td>
<td>104</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table                                                                 Page
1.  Student Participant Fluency and Lexile Summary..................................... 25
2.  Number of C-Units by Student Lexile Score............................................... 46
3.  Percent Comprehension Accuracy by Student Lexile Score ......................... 52
B1.  Lexile Scores for Narrative Stories.............................................................. 75
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Quantity of C-units for P1’s and P2’s students</td>
<td>42</td>
</tr>
<tr>
<td>2.</td>
<td>Quantity of C-units for each of P1’s students</td>
<td>44</td>
</tr>
<tr>
<td>3.</td>
<td>Quantity of C-units for each of P2’s students</td>
<td>45</td>
</tr>
<tr>
<td>4.</td>
<td>Accuracy of C-units for P1’s and P2’s students</td>
<td>48</td>
</tr>
<tr>
<td>5.</td>
<td>Accuracy of C-units for each of P1’s students</td>
<td>50</td>
</tr>
<tr>
<td>6.</td>
<td>Accuracy of C-units for each of P2’s students</td>
<td>51</td>
</tr>
<tr>
<td>7.</td>
<td>High-level, low-level, and total comprehension questions per minute for P1 and P2 during baseline and intervention</td>
<td>54</td>
</tr>
<tr>
<td>8.</td>
<td>Low- to high-level question sequences per minute for P1 and P2 during baseline and intervention</td>
<td>56</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Reading ability is critical for a child’s success in school and throughout life. The RAND Reading Study Group (Snow, 2002) identified reading comprehension as one of the most pressing issues in literacy and emphasized understanding how to improve reading comprehension outcomes for all students, especially those who are failing, as critical for future literacy research. Further, students face increasing academic challenges in comprehending complex text as they advance through the grade levels. The RRSG determined good instruction is the most powerful means of fostering the development of proficient comprehenders and preventing reading comprehension problems. However, determining instructional strategies for low performing students to create an inclusive grade level reading opportunity is challenging. Therefore, to deliver good literacy instruction, teachers must be trained in evidence-based instructional strategies that promote increases in student outcomes.

Questioning is the instructional tool teachers use most frequently in their classrooms (Wasserman, 1991). Teacher questions account for one sixth to one tenth of all classroom interactions (Duncan & Biddle, 1974). Teacher questions are essential to engage the learner, foster critical thinking skills, reinforce student understanding, and deliver feedback (Caram & Davis, 2005). Sinclair and Coulthard (1975) defined classroom questioning as a three-part sequence consisting of “an initiation by the teacher, followed by a response from the pupil, followed by feedback to the pupil’s response from the teacher” (p. 21). This exchange can also be described as “the teacher asks a question,
the learner gives an answer, and the teacher makes a comment” (Lynch, 1991, p. 201).

Each element of the three-part sequence is important for classroom learning, but the questions teachers ask are especially critical, as they need to be appropriately integrated into instructional discourse to enhance student-centered learning (Dillon, 1981; K. Ellis, 1993; Roth, 1996).

**Purpose of Questions**

Questions in the classrooms serve many purposes for both teachers and students. Teachers use questioning strategies to actively engage students as they provide response opportunities. Students who actively respond during instruction allow a teacher to assess their ability to recall information and develop critical thinking skills (Gall, 1970). Questions also enable a teacher to cue students to strengthen responses by providing more detail, encouraging inquiry, creating an atmosphere of discussion, and guiding problem solving (Gall, 1970). The use of questions posed by teachers needs to be appropriately integrated into instructional discourse to purposefully enhance student-centered learning (Dillon, 1981; K. Ellis, 1993; Roth, 1996).

Questioning strategies implemented in reading instruction may result in stronger student outcomes, specifically for reading comprehension. Teachers who use strategic questioning strategies can lead students to engage in higher order thinking skills that will help students understand what is read, make personal connections to the text, and which may ultimately lead to gains in reading comprehension.
Levels of Processing for Comprehension

Defining reading comprehension continues to be complex because there are several levels of understanding on which to assess comprehension. For example, text-level comprehension is adequate if teachers are only interested in recall of the content. However, the ultimate goal of higher-level comprehension requires students to link text to personal experiences or other information already in their background knowledge (Kintsch, 2005).

Comprehension is the ability to understand and construct meaning from what one reads (Almasi, 2003). According to Kintsch’s theory of discourse processing, there are three main levels of comprehension processing leading to comprehension. First, at the *local-level*, readers must tie sentence meaning together for understanding the meaning and organization of text. Next, at the *macro-level*, readers must identify the important themes or topics in a text, sufficient enough to support recall of the text and ideas across sentences (Kintsch, 2005). Finally, the *situation level* requires readers to process the text more deeply. The goal at this level is for students to effectively integrate ideas from the text to their personal knowledge base, comprehending how the text is meaningful to them and may be applied to solve problems or judge the world around them (Kintsch, 2005).

To promote deeper comprehension, it is essential for readers to access the new knowledge and use it in novel situations. Hence, teachers are tasked with asking questions at different levels to promote proficiency for the many levels of reading comprehension.
Question Levels

To effectively use questioning strategies, teachers must first recognize the types of questions to use. Teachers who can discriminate among types of questions are more proficient in knowing when to ask meaningful questions with the purpose of increasing opportunities for students to comprehend content (Mangano & Benton, 1984; Redfield & Rousseau, 1981; Wilen, 1981; Wimer, Ridenour, Thomas, & Place, 2001).

One of the most common ways to classify questions is by the use of cognitive hierarchies, which often includes categorizing questions into levels. There are a variety of ways to classify the cognitive level of questions. According to Gall (1970), there are at least 11 classification systems used to categorize questions. To analyze the classification systems, Gall divided them into the following categories: recall, analytic thinking, creative thinking, evaluative thinking, and other. In their classification system, Tienken, Goldberg, and DiRocco (2009) synthesize the work of other researchers and use the terms “reproductive” and “productive” for lower and higher level questions. They found teachers use reproductive (lower-level) questions 76% of the time and productive (higher-level) questions 24% of the time.

In 1956, Bloom and Krathwohl developed a hierarchal system known as Bloom’s Taxonomy, a classification system of thinking skills that includes six major categories: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Goodwin, Sharp, Cloutier, Diamond, & Dalgaard (1983) distinguishes which Bloom’s Taxonomy categories include low- and high-level questions, and identifies the first three levels—Knowledge, Comprehension, and Application—to be defined as low-level questions.
According to Kintsch’s theory of discourse processing, *macro-level* comprehension is expressed when responding to low-level questions. Low-level questions help teachers manage many components before moving to high-level questions, such as reviewing and summarizing content, evaluating students’ preparation and comprehension, and diagnosing strengths and weaknesses of individual students. The remaining levels—*Analysis, Synthesis,* and *Evaluation*—are defined as high-level questions and require students to engage in deeper levels of thinking (Goodwin et al., 1983). In Kintsch’s theory of discourse processing, comprehension via the *situation model* is expressed when responding to high-level questions. Open-ended, longer response questions provide a more accurate measure of deep understanding, especially when readers are required to express their understanding in their own words (Kintsch, 2005).

In a study utilizing three different cognitive classification systems, Mills, Rice, Berliner, and Rosseau (1980) analyzed 54 typed transcripts to determine the degree of correspondence between the cognitive level of teacher questions and the cognitive level of student responses, using one of the following classification systems: Bloom’s Taxonomy, Aschner-Gallagher, or Smith and Meux. After coding between 2,779 and 3,483 episodes (teacher question and student response) using 20-minute intervals, the overall percent of correspondence was: Bloom’s Taxonomy, 51.3%; Aschner-Gallagher, 56.1%, and Smith and Meux, 51.4%. The overall amount of correspondence is greatest using the Aschner-Gallagher system of question classification. However, Bloom’s Taxonomy was most useful for discriminating between lower and higher cognitive levels of overall question and answer correspondence (Mills et al., 1980).
Question Levels Aligned with Bloom’s Taxonomy

Knowledge. The first level, Knowledge, is where students recall previously learned material through three main categories of knowledge: factual, conceptual, and procedural. Factual knowledge refers to remembering terminology and specific facts; conceptual knowledge refers to the interrelationships among larger structures (i.e., knowledge of classifications and categories); procedural knowledge refers to how to do something and when to use specific skills and techniques (Bloom & Krathwohl, 1956; Krathwohl, 2002). Examples of teacher questions at the knowledge level might be: “What is the title of the book,” “Who is the story’s author,” or “What does an illustrator do”?

Comprehension. In the comprehension level, students demonstrate their understanding of the remembered material in their own words or by citing examples. This level incorporates interpretation, translation, and inference. Examples of teacher questions at the comprehension level might include: “Whom did the tree love?” or “What did the boy do with the tree’s leaves?”

Application. For this level, students use their knowledge and comprehension of material in a new context to solve a problem, answer a question, or perform another task. Examples of teacher questions at the application level might include, “How do you know the tree and the boy were friends?” or “Why did the boy make the tree happy?”

Analysis. Questions asked at this level require students to break down learned information into parts and explain the relationship between those parts. An example of a teacher question at this level might be: “Why did the tree continue to give to things to the boy?” or “What is the relationship between the two characters?”
**Synthesis.** The *synthesis* level is where students put the parts of the material from the *Analysis* level together to form a plan or a set of procedures. An example of a teacher question at this level might be, “How could the boy have been a kinder friend to the tree”?

**Evaluation.** The final level, *evaluation*, is the highest level, requiring students to consider the previous levels to arrive at a reasoned judgment. An example of a teacher question at this level might be, “What life lesson can you gain from the story *The Giving Tree*?”

**Sequencing Questions**

Understanding how to move through levels of Bloom’s Taxonomy may be an effective instructional strategy for teachers when delivering reading lessons to large or small groups of students (Goodwin, 1983). Moyer and Milewicz (2002) concluded that teachers who question at these various levels are more adept at discerning the range and depth of students’ thinking.

Identifying and labeling questioning patterns helps teachers evaluate students’ understanding, determine students’ instructional levels, and develop strategies for promoting critical thinking (Buschman, 2001; Moyer & Milewicz, 2002; Ellis & Worthington, 1994; Sindelar, Bursuck, & Halle, 1986; Stronge, 2010). Teachers can also use questioning strategies to know at which level to begin asking questions for each student, as some students may need the lowest level questions first while some may need a mid-level question initially. It is also possible some students could begin with a high-
level question. Two specific questioning sequences teachers may use include moving from low- to high-level questions or moving from high- to low-level questions.

**High- to Low-Level Questions**

In a high- to low-level questioning sequence, teachers start with a high-level question and move toward low-level questions depending on the students’ response. That is, high-level questions may be followed by low-level questions to help teachers detect students’ understanding of underlying concepts and principles. The goals of this approach are to promote higher order thinking and to help students make connections to their background knowledge and real-life examples. Research is conflicting as to the benefit students receive when only high-level questions are presented. Gall et al. (1978) conducted a two-part study to determine if the teaching skills of redirection, probing, and higher cognitive questioning affected student learning. The first study consisted of three treatments: (1) probing and redirection, (2) no probing and redirection, and (3) a filler activity. In the probing and redirection condition, teachers asked students 16 questions (four fact, four multi-fact, and eight higher-cognitive questions, using a prescribed questioning pattern). The authors reported teachers’ use of probing and redirection in recitation did not facilitate knowledge acquisition or higher cognitive responding. In the second study, the researchers varied the percentage of higher cognitive questioning asked by teachers. Each redirection included sixteen questions aligned with each recitation; however, each treatment contained different percentages of higher cognitive questions (25%, 50%, and 75%). In general, students who received 25% higher cognitive questions outperformed students in the 75% higher cognitive questions and 50% higher cognitive
questions treatment. The findings from this study suggest questioning patterns that emphasize fact questions (i.e., low-level questions) increase higher student achievement than questioning patterns emphasizing higher cognitive questions. Importantly, none of the conditions in this study included a condition in which teachers purposely linked high-level and low-level questions.

**Low- to High-Level Questions**

A low- to high-level questioning sequence is a preventative approach where teachers begin by asking low-level questions and move up through the questioning levels contingent on student responding. This direction ensures students have the foundation knowledge needed to respond to more difficult questions, or as they move to high-level questions. The goals of this approach are to reduce student errors and increase instructional/behavioral momentum.

To create meaningful learning opportunities, it is important for teachers to skillfully sequence questions to help students achieve at high levels of comprehension and thinking (Bulgren, Marquis, Lenz, Deshler, & Schumaker, 2011). During instruction, teachers can place demands on students to apply knowledge at higher levels by applying, synthesizing, and evaluating information. Bulgren et al. utilized a question exploration routine (QER) to help secondary students increase their ability to respond to complex questions. The study classified student participants based on four ability levels (HA: high ability, AA: average ability, LA: low ability, and SWD: students with disabilities). The use of the QER was compared to the traditional lecture-discussion method to determine if asking low- to high-level questions supported student achievement. Three instructional
phases (Cue, Do, Review) were integrated in a graphic organizer, the question-exploration guide (QEG), in which students took notes and participated in a discussion. During the lecture-discussion condition, students simply copied notes from information a teacher provided using an overhead projector. The QEG was structured to deepen student understanding through the utilization of sequencing information using low- to high-levels of information. Based on the results, the QER condition resulted in students performing 26 points higher (QER, $M = 71.70$) when compared to students participating in the traditional lecture-discussion ($M = 45.98$), supporting the implementation of the low- to high-level questioning sequence.

**Purpose Statement**

The purpose of this study was to evaluate the effectiveness of preservice teachers’ ability to (1) produce and deliver low- and high-level questions, and (2) strategically move from low- to high-level questions when delivering reading instruction to small groups of elementary students, in the classroom setting. Further, this study evaluated the effectiveness of the low- to high-level questioning strategy on student reading comprehension outcomes.

When used in a strategic manner, moving from low- to high-level questioning increases the probability students will provide richer, more substantive responses to high-level questions. Findings from this study will help teachers, teacher educators, and future researchers understand how to develop and implement effective teacher questioning strategies.
The research questions addressed in this study were as follows.

1. To what extent do teacher’s high-level questions with supporting low-level questions increase the quantity of comprehension units (C-units) in students’ responses to comprehension questions asked during a reading lesson with students with disabilities?

2. To what extent do teacher’s high-level questions with supporting low-level questions increase the accuracy of comprehension units (C-units) in students’ responses to comprehension questions asked during a reading lesson with students with disabilities?

3. To what extent does didactic instruction and practice in the TeachLivE™ Lab on teacher questioning increase the rate of total questions asked by preservice teachers during a reading lesson with students with disabilities?

4. To what extent does didactic instruction and practice in the TeachLivE™ Lab on teacher questioning increase the rate of preservice teachers’ delivery of low- and high-level questions when teaching a reading lesson to students with disabilities?

5. To what extent does didactic instruction and practice in the TeachLivE™ Lab on direction of teacher questioning (low- to high-level) increase the rate of preservice teachers’ high-level questions with supporting low-level questions when teaching a reading lesson to students with disabilities?
CHAPTER II
REVIEW OF LITERATURE

Searching Procedure

Studies were identified through electronic search of ERIC via EBSCO Host database, Google Scholar, and PsycINFO via EBSCO host for research published in the last 40 years (1970-present). Search terms included independent variable descriptors (student engagement,* teacher questioning,* student response,* opportunities to respond,* Bloom’s Taxonomy,* effects of teacher questioning, questioning strategies, wait time,* teacher questioning behavior, cognitive domain, active student responding,* choral response,* higher level thinking,* and high level and low level question*) The dependent variable descriptors were used to locate articles relating to the research topic. Various combinations for independent and dependent descriptors resulted in the selection of relevant articles to support the literature review.

Research was selected based on the following criteria:

1. Published in a peer-reviewed journal.
2. The independent variable addressed the use of teacher questioning or teacher discourse, and opportunities to respond.
3. Dependent variables targeted student achievement or student engagement.
4. Participants included elementary and secondary age of students with and without disabilities.
5. Studies included were meta-analyses, qualitative and quantitative research, and single subject research.
Meta-Analyses on Teacher Questioning

Winne (1979) reviewed several studies to summarize the evidence gathered regarding the effects of teacher higher-level questions vs. fact questions (i.e., low-level) on student achievement. The intent of the review was to determine the validity of research comprised of teacher questioning. The studies selected for the review had to meet a two-part criterion. The initial criteria required was the study needed to contrast student achievement after receiving instruction dominated by low-level questions or predominately high-level questions. The second criteria supported the selection of research based on a teacher’s attempt to purposefully manipulate questioning strategies to influence student learning. Studies were divided into two types—training experiments or teaching skill experiments. Training experiments were studies in which teachers received training, but utilized the skill at their own discretion. Skill experiments consisted of studies in which teachers questioned with a prescribed frequency and manner. Of the nine training experiments, one study found the use of higher cognitive questions improved student achievement. In six of the nine skill experiments, Winne indicated high-level questions influenced student achievement. Winne determined the predominant use of high-level questions had little effect on student achievement (Radfield & Rousseau, 1981; Winne, 1979).

Another meta-analysis, conducted by Radfield and Rousseau (1981), utilized the same 18 studies identified by Winne (1979) with an additional two studies. Radfield and Rosseau used the same categorization system as Winne, training experiment and skills experiment. The classification of studies aligned with Winne’s designation. In contrast to
Winne’s finding, Radfield and Rosseau utilized an effect size ($ES$) measure to evaluate the effects of teacher questioning. For this analysis, Radfield and Rosseau calculated $ES$ for 14 of the 20 studies reviewed, which resulted in an $ES$ of $+.7292$. Seven studies were considered high quality ($ES +.7631$) compared to the $ES$ for the studies with insufficient quality ($+.7148$). Studies categorized as training experiments resulted in the largest $ES$ ($+.8274$) as compared to skills experiments ($ES +.6029$). Radfield and Rosseau noted small scale studies yielded a higher $ES$ because experimental control proved to be more effective. The results of the meta-analysis conducted by Radfield and Rosseau did not support Winne’s finding that teacher questioning has little effect on student achievement. Rather, they found a teacher’s use of high-level questions does impact student achievement.

Radfield and Rosseau (1981) acknowledged three possible explanations for the varying results—study selection criteria, number of finding(s) per study, and the categorization of selected studies. Winne (1979) selected studies when student achievement was contrasted after exposure to instruction using predominately high-level questions. Winne’s findings indicated only 15% of the 18 studies used for the meta-analysis showed high-level questions improved student achievement and 60% of studies selected saw no significant gain in student achievement. In contrast, Radfield and Rousseau categorized 14 studies that resulted in the $ES$ of $+.7292$. The independent variable for Winne was high-level questions, and Radfield and Rousseau identified the independent variables, skill training and training experiment. The dependent variable for both meta-analyses continued to be student achievement.
In contrast to Redfield and Rousseau’s (1981) findings, Samson, Strykowski, Weinstein, and Walberg. (1987) completed a meta-analysis that supported Winne’s findings that significant effects from the cognitive level of questions have yet to be demonstrated. Samson et al. included a total of 44 studies for his synthesis. Using an inclusionary criteria similar to Redfield and Rousseau, Samson calculated the $ES$ for each study and incorporated an $ES$ weighing procedure in an attempt to establish more equalization. The overall $ES$ (+.13) of high-level teacher questions and student achievement was significantly smaller than Redfield and Rousseau ($ES +. 7292$).

Carlsen (1991) offered possible explanations for the weaknesses in questioning research findings. The first explanation was the detection of student achievement as it relates to the use of the cognitive level of questions is dependent on methodology. Carlsen acknowledged it seems logical that teachers who ask high-level questions would promote higher level thinking among students. Arnold, Atwood, and Rogers (1974) sought to identify if teachers are able to ask questions at each of the Bloom’s Taxonomy levels. The researchers wanted to determine the relationship between question level and student response level. The analysis of 180 questions resulted in comprehension questions presented most frequently and analysis questions provided at the lowest level. It was inferred that teachers believed it to be easier to phrase questions at the lower levels of Bloom’s Taxonomy. Questions at the higher level of Bloom’s hierarchy required additional time for students to respond. Arnold et al. acknowledged high-level questions supported students being able engage in higher order thinking skills. However, Ellis (1993) found questions utilized by teachers require 60% factual recall and 20%
procedural response. This research suggests teachers consistently ask low-level questions during classroom instruction.

**Variables Affecting Teacher Questioning**

Several factors affect teacher questioning. Teachers’ content knowledge affects the quality of questions, while the type of instructional activity and teachers’ wait time after asking a question, and after students responds, affects the rate of teachers’ questions.

**Teacher Knowledge**

Teacher knowledge is another factor influencing teacher questioning. Teachers’ curricular knowledge is critical to formulate questions that relate to the subject matter, and then sequence those questions to students’ needs. Hashweh (1987) found science teachers with a greater understanding of content are more likely to ask high-level questions requiring students to synthesize information, as compared to science teachers with less content knowledge, who often use low-level questions.

**Instructional Activity**

Another factor in how teachers use questioning is the instructional activity. While content knowledge influences the type of questioning, the instructional activity influences the frequency of questions. For example, skill instruction provided by teachers often consists of drill and practice where teachers utilize low-level questions delivered at a rapid pace. Students typically respond rapidly and correctly during drill and practice type activities (Brophy, 1986). In contrast, a teacher’s approach to classroom discourse during
an instructional activity where students are required to respond to more open-ended, referential questions utilizes more high-level questions delivered at a more reflective pace.

**Wait Time**

The way a teacher facilitates wait time into classroom discussion when asking questions may influence students’ ability to respond correctly. Rowe (1974) defined two types of wait time: (1) Wait Time I is a period of time following a teacher’s question and before a student response, and (2) Wait Time II is the period of time following a student answer before the teacher begins talking again. Both forms of wait time are beneficial (Tobin, 1987). Teachers ask fewer low-level questions and more high-level questions when increasing the wait time from one second to over three seconds (Rowe, 1974; Tobin, 1987). Maintaining wait time is also effective in improving the quality and quantity of student responses (Rowe, 1974). Fagan et al. (1981) found extending wait time increased the length of student responses, supported students to engage in higher-order thinking skills, and increased detailed complexity in students’ responses. Tobin also concluded wait time effects higher cognitive level achievement by allowing time for students to process information, leading to an improvement of the level of teacher and student discourse. Wait time following a question should vary depending on the complexity of the question. Researchers suggest abstract high-level questions generally require more wait time than low-level factual based questions (Arnold et al., 1974; Brophy, 1983).
Benefits Accrued from Effective Teacher Questioning

Response Accuracy

Through the instructional cycle, teachers provide students with guided practice opportunities to support students in acquiring and applying concepts, procedures, rules, skills, and answering teacher questions (Ellis & Worthington, 1994). Effective teacher questioning can be utilized during guided practice opportunities by eliciting student responses to check for understanding. In a review of research, effective teachers were recognized for eliciting accurate responses from students 82% of the time and less effective teachers generated accurate answers to questions 73% of the time (Ellis & Worthington, 1994; Rosenshine, 1986).

Throughout guided practice, it is critical teachers utilize questions effectively to monitor student responses and to determine if they are accurately acquiring the new information (Ellis & Worthington, 1994). A teacher can often reinforce correct student responses through praise (Ellis, 1993). When inaccurate responses are provided, teachers can simplify questions to begin scaffolding the instruction to help the student demonstrate understanding. Through guided practice, student knowledge is being constructed and reconstructed (Rosenshine, 1995). Therefore, it is important for educators to effectively utilize teacher questioning strategies to assist students in connecting new information to existing background knowledge, deepening their level of comprehension (Bulgren et al. 2011).
Student Motivation

The use of questioning strategies can guide student learning. Children who are low achieving may be reluctant to ask questions for clarification (Schumm, Vaughn, & Sobel, 1997). Student knowledge on a particular topic can affect the recall and interest level of students and affect motivation (Alexander, Kulikowich, & Schulze, 1994). Therefore, questions presented by a teacher can be an effective strategy to engage the learner and increase motivation. This can help develop critical thinking skills, reinforce student understanding, correct errors, and provide feedback (Caram & Davis 2005).

Student Outcomes

Teachers must purposefully engage in strategic questioning with the goal to improve student learning outcomes, especially for low-performers. Assisting students in becoming fluent with foundation knowledge allows for the retention and application of information (Hattie, 2009). Demonstrating accurate response to lower level questions (e.g., recalling facts and sequences of events) allows students to begin refining and extending their understanding to higher levels. Therefore, effective questioning strategies are needed to help students increase their academic knowledge and skills.

Active Learning

Integrating questions into daily instruction enables teachers to cue choral responses and promote active learning (Haydon, Borders, Embury, & Clarke, 2009). An active student response occurs when students write or verbally respond to a teacher’s question. Choral responding enables teachers to provide instructional pacing appropriate
to maintain the attentiveness of students and monitor understanding.

**Opportunities to Respond**

Teacher questions are often used to increase student participation by creating opportunities to respond (OTR). Providing OTR also enables teachers to adjust instruction based on student feedback (Sutherland, Alder, & Gunter, 2003). Eliciting student responses through a combination of individual or group choral responses allows teachers to maintain a level of unpredictability throughout their instruction to increase on-task behaviors and participation (Haydon et al., 2009; Rosenshine, 1981). Rosenshine recommended approximately two thirds of the response opportunities should be choral responses and about one third of response opportunities should be individual responses. During the instruction of new material, 4-6 OTR should occur per minute, and 8-12 OTR should occur per minute for drill and practice activities. When adequate opportunities to respond and provide feedback are integrated into effective instructional practices, meaningful learning occurs. Providing students with frequent opportunities to actively respond may also decrease problem behaviors within classrooms (Sutherland et al., 2003).

**Content Acquisition**

Identifying the principles in which students learn is important for teachers to assess student understanding and continue to facilitate classroom discourse (Bransford, Brown, & Cocking, 2000). This is particularly important for children who are low-achieving students, as they may often be reluctant to ask questions for clarification (Schumm et al., 1997). The first principle is the need to activate prior knowledge to help
students make connections to new information. Next, students need to have deep factual knowledge to enable the retrieval and application of new information. Last, a meta-cognitive approach to instruction can help students manage their learning by defining learning goals and monitoring progress. As students learn the content, it is necessary for them to begin constructing the information to make connections to deepen their knowledge while acquiring new skills (Hattie, 2009). Student responses help teachers address incorrect understanding (Haydon et al., 2009). Having the opportunity to provide corrective and positive feedback through questioning strategies enables teachers to effectively monitor student understanding and whether they are learning the content.

**Teacher Expectations**

A teacher’s expectations for students with varying levels of achievement can impact classroom discourse and student responses. Rubies-Davies (2007) conducted a study monitoring teachers with high, average, and low expectations, and found teachers with high expectations for students more likely to present more high-level questions. Teachers with low expectations asked fewer questions. The results showed teachers with high expectations asked more open-ended questions ($M = 17.75$) compared to teachers with average expectations ($M = 9.50$), and teachers with low expectations asked fewer questions overall ($M = 5.00$). Therefore, students receiving instruction from a teacher with low expectations had fewer opportunities to respond.

Mangano and Benton (2001) conducted a study to determine the depth of teachers’ abilities to integrate questioning strategies into their instruction. Teachers identified as having higher-performing students with high adjusted mean scores on the
Scholastic Reading Inventory (SRI) comprehension assessment were more likely to ask questions requiring students to respond with a greater level of understanding than teachers with lower-performing students with low adjusted mean scores. Teachers of lower performing students regularly asked low-level questions mainly requiring one-word responses. Teachers with higher performing students asked an average of 55 questions per lesson compared to the lower performing teachers who asked 95 questions. Although teachers of lower performing students asked more questions, the quality of questions did not extend student thinking to higher levels. Teachers of higher performing students used fewer questions, but utilized a greater amount of probing questions to obtain more detailed responses. Further, teachers of lower-performing students often asked questions requiring one-word responses, as compared to the teachers of higher performing students who expected students to respond with detail and higher levels of accuracy. In other words, a strategic questioning strategy was not used, regardless of the level of the students. The major finding from this study is: expectations may hinder a teacher’s approach when implementing questioning strategies in classroom instruction.

When used in a strategic manner, teacher questioning strategies may increase the probability that students will provide more correct responses to low-level questions and provide richer, more substantive responses to high-level questions because they have the low-level knowledge needed to engage in the higher-level response. Researchers need to determine how well teachers can learn questioning strategies, implement them effectively, and utilize student responses for improving their instruction. Further, researchers need to determine the effects of teacher questioning on student outcomes.
CHAPTER III
METHODS

Participants and Setting

Teacher Selection

Teacher participants were preservice students preparing to become special education teachers at Utah State University (USU). Initially, four teachers were recruited by obtaining a list of all on-campus students with 1 year of coursework completed in the special education program, as well as off-campus students enrolled in USU’s alternative teacher preparation program (ATP). Potential teacher participants were invited to an information meeting where details about the study were presented. Interested attendees volunteered to participate and gave written consent at the meeting. Their decision to participate or not participate did not impact their evaluations or grading while completing their coursework at USU. Four preservice teachers participated in the first research study (i.e., Study 1). For the current study, two teachers from Study 1 agreed to extend their involvement and were offered an incentive of $150 to continue as participants in the current study during the spring semester of their teacher preparation program.

Student Selection

The student participants in this study were 11 fourth-grade students from the cooperating school district. Students were selected from teacher participants’ reading practicum classrooms and had a specific learning disability or were below grade level proficiency on reading fluency and reading comprehension scores (Scholastic, 1999).
Consent for students to participate in the reading lessons and permission for student responses to be recorded as data for this study was obtained from each student’s parent/guardian (see Consent Form, Appendix A).

Individual student data used in this study included reading fluency rate scores using the AIMSweb winter and spring benchmark reading curriculum based measure (R-CBM) score. The scores were used as an indicator for the students’ ability to fluently and accurately read a passage.

Lexile scores were also used for measuring student reading ability (see Appendix B). Students were tested using the SRI to determine their lexile reader score. Students’ lexile reader scores were lower than the lexile text scores of the grade level reading material that students were asked to read for comprehension during the lessons. The first group consisted of five students with lexile scores ranging from 382 to 743 (see Table 1). The second group consisted of six students with lexile scores ranging from 531 to 771. The target grade level lexile proficiency range scores are 770-885.

Setting

Practice sessions for this study took place in the TeachLivE™ Lab in Salt Lake City, Utah, and assessment sessions took place in elementary reading practicum classrooms in Canyons School District. In addition to teacher participants, the primary researcher, the TeachLivE™ coordinator, or other research assistants were present during each session.

The TeachLivE™ Lab is a mixed-reality teaching environment supporting teacher practice in pedagogy and content, and it provides preservice and inservice teachers the
Table 1

*Student Participant Fluency and Lexile Summary*

<table>
<thead>
<tr>
<th>Student</th>
<th>Gender</th>
<th>AIMSweb R-CBM fluency rate</th>
<th>SRI lexile score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Winter target 120</td>
<td>Spring target 136</td>
</tr>
<tr>
<td>Preservice teacher 1 (P1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 451</td>
<td>Male</td>
<td>85</td>
<td>100</td>
</tr>
<tr>
<td>Student 382</td>
<td>Female</td>
<td>89</td>
<td>116</td>
</tr>
<tr>
<td>Student 743</td>
<td>Female</td>
<td>103</td>
<td>130</td>
</tr>
<tr>
<td>Student 519</td>
<td>Female</td>
<td>107</td>
<td>116</td>
</tr>
<tr>
<td>Student 709</td>
<td>Male</td>
<td>111</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preservice teacher 2 (P2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 614</td>
<td>Female</td>
<td>110</td>
<td>128</td>
</tr>
<tr>
<td>Student 531</td>
<td>Female</td>
<td>101</td>
<td>105</td>
</tr>
<tr>
<td>Student 771</td>
<td>Female</td>
<td>113</td>
<td>110</td>
</tr>
<tr>
<td>Student 583</td>
<td>Female</td>
<td>95</td>
<td>105</td>
</tr>
<tr>
<td>Student 657</td>
<td>Male</td>
<td>106</td>
<td>122</td>
</tr>
<tr>
<td>Student 579</td>
<td>Male</td>
<td>114</td>
<td>128</td>
</tr>
</tbody>
</table>

opportunity to learn teaching skills and to craft their practice without placing “real” students at risk during the learning process. The simulated classroom learning environment of the TeachLivETM Lab may be simplified to allow preservice and inservice teachers the opportunity to consolidate instructional routines before they are exposed to more complex classroom contexts (Payr, 2005).

Preservice Teacher 1 conducted reading instruction for fourth-grade students, in a room designated for small group reading intervention. Each 30-minute session took place at the beginning of the day, Monday through Thursday. Throughout the duration of the study, two small groups were present twice weekly. To minimize distractions, all
assessment sessions for the study occurred on a day in which no other reading groups were present.

Preservice Teacher 2 provided reading instruction Monday through Thursday for 30-45 minutes within the fourth-grade classroom of the cooperating teacher. Assessment sessions for the study were conducted in a vacant classroom to minimize distractions.

At the end of each assessment reading session, student performance sessions were conducted at a desk placed in a hallway with each individual student participant and the teacher researcher. The remaining student participants waited with the teacher participant in the classroom. This prevented other student participants from hearing the responses to comprehension questions.

**Materials**

Materials for this study included the didactic instruction lessons and exercises designed to instruct teachers about questioning strategy techniques, narrative stories for assessment sessions, technology necessary for using the TeachLivE™ Lab, a laptop for coding recorded sessions, flipcams, tripods, clipboards, and pens. Further, a lexile score for each narrative story was determined using lexile analyzer software (http://www.lexile.com/analyzer/). The lexile text score is a text readability score based on the semantic and syntactic elements in the text (see Appendix B). Lexile scores for text in this study ranged from 660 to 1020.
**Measures**

**Teacher Performance**

There were four dependent variables used to evaluate teacher performance from assessment sessions in the reading practicum classrooms: (1) rate of total questions (low- plus high-level questions) per session, (2) rate of low-level questions per session, (3) rate of high-level questions per session, and (4) rate of low- to high-level question sequences (i.e., “sequences per minute”). All assessment lessons were transcribed for data analysis and scoring.

For the first three measures, the total number of questions asked per assessment session was recorded and then coded as either low-level (1), high-level (2), high-level yes/no (2a), or rhetorical (R). Sessions were also coded for the frequency in which the teacher participant directed a question to each student. The rate for these question types was calculated by dividing the corresponding question type by the lesson delivery time.

The question rate for the fourth measure was determined using a two-step process. First, participants’ lesson plan for each assessment session in the reading practicum classroom was transcribed. Importantly, questions that were changed or added during lesson delivery were included as part of the lesson plan for scoring. Similarly, questions that were not asked (i.e., omitted) during implementation were not included. Second, each low- and high-level question was coded as “1” or “2,” respectively, and the high-level questions were numbered sequentially as they appear in the lesson. Low-level questions occurring previous to and in support of a high-level question were recorded as a *sequence* and numbered sequentially as they appeared in the lesson. The rate of low- to
high-level question sequences or *sequences per minute*, were calculated by dividing the number of high-level questions with corresponding low-level questions by the lesson delivery time.

Any rhetorical questions asked during lesson delivery were coded as “R” and not included in the final totals for the question measures. Further, high-level questions asked in a yes/no format were coded as “2a.” Any connected sequence of a 2a question to a high-level question (2) was recorded as a *2a sequence* and not counted toward the low- to high-level questioning sequence (see Appendix C for scoring guide).

Operational definitions for question types are provided below.

**Low-level questions:** Questions seeking direct answers of factual information where correct responses are mostly found directly in the text; they are often closed questions with a limited number of acceptable answers. Examples: *Students are required to remember facts, terms, definitions, concepts; questions often begin with “who, what, where, and when.”*

**High-level questions:** Questions seeking more indirect and evaluative responses; they are often open-ended questions with many acceptable answers. Examples: *Students are required to break material down, explain relations, and make judgments or comparisons; questions often begin with “how,” “why,” and “compare.”*

**Sequences per minute (i.e., “sequences”):** Each low- to high-level questioning sequence implemented by the teacher where at least one low-level question was required for the high-level question(s) asked in that sequence. In essence, a sequence consists of high-level question(s) with supporting low-level question(s), whose content supports and is pertinent for responding to that specific high-level question.

**Rhetorical questions:** Questions where the teacher is not seeking an evaluative response from the student and are often delivered to verify or validate an answer or discussion on the relevant topic. Examples: *“It is important to prepare for a test, isn’t it,” “Riding a horse would be exciting, right?”*

**High-level yes/no questions (i.e., 2a sequences):** Questions seeking an evaluative judgment and prompting a yes/no response. These occur when at least one supporting 2a question is asked directly before a 2 (i.e., high-level question) as
part of a questioning sequence. This also includes “participation questions” where students are prompted to raise their hand or respond with a yes/no. Examples: “Do you value some of your possessions more than others?,” “How many of you have ridden a horse before?,” and “Is it important to recycle?”

Student Performance

There were two dependent variables used to evaluate student performance for reading comprehension in this study: (1) quantity of comprehension units (C-units), and (2) accuracy of comprehension units (C-units).

After reading the narrative story in the reading practicum classroom, the researcher asked each student (one-on-one) to provide a verbal response to three reading comprehension questions (i.e., assessment questions). All assessment questions were high-level questions. To establish consistency across all assessment questions from the stories, a rubric for generating questions was followed. Question one referenced a character or character trait from the story (e.g., complaining), question two referenced an event (e.g., going on a family picnic), and the third question referenced an idea (e.g., helping others).

Each assessment question consisted of two parts (see Appendix D). The first part prompted students to tell about or describe a personal experience (e.g., Tell about a time you were a good friend). The second part prompted the student to link his or her response back to the text, that is, to the corresponding character or character trait, idea, or event from the story with the following question: “How does that relate to the story we just read?”. The question types (character/character trait, event, idea) were asked in random order across students to control for practice effects on each type of question.

Student responses were transcribed and evaluated based on two critical elements.
First, evaluators determined if the student provided information about a personal experience (Part 1). Second, evaluators determined if the student linked his or her personal experience back to the story (Part 2). Only Part 2 was used to determine quantity and accuracy of C-units, as this is where students demonstrated understanding of the narrative story and aligned a personal experience back to the text. The definition of a C-unit is provided below.

**C-unit:** An independent clause with its modifiers that captures an independent idea from the text. C-units include the main clause with all subordinate clauses attached to it and cannot be further divided without the disappearance of its essential meaning (see Appendix E for scoring rubric). For example, there are two C-units in the sentence, “John showed respect (1) and picked up the garbage under the table (2).

**Quantity of C-units.** This number represented the quantity, or total number of C-units, for each session. Both accurate and inaccurate C-units from the three reading comprehension questions for each narrative story were combined to determine a Quantity C-units score.

**Accuracy of C-units.** The accuracy of C-units was represented as a percentage for each session by dividing the number of accurate C-units by the Quantity C-units score for each narrative story. The accurate C-Unit is aligning the details expressed by students to information from the story.

**Social validity questionnaire.** All participating teachers completed a social validity questionnaire at the end of the study to determine how they felt about their continued participation in the questioning study, specifically regarding their ability to strategically ask questions in the classroom setting as a result of the intervention, their experience in the TeachLivE™Lab, and their feedback for using the questioning
strategies to build students’ reading comprehension (see Appendix F). In addition, student participants completed a social validity questionnaire. This was administered one-on-one with a member of the school staff not involved with the study to minimize any pressure students might have felt if a research team member had collected the information (see Appendix G).

**Independent Variable**

The independent variable consisted of the didactic instruction and feedback sessions implemented with the teacher participants in the TeachLivE Lab. During Study 1, teacher participants were taught to identify low- and high-level questions and to construct a low- to high-level questioning sequence. First, teacher participants learned about using story grammar as a reading comprehension strategy and learned the four major elements of story grammar: (1) characters and setting, (2) actions the characters are engaged in, (3) results of actions, and (4) resolution. Further, participants were exposed to various questions teachers might ask within each element of story grammar, and at which location in the story the question should be asked.

Next, teacher participants learned to identify low- and high-level questions, how to sequence questions from low- to high-level, and how to determine the location, or where, to ask the question sequences in narrative stories. They completed six guided practice exercises related to this lesson. The first two exercises helped participants relate question levels to story grammar elements and provide examples of low-level questions that support high-level questions. The remaining four independent practice exercises
focused on integrating low-level questions, high-level questions, and question location in narrative stories. These tasks were scaffolded until the last exercise (6), where teacher participants produced question sequences at various levels throughout the story.

Finally, following this instruction, participants designed lessons independently, practiced delivering those lessons in the TeachLivE Lab™, and received feedback on their lesson delivery. All of these lessons were video recorded.

In this study, the independent variable was the same as in Study 1, but the didactic instruction was revised to include three new story elements (see Appendix J). In addition to constructing questions based on story grammar elements, participants then learned to construct comprehension questions focusing on a character/character trait, event, or idea from the story (see Appendix K). After a comprehensive review of the didactic instruction provided during Study 1 and practice for writing comprehension questions on the three new story elements, teachers delivered their lessons in the TeachLivE Lab™ and received feedback on their performance. After one-on-one didactic instruction, teacher participants were given two lessons they prepared during Study 1 to practice in the TeachLivE™Lab. Immediately following each lesson, a feedback session was provided, where teacher participants met with the researcher and received verbal feedback on their teaching performance and application of essential instructional components (see Appendix H for feedback checklist). All participants’ lessons in the TeachLivE™Lab and their classroom were video recorded using flipcams (see Consent Form in Appendix A). Flipcams were set up at an angle that directly captured the teacher, but only captured the backs of the students.
Research Design

The experimental design for measuring teacher performance in this study is a multiple baseline design across teacher participants, Participant 1 (P1) and Participant 2 (P2). In the baseline condition, teachers were asked to teach, without modification, the lessons they designed during the baseline condition in the summer study. The purpose of this phase was to produce teacher performance similar to performance observed during the baseline condition in Study 1. During the intervention condition, teachers were asked to teach modified lessons from those implemented during the intervention condition in Study 1.

The experimental design for measuring student performance is a multiple baseline across groups of students. P1’s students served as the first leg of the multiple baseline and P2’s students served as the second leg of the multiple baseline. Therefore, the independent variable for this design was the teacher’s behavior, as described previously, and the effect of the teacher participants’ question sequences on students’ responses to high-level assessment questions served as the dependent variable.

Procedures

Baseline

Teacher participants were given three baseline lessons they prepared and practiced in the TeachLivE™ from Study 1. These lessons consisted of a narrative story where P1 and P2 independently designed low- and high-level comprehension questions and determined the location in the story to ask each question. Then they each delivered
the lesson in the TeachLivE™ Lab in the same way it was delivered in Study 1 for practice. Following practice sessions in the TeachLivE™ Lab, teacher participants delivered these same baseline lessons in their reading practicum classrooms with one modification. Since the lexile text scores of the narrative stories were higher than students’ lexile reader score, teachers read each narrative story twice with the students to account for decoding and fluency, and only asked the comprehension questions embedded in the lesson on the third reading. This procedure was completed across two days in the reading practicum classroom. Specifically, on Day 1, students read the narrative story aloud and teacher participants did not ask any comprehension questions (Read #1). Immediately following this reading, students read the same narrative story aloud for a second time and teacher participants, again did not ask any comprehension questions (Read #2). In the next session, Day 2, students read the narrative story aloud a third time (Read #3) and teacher participants asked their prepared reading comprehension questions. Teachers delivered the lesson during the third reading the same way it was practiced in the TeachLivE™ Lab. Overall, each teacher participant practiced three baseline lessons in the TeachLivE™ Lab before delivering the same lessons in the classroom.

The rationale to have the students read the passage multiple times was (1) to ensure students could simply read the words in the narrative story, and (2) to build fluency for processing the language of the text, as the narrative stories in the study were on students’ grade levels, not their reading levels (Shanahan, Fisher, & Frey, 2012).

Following the third reading where teachers asked comprehension questions, students responded to three assessment questions that aligned with the narrative story.
This was done one-on-one with the teacher participant or member of the research team. A copy of the questions was given to each student and the teacher/researcher read each question aloud. Students then provided their answer verbally. Audio recordings for student responses were obtained. The teacher/researcher re-read the question if requested by the student and only said “Do your best,” for feedback. The teacher/researcher was not allowed to prompt the student for more information or clarification (e.g., “Anything else?”).

**Intervention**

In the intervention condition, P1 and P2 reviewed the didactic instruction from Study 1 and learned how to construct questions with the new story elements for this study. Didactic instruction was implemented one-on-one with the primary researcher. After completing the didactic instruction lessons, each teacher participant was given two intervention lessons they prepared during the Study 1 to deliver in the TeachLiveE™ Lab for practice.

For each TeachLiveE™ Lab practice session, teacher participants delivered two lessons. Immediately following implementation of the first lesson, teacher participants met with the primary or secondary researcher to receive verbal feedback and review the fidelity checklist of essential instructional components (see Appendix D). The primary researcher conducted half of the feedback sessions with each participant and the secondary researcher conducted the other half of the feedback sessions. Teacher participants then had 5-15 minutes to modify their second narrative story based on feedback received from delivering the first story. The researcher did not provide any
additional feedback or respond to participant questions regarding the modified lesson. Identical to the first lesson delivery, participants delivered their second lesson in the TeachLivE™ Lab and then engaged in a feedback session with the researcher immediately following delivery of their second lesson. Following this second round of feedback, two different prepared lessons from the Study 1 were assigned for the teacher participant to deliver at the next practice session in the TeachLivE™ Lab, where the procedures were identical to the first intervention session, and this format continued for the duration of the study. Overall, each teacher practiced four intervention lessons in the TeachLivE™ Lab.

After completing each practice session in the TeachLivE™ Lab, teacher participants were directed to deliver the practiced lessons to students in their reading practicum classrooms across two consecutive days. The procedure for reading the stories in the classroom was the same as those used during the baseline sessions. That is, on Day 1, students read the narrative story aloud and teacher participants did not ask any comprehension questions (Read #1). Immediately following this reading, students read the same narrative story aloud for a second time and teacher participants again did not ask any comprehension questions (Read #2). On Day 2, students read the narrative story aloud (Read #3) and teacher participants asked their prepared comprehension questions. Teachers delivered this lesson in the way it was practiced in the TeachLivE™ Lab. Following each reading lesson, students responded verbally to three assessment questions following the same procedures used in the baseline condition.
Interobserver Agreement

Interobserver agreement (IOA) refers to the degree to which two or more independent individuals observe the same behavior at the same time. All teacher questions and student responses to assessment questions during the lesson were transcribed from the video recordings. The primary researcher served as the primary scorer in this study and coded data during all sessions of the study. The secondary researcher coded data for 25% of the sessions (Cooper, Heron, & Heward, 2007).

Interobserver agreement for the student measure (i.e., C-units) was determined for both quantity and accuracy of C-units. The secondary researcher scored 25% of total intervention lessons for both teacher participants. Baseline lessons were not scored for IOA because of very few student responses to Part 2 of the assessment questions, where the C-units were measured (i.e., C-units cannot be scored unless students respond to Part 2 of the assessment questions). Four rounds of IOA were conducted where both researchers would meet after each round to calculate the number of agreements and disagreements and to discuss the discrepancies in scoring before moving to the next round of IOA scoring. For quantity of C-units, the mean IOA was 85%, with a range of 77% to 94%. For accuracy of C-units, the mean IOA was 88%, with a range of 83% to 92%. The majority of disagreements for quantity were in determining the onset of a new C-unit within the student response. The majority of disagreements for accuracy were due to determining whether or not a C-unit incorporated student inference, which would make that C-unit inaccurate.
**Fidelity**

Fidelity of treatment confirms whether the manipulation of the independent variable was implemented as planned. For this study, a fidelity score was determined for 50% of the didactic instruction lessons and 25% of feedback sessions provided by the researchers during the intervention phase.

The secondary researcher watched a recording of the didactic instruction provided by the primary researcher before participants engaged in practice sessions in the TeachLivETMLab (see Appendix L). The mean fidelity of implementation during didactic instruction was 100%. Researcher 1 implemented the didactic instruction lessons (see Appendix J) with fidelity and clearly communicated information to support the teacher participant to acquire new information to support writing low and high-level questions and sequences, which included the story grammar elements, character trait, event, and ideas. The teacher was provided a note guide (see Appendix K) with question examples. These examples allowed the teacher participant to develop a clear understanding. Only one instance was noted where the participant sought clarification.

Fidelity of implementation to ensure feedback sessions provided by the researcher after practice sessions were carried out in a consistent, nonbiased manner was also determined. For each teacher participant’s lesson, either the primary or secondary researcher evaluated teacher participants’ instruction using a yes/no checklist of components (see Appendix H). First, this checklist was used to record whether the participant implemented the targeted elements for using the questioning strategy they learned from didactic instruction. Next, the checklist was reviewed in each feedback
session to help participants learn how to become more proficient in implementing the questioning strategy and improving overall instruction when delivering the reading lesson to students in the TeachLivE™Lab. The second observer watched recordings of 25% of total intervention feedback sessions using a Fidelity of Feedback checklist to ensure that feedback provided was aligned with the targeted elements for the questioning strategy and that the researcher individualized feedback for each participant based on teaching performance (see Appendix I). The mean fidelity of implementation for feedback sessions was 100% for the primary and secondary researchers. The feedback sessions provided to the teacher participants ranged between 10-14 minutes. During the feedback sessions, teacher participants had opportunities to ask questions to clarify or enhance their understanding regarding the effective use of questioning. Both researchers gave feedback and provided specific examples connected to the lesson delivered.

Upon the completion of the didactic training and feedback sessions, the teacher participants delivered planned reading lessons within a classroom setting. Fidelity of implementation within the classroom was determined by comparing questions included on the teacher’s written intervention lesson with the transcript for the actual classroom lesson. For each teacher, one lesson plan was compared to the classroom transcript. The planned questions were precisely worded and asked in the same order as in the written lesson plan, yet on occasion the teachers slightly altered the wording of the question (e.g., Original question, “What is clutter?” Revised question, “Who can tell me what clutter is?”).

For P1, 73% of the questions on the classroom transcript were the same as the
questions in her lesson plan. On occasion P1 provided additional prompts to support student responses. For P2 87% of the questions on the classroom transcript were the same as the questions in her lesson plan. Similar to P1, P2 added additional words into the question.
CHAPTER IV
RESULTS

This study examined the effects of teacher questioning strategies on students’ reading comprehension, when utilizing a low- to high-level question sequence. In addition, it examined didactic instruction and practice in the TeachLivE™Lab to assist preservice teachers in developing questioning strategies to increase the rate of questions delivered during small group reading instruction. Details regarding student performance and teacher performance outcomes are provided below. It is important to note, student 823 (teacher P1) was eliminated from the study since he was absent for three of the seven stories. Therefore, results for five students from Preservice Teacher 1 and six students for Preservice Teacher 2 are detailed. Additionally, during baseline, four students for teacher P1 were absent for one session (Students 382, 519, 614, and 771).

Quantity of C-Units

Research Question 1 asked, “To what extent do teacher high-level questions with supporting low-level questions increase the quantity of C-units in response to comprehension questions asked during a reading lesson with students with disabilities”? The quantity of C-units for preservice teacher 1’s and preservice teacher 2’s students are presented below. The student quantity results are discussed according to baseline and intervention phases of the study. Figure 1 is a dot plot depicting the range and mean quantity of C-units for the students of each teacher. During intervention the students for both teachers increased the average number of C-units in response to
comprehension questions as compared to the average number of C-units in response to comprehension questions during baseline. During baseline, P1’s students averaged 6.5 C-units across three stories, while P2’s students averaged 4.4 C-units across the three stories. In contrast, during intervention, P1’s students averaged 8.1 C-units across 4 stories and P2’s students averaged 6.2 C-units across stories. Importantly, the increase in C-units for each teacher’s students occurred when intervention was initiated depicting a small level
change in the average number of C-units for the students of each teacher.

Figures 2-3 show individual student data for each teacher’s students. During the baseline phase for P1, four of the five students performed above the group mean. Students 382, 709, and 743 performed above the group mean. In contrast, student 519 performed below the group mean during the three data sessions, while student 451 performed below the group mean for two out of the three data sessions.

During intervention, the overall group trend showed a slight increase in the number of C Units. Students 382 and 709 performed above the trend for the group mean. In contrast, student 451 displayed an increase in the number of C-units at the beginning of the intervention phase, but a decline in the data occurred during the last two stories. Other students in the P1 group did not demonstrate this marked decline.

Relative to their baseline performance, students 382 and 519 increased the number of C-units they produced when responding to comprehension questions. Students 451, 709, and 743 produced about the same number of C-units during intervention as during baseline. Only students 382 and 451 showed variability in responding during intervention.

Overall, students of P2 showed an increased number of C-units from the initial baseline story to the second baseline story (see Figure 1). Although the group mean slightly increased, student 531 exhibited a trend of zero C-units throughout baseline (see Figure 3). Further, students 579, 583, and 771 demonstrated a significant increase during their baseline phase. Student 614 initially performed above the mean and then dropped below the mean on the second session.
Figure 2. Quantity of C-units for each of P1’s students.
Figure 3. Quantity of C-units for each of P2’s students.
During intervention, students in P2’s group showed variability in their trends. Student 531 and 771 responded positively to the intervention, which resulted in a trend above the overall group mean. Students 579 and 657 experienced a trend below the group mean for stories 830, 710, and 780. Relative to baseline performance, student 531 increased the number of C-units produced when responding to comprehension questions. Student 657, produced about the same number of C-units during intervention as during baseline. Students 579, 583, 614, and 771 showed variability in responding during baseline.

The quantity of C-unit data displayed in Table 2 details the extent to which students responded with detailed elaboration to questions about the story read organized

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline mean</th>
<th>Intervention mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>382 a</td>
<td>7.00</td>
<td>9.50</td>
</tr>
<tr>
<td>451 a</td>
<td>6.00</td>
<td>6.00</td>
</tr>
<tr>
<td>519 a</td>
<td>3.50</td>
<td>7.25</td>
</tr>
<tr>
<td>531</td>
<td>0.00</td>
<td>7.50</td>
</tr>
<tr>
<td>Mean (bottom third)</td>
<td>4.14</td>
<td>7.56</td>
</tr>
<tr>
<td>579</td>
<td>5.67</td>
<td>5.75</td>
</tr>
<tr>
<td>583</td>
<td>6.33</td>
<td>6.50</td>
</tr>
<tr>
<td>614</td>
<td>6.00</td>
<td>5.00</td>
</tr>
<tr>
<td>657</td>
<td>4.33</td>
<td>6.25</td>
</tr>
<tr>
<td>Mean (mid-third)</td>
<td>5.58</td>
<td>5.88</td>
</tr>
<tr>
<td>709 a</td>
<td>8.00</td>
<td>10.00</td>
</tr>
<tr>
<td>743 a</td>
<td>7.33</td>
<td>7.33</td>
</tr>
<tr>
<td>771</td>
<td>7.00</td>
<td>6.25</td>
</tr>
<tr>
<td>Mean (top-third)</td>
<td>7.44</td>
<td>7.86</td>
</tr>
</tbody>
</table>

*Note.* Student participants organized based on lexile scores. *a* Teacher participant (P1) students.
by student’s lexile scores. During baseline the students with the lowest lexile scores also had the fewest number of C-units, while the students with the highest lexile scores had the highest number of C-units. Simply, students with lower lexiles generally provided less information when responding to comprehension questions than students with higher lexile scores. During intervention, seven of the 11 students experienced an increase in the number of C Units from the baseline to the intervention. The most pronounced increase in the number of C-units occurred with the students with the lowest lexile scores.

**Accuracy of C-Units**

Research Question 2 asked, “To what extent do teacher high-level questions with supporting low-level questions increase the accuracy of C units in response to comprehension questions asked during a reading lesson with students with disabilities”?

The accuracy of C-units for preservice teacher 1’s and preservice teacher 2’s students are presented below. The student accuracy results are discussed according to baseline and intervention phases of the study. Figure 4 is a dot plot depicting the range and mean accuracy of C-units for the students of each teacher. During intervention the students for both teachers increased the average accuracy of C-units in response to comprehension questions as compared to the average accuracy of C-units in response to comprehension questions during baseline. During baseline P1’s students averaged 52% accuracy across three stories while P2’s students averaged 63% accuracy across the three stories. In contrast, during intervention P1’s students averaged 99% accuracy across four stories and P2’s students averaged 85% accuracy across stories. The increase in the
Figure 4. Accuracy of C-units for P1’s and P2’s students.

Accuracy of C-units for each teacher’s students occurred when intervention was initiated depicting a large level change in the average accuracy of C-units for the students of each teacher. Importantly, during intervention, for each teacher, student accuracy improved and the range in student performance decreased except for one of teacher P2’s stories.

Figures 5-6 show individual student data for each teacher’s students. Overall, P1’s students remained in the range of 50% accuracy during baseline. Student 451 performed
below the baseline mean during all three sessions (see Figure 5). Students 382 and 709 both displayed one data point with accuracy of 100% during baseline. Two of the three data points for student 743 were above the group mean (i.e., 70%-90% accuracy).

During the intervention phase of the study, P1’s students displayed a remarkable response to the questioning strategies (see Figure 5). The accuracy for four of the five students was at 100% during all four sessions. Student 743 experienced a slight decline in accuracy on the last story, but still remained above 80%.

P2’s students’ baseline accuracy for individual students is presented in Figure 6. Overall P2’s students averaged between 59% and 69% accuracy on baseline stories. Student 531 scored zero accuracy during the three baseline sessions; yet, students 583, 657, and 614 consistently demonstrated accuracy levels above the group mean during baseline sessions. In fact, student 657 had 100% accuracy throughout baseline.

During the intervention phase, students average accuracy score was above 85% accuracy on three of four stories. On the second intervention story, the distribution of student scores looked similar to the distribution of accuracy scores during baseline ranging from 0 to 100%. Notably, student 531 demonstrated significant improvement from a baseline of 0% to 100% accuracy. Similarly, student 657’s accuracy on every intervention story improved relative to his comprehension accuracy during baseline. Except for the second story the remaining students averaged above 70% accuracy across stories; however, the scores were variable, ranging from 0- to 100%.

Table 3 presents student accuracy scores rank ordered based on their Lexile scores. In general, students with the lowest lexile scores had the lowest baseline comprehension
Figure 5. Accuracy of C-units for each of P1’s students.
Figure 6. Accuracy of C-units for each of P2’s students.
Table 3

*Percent Comprehension Accuracy by Student Lexile Score*

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline mean</th>
<th>Intervention mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>382a</td>
<td>71.43</td>
<td>100.00</td>
</tr>
<tr>
<td>451a</td>
<td>16.67</td>
<td>100.00</td>
</tr>
<tr>
<td>519a</td>
<td>54.17</td>
<td>100.00</td>
</tr>
<tr>
<td>531</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>mean (bottom third)</td>
<td>35.57</td>
<td>100.00</td>
</tr>
<tr>
<td>579</td>
<td>69.44</td>
<td>90.63</td>
</tr>
<tr>
<td>583</td>
<td>87.14</td>
<td>85.21</td>
</tr>
<tr>
<td>614</td>
<td>75.00</td>
<td>70.00</td>
</tr>
<tr>
<td>657</td>
<td>100.00</td>
<td>90.18</td>
</tr>
<tr>
<td>mean (Mid-third)</td>
<td>82.90</td>
<td>84.00</td>
</tr>
<tr>
<td>709a</td>
<td>58.33</td>
<td>93.75</td>
</tr>
<tr>
<td>743a</td>
<td>67.26</td>
<td>92.59</td>
</tr>
<tr>
<td>771</td>
<td>80.00</td>
<td>96.88</td>
</tr>
<tr>
<td>mean (top third)</td>
<td>68.53</td>
<td>94.41</td>
</tr>
</tbody>
</table>

*Teacher participant (P1) students*

scores. After intervention, 10 of the 11 students demonstrated a mean comprehension accuracy above 85%. The students in the bottom third of the group responded remarkably well throughout the intervention phase with a mean of 100% accuracy. In addition, students in the top third of the group experienced improvements during the intervention phase with mean scores above 90% accuracy. Only one student in the mid-third group (student 579) demonstrated growth during the intervention.

Overall, all students in P1’s group responded with positive growth in their accurate C-units. Their average baseline group mean was 53.57, with a final mean of 97.27. In comparison, only three of the six students in P2’s group displayed growth at the
end of the intervention. The final group mean for P2’s students was 88.82.

**Rate of Total and Low- to High-Level Questions**

Research Question 3 asked, “To what extent does didactic instruction and practice in the TeachLivE™ Lab on teacher questioning increase the rate of total questions asked by preservice teachers during a reading lesson with students with disabilities”?

Research Question 4 asked, “To what extent does didactic instruction and practice in the TeachLivE™ Lab on teacher questioning increase the rate of preservice teachers’ delivery of low- and high-level questions when teaching a reading lesson with students with disabilities”?

Teacher questioning presented by the preservice teachers (P1 and P2) exhibited a low rate of total questions (i.e., 0.5-1.0 per minute) in the baseline phase (see Figure 7). Both teachers displayed an increase in their overall rate of questioning after practice opportunities in the TeachLivE™Lab and didactic instruction on constructing low to high-level question sequences.

The rate of low- and high-level questions for both preservice teachers is represented in Figure 7. P1 and P2 consistently asked more high level than low-level questions during the baseline phase. During intervention, P1 increased her rate of low-level and high-level questioning equally, while P2 increased her low-level questioning more than her high-level questioning.
Figure 7. High-level, low-level, and total comprehension questions per minute for P1 and P2 during baseline and intervention.
Rate of High-Level with Supporting Low-Level Questions

Research Question 5 asked, “To what extent does didactic instruction and practice in the TeachLivE™ Lab on direction of teacher questioning (low- to high-level) increase the rate of preservice teachers’ high-level questions with supporting low-level questions when teaching a reading lesson to students with disabilities”?

Throughout the study, the preservice teachers’ use of questioning strategies to support students’ ability to comprehend was evident. In their intervention lessons, both teachers used more low to high-level questioning sequences than during baseline (Figure 8). P1 displayed a rapid increase in the number of low to high-level question sequences from baseline to intervention. Even with a slight decline on the final assessment measure, the overall use of low to high-level questions sequences per minute remained above the baseline and the initial intervention data point. Similarly, P2’s use of a low to high-level question sequence in her intervention lessons increased rapidly from baseline to intervention. Notably, P2’s final data point in intervention exceeded her previous three intervention data points.

Social Validity Data

A social validity questionnaire was presented to all student participants after all assessment sessions were completed for students (see Appendix G) and both teachers (see Appendix F).
Figure 8. Low- to high-level question sequences per minute for P1 and P2 during baseline and intervention.
Students

Students were asked the questions orally and responses were recorded and later transcribed. When students were asked if they liked or disliked reading the stories and answering questions, all students responded positively and acknowledged the stories helped them with reading. Nine out of the 11 students believed the questions asked by the teacher helped them to remember the stories. Although one student acknowledged the questions helped a “little bit,” the student recognized the questions require you to think. The majority of students acknowledged it is better to ask a lot of questions when reading a story because it helps understanding. Two students indicated, however, that too many questions could interrupt the story or make it difficult to finish reading during the lesson time. All students liked their reading lessons and described the reading opportunity as “fun.” For suggestions to improve the reading lessons seven out of the eleven students would not change anything. Three recommendations made by the remaining students include: providing a preview of lessons, asking more questions, and providing more lesson time. Ten of the 11 students felt smarter after reading stories and answering questions with the teachers. All students felt they became better readers by answering comprehension questions. Some students indicated the comprehension questions improved their ability to understand words, read more fluently, and that questions served as prompts to stop and think about the story. The final comment expressed by a student was that the reading lessons were fun and good.

Teachers

The two preservice teachers were provided a social validity questionnaire to
respond to their experience. In terms of the training provided, both teachers “agreed” or “strongly agreed” they liked and understood the questioning strategies, that the exercises included in the study helped clarify how to prepare lessons that include low- to high-level questions, and learning the strategies was worth their time. They were willing to implement the strategies in their classrooms. Both participants also indicated that using the questioning strategies would not be disruptive in their classrooms, and in general would not be costly to implement.

Participant 1 indicated she spent 30-60 minutes preparing reading lessons, while Participant 2 spent 0-30 minutes. Participants responded differently when asked if there was sufficient time allowed to modify the second lesson after receiving feedback on the initial lesson. Participant 2 felt the time was sufficient, and Participant 1 desired more time. Recognizing Participant 1 spent more time preparing lessons, the desire for more time completing revisions was predictable, and the answer consistent.

Finally, both participants commented that the information and skills acquired during the study were valuable. Participant 1 recognized the skills learned will transfer to her classroom instruction and appreciated the feedback provided during the practice sessions. Participant 1 offered only one critique related to the time restraint in the TeachLivÆLab.
CHAPTER V
DISCUSSION

Effects on Quantity of C-Units and Accuracy of Comprehension

The engagement opportunity presented through the questioning sequence strategy used by the teacher participants resulted in seven out of 11 students increasing the number of C-units when responding to comprehension questions. Students in the bottom third of both groups demonstrated the greatest increase in the quantity of C-units.

The questioning sequence of high-level questions with supporting low-level questions also resulted in 10 out of 11 students demonstrating a mean comprehension score above 85% accuracy. Notably P1 had four of five students perform at 100% accuracy during all intervention sessions. Students in the bottom third of both groups demonstrated the greatest increase in the accuracy of C-units. In essence, the low to high questioning sequence strategy appears to narrow the range of comprehension performance for the students in the group, lifting the performance level of the lower performers.

Effects of Teacher Performance to Utilize Question Sequences

Teacher participants improved their ability to increase their overall rate of questioning. During intervention, P1 had a balanced increase of low and high-level questions. In comparison, P2 only increased the use of low-level questions. The teachers effectively developed their questioning strategies to incorporate low to high-level
questioning sequences. Their data demonstrated a rapid increase from baseline to intervention. P1’s data consistently increased until experiencing a slight decline on the final assessment measure. P2 exhibited variability when using low to high-level question sequences. Overall, both teachers displayed growth in their ability to integrate low to high-level sequence with data remaining above baseline.

**Limitations**

Some limitations of the study and its findings should be noted. First, stories selected for the study were not counter balanced. Student progress would be more likely with easier stories, and it is possible that the intervention stories were easier or more interesting than the baseline stories. It is important to note the lexile range of students in the bottom third, who exhibited the greatest growth, had lexiles in the range of 382-531. The lexile range of stories used for the study was 630-1020. Therefore, it is not likely student progress was a result of reading easier stories; however, it is difficult to know if students had a higher level of interest for specific stories.

The second limitation of the study is related to opportunities to respond. During the intervention sessions, students responded to more questions when compared to the baseline. Providing students more opportunities to discuss the story could have influenced student progress more than the questioning sequence. Although, both teachers increased low to high-level question sequences when compared to the baseline phase, there was still some variability in each participant’s trend during the intervention sessions. The duration of each session varied for both teachers as a result of the response
opportunities being provided to the students.

A third limitation of the study is lexile levels were not controlled. The student lexiles ranged from 382-771. Based on lexile proficiency, P1 had more students performing at a lower level compared to the level of students in P2’s group. Students in P1 had a lower mean for the accurate number of C-units during baseline compared to students in P2. P1 had a higher rate of questions during intervention. It is unknown if the lexile levels influenced the discussion structure of the reading lessons. P1 was more likely to present questions in a more relaxed approach based on fidelity data.

A fourth limitation is the lack of experimental control with instructional delivery. The delivery approach comprised of error correction, feedback, praise and distribution of questions to students. As part of the teacher reading instruction, both teachers provided error corrections when students pronounced words incorrectly. The frequency in which each teacher used error correction procedures was not monitored formally during baseline and intervention sessions. Determining if error correction employed by teachers influenced student comprehension is difficult. Data was not maintained to monitor the number of occurrences for each student.

It is important to acknowledge the teacher participants were receiving support from a university supervisor as part of their preservice teaching requirements. As a result of the supervisor’s feedback both teachers integrated classroom management strategies to promote positive learning skills. Although both teachers implemented the same plan, the rate at which praise and extrinsic reinforcement was provided to students is unknown. It is unclear if differences in the teacher’s praise rate influenced students to actively
respond to questions presented by teachers.

Finally, the distribution of questions presented to students was not controlled. Teachers presented questions, which prompted individual responses. The teachers did not ensure questions were distributed equally among student participants. Therefore, some students potentially responded to more questions.

**Future Research**

Based on the results of this study, future research should establish more methodological control to monitor the effectiveness of the low to high-level question sequence. The selection of stories and lexile levels is another important factor requiring additional attention. Lexile levels and student interest levels should be counterbalanced in selected stories. Particularly within this study, the lexile range of student participants varied between the two groups. Student participants within each group need to have a similar range to more appropriately determine the influence of teacher questioning.

The use of questioning strategies provides engagement opportunities for students. Structuring the amount of time used to discuss the story will provide future research an opportunity to determine the impact of question sequences more easily. It is important to provide more control of the number of questions students respond to during baseline.

Finally, if indeed this questioning strategy effectively increases students reading comprehension with narrative stories, additional research is needed applying this strategy in content area classes.
Practical Implications for Using This Intervention in General Education Classrooms

The use of teacher questions when purposefully integrated into instruction provides valuable learning opportunities for students (Dillon, 1981; Ellis, 1993; Roth, 1996). The structured reading opportunities provided to student participants throughout the study enabled them to read a passage multiple times. Although the repeated reading supported students in reading passages more fluently, it could be challenging for a teacher to consistently allocate the additional reading time into a daily schedule. However, research indicates repeated readings have a marked positive effect on reading comprehension and fluency with an effect size of 0.67 (Hattie, 2009).

During instruction, teachers can utilize questioning strategies to promote proficiency for the varying levels of comprehension among students (Kintsch, 2005). Supporting students as they access grade level materials through guided practice allows teachers to consistently check for understanding as students respond to teachers’ questions. The questioning strategy, sequencing low to high-level questions can help students connect new information by scaffolding information to deepen comprehension levels for students (Bulgren et al., 2011). Strategic questions can assist students in developing the necessary foundations with grade level curriculum to strengthen their knowledge to demonstrate the application of information. The use of question levels can support students in deepening their understanding to higher levels (Hattie, 2009).

By presenting meaningful questions, teachers can easily engage a student and increase motivation. A classroom is comprised of students of varying ability levels. If a
low to high questioning sequence enhances the comprehension accuracy of low-performing students, as it did in this study, then these students might become more active participants in class discussions. In particular, this strategy might help the lower-performing students improve their ability to respond meaningfully to high-level questions. This questioning strategy can easily be incorporated into general education classrooms, helping teachers differentiate instruction with diverse learners during class discussions. That is, different levels of questions can be directed to different students to ensure all students are actively and meaningfully involved in class discussions. Finally, this questioning strategy may be a no-cost strategy to support student achievement with various size groups of students with diverse range of reading comprehension skills.
REFERENCES


APPENDICES
Appendix A

Student Consent Form
Student Consent Form

**Introduction/ Purpose** Shannon Harris and Dr. Benjamin Lignugaris/Kraft in the Department of Special Education and Rehabilitation at Utah State University are conducting a research study to find out more about didactic instruction for teacher questioning strategies in the classroom. You have been asked to take part because your child qualifies for special education services in the area of reading. There will be approximately 3-5 total participants in this research.

**Procedures** If you agree to be in this research study, the following will happen to your child.

1. Child will read short narrative stories aloud with a preservice teacher as part of his/her reading instruction in his/her elementary school. Each story will be read twice.
2. On the third reading of the story, the preservice teacher will ask your child to verbally respond to comprehension questions throughout the story.
3. After reading the story, your child will write responses to three comprehension questions.
4. All of the reading lessons will be video recorded to ensure accuracy of observations.
5. At the end of the study, your child will be asked to complete a questionnaire about their experience in the study.
6. It is anticipated that your child will engage in 4-5 reading lessons over the course of 3-4 weeks.

**New Findings** During the course of this research study, you will be informed of any significant new findings (either good or bad), such as changes in the risks or benefits resulting from participation in the research, or new alternatives to participation that might cause you to change your mind about continuing in the study. If new information is obtained that is relevant or useful to you, or if the procedures and/or methods change at any time throughout this study, your consent to continue participating in this study will be obtained again.

**Risks** There is minimal risk in participating in this research; however, your child may be asked to engage in more reading tasks than his/her peers in other small reading groups and may feel overwhelmed. To minimize this risk, the reading lessons will be scheduled intermittently over the weeks of the study rather than consecutive days in a row. The lessons from this study are aimed to compliment and support your child’s reading progress as he or she continues to engage in the ongoing regular reading curriculum. Further, breaks will be given in between multiple readings of each story and there will be no pressure of time limits for your child to complete any of the reading tasks.

**Benefits** There may or may not be any direct benefit to your child from these procedures. The researchers, however, may learn more about effective teacher questioning strategies when working with students with disabilities. This knowledge may contribute to the
research for determining the best teaching methods to help students in the area of reading, especially for building students’ reading comprehension. Your child may benefit from the questioning strategies that were designed to help increase students’ ability to understand a story and improve overall reading comprehension.

**Explanation & offer to answer questions** Shannon Harris has explained this research study to you and answered your questions. If you have other questions or research-related problems, you may reach Shannon Harris at (435) 797-8674 or shannonharris8@gmail.com. Dr. Lignugaris-Kraft may be reached at (435) 797-2382 or ben.lig@usu.edu.

**Voluntary nature of participation and right to withdraw without consequence** Participation in research is entirely voluntary. You may refuse to have your child participate in this research or you may withdraw your child at any time without consequence or loss of benefits. Your child may also withdraw from this study at any time without consequence. If your child engages in noncompliant behaviors, his or her participation will be terminated by the researchers without your permission.

**Confidentiality** Research records will be kept confidential, consistent with federal and state regulations. Only the investigator and other school certified staff members will have access to the data, which will be kept in a locked file cabinet in a locked room to maintain confidentiality. To protect the privacy of your child, his/her name will be replaced with a code number on all data collected for this study. The code will be stored in a locked file cabinet at USU. Personal, identifiable information will be kept for one year in order to finish analyzing data and finalize results. Then the code along with any other personal, identifiable information will be destroyed.

Further, each reading lesson will be video recorded using flipcams. These records will be stored using an encrypted and password-protected application. The password will only be available to members of the research team. Access will be monitored regularly to ensure that no unauthorized individuals have tried to access the video content.

Flipcams will be set up at an angle that directly captures the teacher, but only captures the backs of the students. If students’ faces are captured directly on camera, their faces will be blurred using video editing software prior to storing videos.

Other than video records, all data will be stored only in the lead researcher’s password-protected computer at Utah State University in password-protected files. All standards for confidentiality required by the American Psychological Association (APA) will be followed.

**IRB Approval Statement** The Institutional Review Board for the protection of human participants at Utah State University has approved this research study. If you have any questions or concerns about your rights or a research-related injury and would like to
contact someone other than the research team, you may contact the IRB Administrator at (435) 797-0567 or email irb@usu.edu to obtain information or to offer input.

**Copy of Parent Permission** You have been given two copies of this Parent Permission document. Please sign both copies and keep one copy for your files.

**Investigator Statement** “I certify that the research study has been explained to the individual, by me or my research staff, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered.”

**Signature of Researchers:**

[Signatures]

**Signature of Parent / Guardian** By signing below, I agree for my child to participate in this study. I also give my consent to have my child be video recorded under the protocols described in this document.

_______________________________  __________________________
Parent(s)/Guardian Signature    Date

**Child/Youth Assent:** I understand that my parent or guardian is aware of this research study and that they have given permission for me to participate. I understand that it is up to me to participate even if they say yes. If I do not want to be in this study, I do not have to and no one will be upset if I don’t want to participate or if I change my mind later and want to stop. I can ask any questions that I have about this study now or later. By signing below, I agree to participate.

_______________________________  __________________________
Name (please print)     Date

_______________________________  __________________________
Child/Youth Signature    Date
Appendix B

Lexile Scores for Narrative Stories
Table B1

*Lexile Scores for Narrative Stories*

<table>
<thead>
<tr>
<th>Story</th>
<th>Lexile score</th>
<th>Grade</th>
<th>Mean sentence length</th>
<th>Mean log word frequency</th>
<th>Word count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A World of Good</td>
<td>790L</td>
<td>4</td>
<td>12.36</td>
<td>3.63</td>
<td>865</td>
</tr>
<tr>
<td>2. Career crisis</td>
<td>660L</td>
<td>3</td>
<td>10.12</td>
<td>3.59</td>
<td>860</td>
</tr>
<tr>
<td>3. Disappearing sugar</td>
<td>750L</td>
<td>4</td>
<td>10.90</td>
<td>3.50</td>
<td>937</td>
</tr>
<tr>
<td>4. Foolproof plan trout fishing</td>
<td>880L</td>
<td>5</td>
<td>13.58</td>
<td>3.58</td>
<td>896</td>
</tr>
<tr>
<td>5. Grandma Betty’s Banjo</td>
<td>1020L</td>
<td>6-8</td>
<td>16.48</td>
<td>3.58</td>
<td>857</td>
</tr>
<tr>
<td>6. Growing Together</td>
<td>630L</td>
<td>2-3</td>
<td>10.01</td>
<td>3.64</td>
<td>921</td>
</tr>
<tr>
<td>7. How Night Came</td>
<td>1010L</td>
<td>6-8</td>
<td>16.31</td>
<td>3.59</td>
<td>946</td>
</tr>
<tr>
<td>8. Lessons on the Ledge</td>
<td>970L</td>
<td>5</td>
<td>15.12</td>
<td>3.55</td>
<td>907</td>
</tr>
<tr>
<td>10. Mystery Noises</td>
<td>820L</td>
<td>4</td>
<td>12.82</td>
<td>3.62</td>
<td>872</td>
</tr>
<tr>
<td>11. Priceless Possessions</td>
<td>750L</td>
<td>4</td>
<td>12.01</td>
<td>3.68</td>
<td>901</td>
</tr>
<tr>
<td>12. Riding High</td>
<td>710L</td>
<td>2-3</td>
<td>11.47</td>
<td>3.69</td>
<td>860</td>
</tr>
<tr>
<td>13. The Clutter Challenge</td>
<td>780L</td>
<td>4</td>
<td>12.03</td>
<td>3.61</td>
<td>866</td>
</tr>
<tr>
<td>14. The Secret Ingredient</td>
<td>700L</td>
<td>2-3</td>
<td>10.27</td>
<td>3.51</td>
<td>863</td>
</tr>
<tr>
<td>15. Trash Talks</td>
<td>830L</td>
<td>4</td>
<td>12.91</td>
<td>3.61</td>
<td>878</td>
</tr>
</tbody>
</table>

*Note.* Lexile Benchmarks obtained from [http://www.lexile.com/analyzer/](http://www.lexile.com/analyzer/)
Appendix C

Scoring Guide
Scoring Codes:

1 = low-level question
2 = high-level question
> = connected low to high sequence (i.e., “connect”)
R = rhetorical question
2a = high-level yes/no question
O = 2a connects

Definitions:

**Low-level questions:** Questions that seek direct answers of factual information where correct responses are mostly found directly in the text; they are often closed questions with a limited number of acceptable answers.

*Examples: Students are required to remember facts, terms, definitions, concepts; questions often begin with “who, what, where, and when.” Vocabulary questions (e.g., “What is a career?”) are considered low-level questions. *note: There are some yes/no questions that are still low-level (text-based) and should be coded as “1,” not “2a.”

**Example:** What was Zachary’s goal? (found in the text) = 1 (low-level question)

**Example:** What made Ben nervous? (found in the text) = 1 (low-level question)

**High-level questions:** Questions that seek more indirect and evaluative responses; they are often open-ended questions with many acceptable answers.

*Examples: Students are required to break down the text and explain relations, make judgments or comparisons, and/or provide examples; questions often begin with “how,” “why,” and “compare.” Also, any personal applications (e.g., “Tell me about a time when you had an experience like the main character.”) or personal opinions (e.g., “What do you think Sam should have done instead?”) are considered high-level questions.

**Example:** Give me some examples of other ways that you might be able to get information about a career that you’re interested in. = 2 (high-level question)

**Example:** If you could have changed the ending of this story, how might you have changed it? = 2 (high-level question)

**Connected question:** high-level question with supporting low-level question(s) whose content supports and is pertinent for responding to that specific high-level question.

*Note: At least one low-level question is required per high-level question and/or another already connected supporting high-level question; low-level questions may apply to more than one high-level question. To determine a “connect,” look to see whether the high-level question asked is supported by at least one low-level or another already
connected high-level question.

OR A 2a connect

Example:
What is recycling? = 1
What are some examples of things that we
often throw away that we shouldn’t throw away? = 2
What can you do with those old clothes? = 2

Rhetorical questions: Questions where the teacher is not seeking an evaluative
response from the student; these questions are often delivered to verify or validate an
answer or discussion on the relevant topic.
Examples: “It is important to prepare for a test, isn’t it?,” “Riding a horse would
be exciting, right?”

More info. on Rhetorical questions:
- When the teacher asks “thinking questions” (usually Before Reading), they are
considered R because the teacher is not seeking a response. (Example: “Be thinking, ‘I
wonder what will happen in this story.’”)
- When a teacher restates or clarifies information and ends with “right?” (Example: “So
the girl was afraid to enter the classroom, right?” or “It’s important to be kind to each
other, right?”)

High-level yes/no questions (i.e., “2a Questions”): Questions that seek an
evaluative judgment, but require a yes/no response. This also includes “participation
questions” where students are prompted to raise their hand or respond with a yes/no (e.g.,
“How many of you have ridden a horse before?”).
Examples: “Do you value some of your possessions more than others?,” and “Is
it important to recycle?”

2a connects: occurs when at least one supporting 2a question is asked directly
before a 2 (i.e., high-level question) as part of a questioning sequence.

You can connect a 1 to a 2a connect, this counts as a connect

Example:
Would any of you want to clean it up? = 2a
Why not? = 2 2a Connect (1)

Example:
Have any of you ever ridden a horse? = 2a
Maria, how old were you when you
rode the horse? = 2 2a Connect (2)

Additional Examples for Question Types:
<table>
<thead>
<tr>
<th>Low-level (1)</th>
<th>(2a)</th>
<th>High-level (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes/no questions (text-based) (e.g., Did Carla go to the basketball game?)</td>
<td>participation questions: where students are asked to raise their hand if they _________. (e.g., Raise your hand if you think that’s embarrassing.)</td>
<td>Predictive questions (e.g., What do you think will happen?)</td>
</tr>
<tr>
<td>Questions such as, “Does anyone have anything to add?” and “Anyone else?” if asked independent of a questioning sequence.</td>
<td>Evaluate personal yes/no questions (e.g., Do you value some of your possessions more than others?)</td>
<td>Questions that ask students to explain, summarize, or compare.</td>
</tr>
<tr>
<td>All vocabulary questions are low-level, whether defined directly in the text or asked by the teacher in general at any point in the lesson.</td>
<td>More examples: So is the sugar really disappearing?</td>
<td>Questions that ask for student opinions (e.g., What do you think?) (e.g., In your opinion, ________)</td>
</tr>
<tr>
<td>*Vocabulary questions that are yes/no vocabulary questions = low level (Example: “Is a career a job then?”)</td>
<td>Do you think the team will win the game next week?</td>
<td>Why? Questions (when teacher prompts student to elaborate)</td>
</tr>
<tr>
<td></td>
<td>Do you guys know what that is?</td>
<td>Anyone else? (as long is it is in the context of a previously asked high-level question)</td>
</tr>
<tr>
<td></td>
<td>Do you think so?</td>
<td>“How would you feel?” or “How do you think the character feels?” questions</td>
</tr>
<tr>
<td>They were in your house?</td>
<td>Any multiple-choice question that is NOT text-based (e.g., Do you think Billy is going be happy or sad?)</td>
<td>Questions like, “So, what?” are considered a 2 if connected to a 2 in the sequence; the teacher is essentially asking the student to repeat the response. If the student was responding to a 1, and the teacher asked, “So, what?” then you would count the question as a 1. This same criteria goes for questions like, “Say that again?” and “What do you mean?”</td>
</tr>
<tr>
<td>Do you live in a city or suburb? (personal multiple choice...it involves evaluative thinking)</td>
<td>Do you think his sister is treating him fairly? Why or why not?</td>
<td>If two questions asked within 3-5 seconds of each other and before a student response include a 2a question and a high-level question, then the item is scored as a high-level question only (no 2a connect). (example: Do you think his sister is treating him fairly? Why or why not?</td>
</tr>
<tr>
<td></td>
<td>Questions that ask students to give examples like, “Do you have any examples of healthy lunches?”</td>
<td>Text-based multiple choice</td>
</tr>
</tbody>
</table>
* Directions for the student to expand their response or question statements like, “Explain how they solved the puzzle.” count as questions.
* Two or more questions asked within 3-5 sec of each other and before the teacher calls on a student and gets a response counts as ONE question; to score, if at least one question in the sequence is high, score the entire item as high-level (2). (e.g., If other people value something, can that change your opinion of its value? Maria, what do you think?)
* When a teacher repeats a question (i.e., asks the same question to another student) this still counts as new question
* A connected question doesn’t have to be just before a high-level question—see Participant #2 A6: 21-25

**Additional Examples:**
It counts as a “Connect” when:
A 2a connect is connected to a 1

```
1
2a
  2

Connect (1)
```

Another Example:

```
1
2a
  2

Connect (1)
```

```
2a Connect (1)
```

```
Connect (2) (this is a connect because it is supported by a 2a connect that was linked to a low level)
```

Another Example:

```
2a
  2

2a Connect (1)
```

```
2

2a Connect (2)
```
Appendix D

Student Comprehension Measure Example
The Clutter Challenge

1. Describe the cleanliness of your bedroom. How does that relate to the story we just read?

2. Describe a time when you or someone you know cried because of feeling happy. How does that relate to the story we just read?

3. Explain why you do or do not like having things change in your life. How does that relate to the story we just read?
Appendix E

Student Comprehension Measure Scoring Rubric
SCORING GUIDELINES: C-units (Part 2 only)

Relating Personal Experience Back to the Story
How does that relate to the story we just read?

For each response:
1. Part 1 (P1): Student relates the question to a personal experience.
2. Part 2 (P2): Student links his or her response back to the story that references a character/character trait, event, or idea in the story.

Only Part 2 of students’ responses are scored for:
1) Total C-units
2) Accuracy of C-units

Definition of a C-unit:
The definition of a C-unit comes from SALT Software, LLC.

The analysis of oral language samples requires recorded speech to be segmented or divided into units. The following describes the rules for segmenting utterances into Communication units (C-units), a rule-governed and consistent way to segment utterances.

Definitions:
C-Unit: The formal definition of a C-unit is “an independent clause with its modifiers”. It includes one main clause with all subordinate clauses attached to it. It cannot be further divided without the disappearance of its essential meaning.

Clause: A clause, whether it is the main clause or a subordinate clause, is a statement containing both a subject and a predicate. Grammatically, a subject is a noun phrase and a predicate is a verb phrase (*a pronoun also counts for the noun phrase).

Segmenting Utterances into C-Units
Main clauses can stand by themselves and can be segmented into one C-unit. Subordinate clauses DEPEND on the main clause to make sense. They cannot stand alone or be separated from the main clause. So a C-unit will either consist of a main clause or a main clause with its subordinating clause(s). The following examples are broken down into main and subordinate clauses. The main clause is bolded and the subordinate clauses are underlined.

1. The canary was perched on a branch when the man approached him.
2. Anastasia was angry with her mother because she didn’t get to buy a toy.
3. When the boy looked in the jar he saw that the frog was missing.

Notice the subordinate clauses cannot stand-alone or are incomplete without the main clause. Thus, they are not separated (segmented further) from the main clause.

**C-units: Total**

When scoring for Total C-units within the main or subordinate clause, each subject + predicate/each noun + verb, counts as one C-unit. See the examples below:

List of Helping Verbs:
am, are, is, was, were, be, being, been  
may, must, might  
have, has, had  
can, could, would, should  
shall, will  
do, does, did

Examples: (subject (noun) and predicate (verb) are highlighted in yellow)

1. **The canary was perched on a branch (1) when the man approached him (2).**  
   (when = adverb, him = pronoun)

2. **Anastasia was angry (1) with her mother because she didn’t get (2) to buy a toy (3).**

3. When the **boy looked** (1) in the jar **he saw** (2) that the **frog** was missing (3).  
   (when = adverb)

*do not include conjunctions (because, so) as part of the C-unit.  
*do not include prepositions (in, on, to, for, at, of, by, not) as part of the C-unit.  
*Went, gone, given, made, done, are examples of irregular verbs.

**Example of a student response:**  
…he picked, um, cause he want to the picnic and there were trash under and on the table.  
And he picked it up and threw it away.

…**he picked** (1), um, cause **he went** to the picnic (2) and there **were trash** under and on the table (3).  
And **he picked it up** (3) and **threw it away** (4).

Total C-units = 4

**Example of a student response:**  
…there’s a team of recycling clubs and, um, and they wanna work together to, um,  
together to, work something, they all can do together.
...there’s a team of recycling clubs (1) and, um, and they wanna work together (2) to, um, together to, work something, they all can do together (3).

Total C-units = 3

**C-units: Accuracy**

Each C-unit is accurate when it aligns with what happened in the story or information from the story.

*The student must be accurate in their knowledge of details from the story.* For example, in the story *A World of Good*, Uncle Matt joined the Peace Corps. If the student refers to it as the Marine Corps or something other than Peace Corps, the question part is inaccurate. However, if the student mispronounces a word but captures the information from the text accurately, then the question part should be scored as accurate (e.g., the students says “suburbian” instead of “suburbia.”).

*If a student responds to P2 with a hypothetical situation (even if it could be accurately derived from the story) it is inaccurate.* For example, in the story *Career Crisis*, the student created a hypothetical situation with the response, “Maybe on a job someday someone doesn’t understand what to do,” and each C-unit would be scored as inaccurate because the student needed to reference characters, events, and ideas that are in the story.

*Inferences made by student:* If there is inference at all when the student discusses the text in P2, then that C-unit is inaccurate.

Example:

**Question:** Tell about a time you did something that wasn’t easy? How does that relate to the story we just read?

**Accurate response:** Uncle Matt had to work really hard for food and water *(this really did happen in the story)*.

**Inaccurate response:** When Uncle Matt went on a safari while he was in Africa and it was hot and he got a sunburn *(these events did not happen in the story)*.

**Inaccurate response:** Uncle Matt worked really hard for food and water, but he probably felt good to help the people and the work didn’t bother him *(inference made by the student)*.
Appendix F

Social Validity Questionnaire: Teacher Participants
Teacher Participants

Social Validity Questionnaire:
A questionnaire to measure social validity will be given at the end of the study following the completion of all intervention and measurement sessions and will be completed by all teacher participants.

Rate the following as:
l = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, or 5 = strongly agree.

1. My understanding of the questioning strategies taught in this study is clear. ____
2. I am willing to implement the questioning strategies in my classroom. ______
3. It will be costly to implement questioning strategies in my lessons. ______
4. I like the questioning strategies learned in this study. ______
5. Implementing the questioning strategies will be disruptive in the classroom. ___
6. Learning the questioning strategies in this study was worth my time. ______
7. The exercises I completed helped clarify how to prepare lessons that include low- and high-level questions. ______

8. How much time did you spend preparing each reading lesson?
   0-30 min  30-60 min  more than 60 min

9. Did you have sufficient time to modify your second daily lesson after receiving feedback on your first lesson?
   Yes      No

10. Other comments regarding any aspects of the study:

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
Appendix G

Social Validity Questionnaire: Student Participants
Social Validity Questionnaire:

A questionnaire to measure social validity will be given at the end of the study following the completion of all intervention and measurement sessions and will be completed by all student participants. Each student will complete the questionnaire verbally and one-on-one with a school staff member who was not included in or had any knowledge of the study.

1. Did you like or dislike reading the stories and answering questions? Why?

________________________________________________________________________

2. Do you feel like you remembered the stories better because of the questions the teacher asked? Explain.

________________________________________________________________________

3. Do you think it’s better to ask a lot of questions when you read a story? Why or why not?

________________________________________________________________________

4. What was something you liked about the reading lessons?

________________________________________________________________________

5. What would you change to make the reading lessons better?

________________________________________________________________________

6. Overall, do you feel smarter after reading the stories and answering the questions with the teacher or do you feel the same as you always have? Explain.

________________________________________________________________________

7. Has answering comprehension questions helped you to be a better reader? Explain.

________________________________________________________________________

8. Is there anything else you’d like to comment on about the reading lessons?
Appendix H

Feedback Checklist
### Feedback Checklist

<table>
<thead>
<tr>
<th>Y/N</th>
<th>Procedure Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Participant asked comprehension questions throughout story; questions were asked immediately following the relevant information.</td>
</tr>
<tr>
<td></td>
<td>2. Low-level questions were clear and articulated well to students.</td>
</tr>
<tr>
<td></td>
<td>3. High-level questions were supported by low-level questions.</td>
</tr>
<tr>
<td></td>
<td>4. Participant’s questions incorporated the basic story grammar elements.</td>
</tr>
<tr>
<td></td>
<td>5. Questions asked throughout story focus on characters, events, ideas</td>
</tr>
<tr>
<td></td>
<td>6. Participant incorporated high-level questions the cue students to relate back to the text through personal experiences.</td>
</tr>
</tbody>
</table>
Appendix I

Fidelity of Feedback for Participants TeachLivE™ Lab
### Fidelity of Feedback for Participants

**TeachLivE™ Lab**

(mark "yes or no" as you watch the video of the feedback session and complete this checklist below)

<table>
<thead>
<tr>
<th>Y/N</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher provided feedback on constructing and delivering low-level questions for the lessons.</td>
</tr>
<tr>
<td></td>
<td>Researcher provided feedback on constructing and delivering high-level questions for the lessons.</td>
</tr>
<tr>
<td></td>
<td>Researcher provided feedback on the low- to high-level questioning strategy.</td>
</tr>
<tr>
<td></td>
<td>Researcher provided feedback on participant’s instructional delivery (e.g., stopping to ask questions, concise statements, delivering questions with clarity)</td>
</tr>
<tr>
<td></td>
<td>Researcher responded to participant’s questions or clarifications in a positive, professional manner.</td>
</tr>
<tr>
<td></td>
<td>Using the Fidelity of Implementation Checklist, the researcher addressed all Procedure Elements and written feedback with the participant.</td>
</tr>
</tbody>
</table>
Appendix J

Didactic Instruction
LESSON ONE: REVIEW

Teacher:

Last summer, you learned about questioning strategies for building reading comprehension. First, you learned about story grammar, the structure used to write narrative stories. Look at your Questioning Note Guide. There are four basic story grammar elements. They are:

1. Characters and Setting
2. Actions the characters are engaged in
3. Results of actions
4. Resolution

You also learned that teaching your students to look for these story grammar elements before, during, and after reading the story can help build reading comprehension. Importantly, you should ask comprehension questions that align with story grammar elements after relevant parts of the story are read. For example, if one of your questions is, “Where does this story take place?” you should ask this question immediately after reading the relevant sentence in the story (e.g., His family lived in London.).

Further, you learned that teacher questioning in the classroom is the most frequently used instructional tool and how teachers ask questions is critical for helping students learn and understand the content. Therefore, teachers need to ask good questions and think strategically about when to ask them. The goal for teachers is to always be thinking about setting students up to respond correctly the first time. This may be accomplished through questioning levels. There are two questioning levels: low-level and high-level.

Let’s take some time to review low- and high-level questions. Look at your Questioning Note Guide.

(Review Question Types on Questioning Note Guide)

Ultimately, asking high-level questions is the goal for building students’ reading comprehension skills, but teachers cannot assume that all students will respond correctly to high-level questions as a result of reading the story only. Teachers must ensure that students comprehend what they read by asking questions at different levels. Last summer you learned a specific questioning sequence, moving from low-level questions to high-level questions. The strategy to ask low-level questions and move to high-level questions
is one way to increase the probability that students will respond correctly the first time and increase their reading comprehension.

Let’s take some time to review the questioning sequence of moving from low- to high-level questions. For every high-level question you ask, there needs to be at least one supporting low-level question whose content is pertinent for responding to that high-level question. Listen again: For every high-level question you ask, there needs to be at least one supporting low-level question whose content is pertinent for responding to that high-level question. Let’s look at some examples on the Questioning Note Guide.

(review examples on Questioning Note Guide)

Here are a few tips for writing low- and high-level questions. First, go to each high-level question you’ve written and ask yourself, “Is this high-level question supported by at least one low-level question?” If so, read through each questioning sequence throughout the story and evaluate if your low- to high-level sequence is connected and based on a central idea and that it flows well.

Next, determine if your questions prompt an elaborated student response rather than a yes/no response. Remember, you want to ask questions that generate discussion. For example, instead of asking, “Did the brothers sneak into the basement?” ask “Summarize what the brothers did to sneak into the basement.” Here’s another example: Instead of asking, “Would you rather live in the city or the country?” ask “What are some reasons that you would rather live in the city/country?”). Let’s consider one more example: Instead of asking, “Did Bobby ride the bus?” ask “What did Bobby do while he was visiting the city?”.

Finally, have confidence. Even though you prepare low- and high-level questions for a reading lesson, you may still need to react to students’ responses and come up with a low- or high-level question on the spot during the lesson. Be just as smart and focused about how you ask questions on the spot as you are when you prepare the lesson beforehand.
LESSON TWO: WRITING SPECIFIC QUESTIONS

Teacher:

Nice job reviewing what you’ve learned about low- and high-level questions as well as implementing strategic questioning sequences. As we move forward in this study, you will continue to deliver lessons by asking comprehension questions while reading a narrative story with students.

First, your lessons from last summer will be given back to you. You will be asked to evaluate your questions from each lesson for low- and high-level questions, as well as any implementation of questioning sequences. You may opt to keep what you prepared for last summer’s lessons, or you may opt to modify any or all of the questions in these lessons.

Think about what you’ve learned about questioning strategies up to this point. In addition to that knowledge, now you are going to learn another strategy for writing comprehension questions.

Look at your Questioning Note Guide. Just as you learned to write questions aligned with elements of story grammar, today you will learn to align questions with the following:

1. A character/character trait
2. Event
3. Idea

First, write questions that align with a character in the story. For example, perhaps a character in the story is someone who is in charge, or a leader. You might ask a question like, “What are some of the duties the main character might have because he is the president?” Sometimes there may be minimal information in a story that provides a clear picture about a character; therefore, you could use a character trait. For example, the character might be honest, unhappy, or sneaky. You might ask a question like, “Why is being honest an important part of being a leader?”

Second, write questions that align with an event in the story. For example, perhaps a character goes camping with friends, gets an A on a math test, or starts taking piano lessons. Examples of questions might be, “What were some of the things Sally did to help her prepare for the math test?” or “Explain how Bobby’s attitude changed after he started taking piano lessons.”
Third, write questions that align with an idea from the story. For example, perhaps the idea of friendship, teamwork, perseverance, or courage is in the story. Examples of questions might be, “Why is it important to be a good friend?” or “Give some examples of how teamwork leads to success?” or “Tell about a time you showed courage.”

Look at your Questioning Note Guide. Let’s look at the examples of the low- to high-level questioning sequences with questions that align with a character or character trait, an event, or an idea.

As we move forward in the study, carefully prepare your lessons to include the things you’ve reviewed and learned about teacher questioning today. Do your best.
Appendix K

Didactic Instruction Questioning Note Guide
Didactic Instruction Questioning Note Guide

Name: __________________________________

Questioning Note Guide

**Story Grammar Elements:**
1. Characters and Setting
2. Actions the characters are engaged in
3. Results of actions
4. Resolution

**Question Types:**

**Low-level questions:** Questions that seek direct answers of factual information where correct responses are mostly found directly in the text; they are often closed questions with a limited number of acceptable answers.

*Examples: Students are required to remember facts, terms, definitions, concepts; questions often begin with “who, what, where, and when.” Vocabulary questions (e.g., “What is a career?” are considered low-level questions.*

*Example: What was Zachary’s goal? (found in the text)*

*Example: What made Ben nervous? (found in the text)*

**High-level questions:** Questions that seek more indirect and evaluative responses; they are often open-ended questions with many acceptable answers.

*Examples: Students are required to break down the text and explain relations, make judgments or comparisons, and/or provide examples; questions often begin with “how,” “why,” and “compare.” Also, any personal applications (e.g., “Tell me about a time when you had an experience like the main character.”) or personal opinions (e.g., “What do you think Sam should have done instead?”) are considered high-level questions.*

*Example: Give me some examples of other ways that someone could get information about different careers.*

*Example: If you could have changed the ending of this story, how might you have changed it?*
Questioning Sequence: Low-level to High-level:

Example 1:
(low) What is recycling?
(high) What are some examples of things that we often throw away that we shouldn’t throw away?

Example 2:
(low) Who is the main character in this story?
(low) Where does the main character live?
(high) Why do you think the main character’s plan to run away will help the family?

Example 3:
(low) What was the name of the bookstore in this story?
(low) Why was the bookstore an important part of the community? (found in text)
(high) Summarize what Sally did to to help keep the local bookstore from going out of business?
(high) What are examples of things you can do to support local businesses?

Example 4:
(low) What was the main character’s goal in this story? (text-based)
(high) What did the main character do to reach his goal?
(high) How can this help you in achieving your own goals?

Example 5:
(low) Who built the model airplanes with Tony?
(low) What was Tony considering to do with his model airplanes?
(high) Explain what you would do with the model airplanes.
<table>
<thead>
<tr>
<th>Character/character trait</th>
<th>Event</th>
<th>Idea</th>
</tr>
</thead>
</table>

**Example 1:**
(low) What club does Sally want to join?
(low) Who is the president of the recycling club?
(high) What are some of the duties the president might have?

**Example 2:**
(low) Who caught the boys stealing from the grocery store?
(low) What did Tommy say to the police officer?
(high) Why is honesty important?
(high) How would the world be different if everyone was honest?

**Example 3:**
(low) How did Sally feel about the upcoming math test?
(low) What was the consequence Sally’s parents gave her if she failed her math test?
(low) What was the first thing Sally did to prepare for the math test?
(high) Explain how Sally’s attitude changed about school as a result of working hard and studying her best for the math test.

**Example 4:**
(low) Who are the two best friends in this story?
(low) Which of the two friends made the mistake?
(high) What would you do if a friend betrayed you like that?
(high) Why is it important to be a good friend?
Appendix L

Didactic Instruction Fidelity Checklist
# Didactic Instruction Fidelity Checklist

Fidelity Checklist: Didactic Instruction  
(See Didactic Instruction Lessons 1 & 2 and Questioning Note Guide)

## Lesson 1

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teacher participant had access to the “Questioning Note Guide” to guide them during instruction for Lesson 1.</td>
</tr>
<tr>
<td></td>
<td>Researcher reviewed the basic story grammar elements.</td>
</tr>
<tr>
<td></td>
<td>Researcher reviewed the definitions for low-level and high-level questions and provided examples.</td>
</tr>
<tr>
<td></td>
<td>Researcher and teacher participant reviewed and discussed the 5 examples of low- to high-level questioning sequences from the Questioning Note Guide.</td>
</tr>
<tr>
<td></td>
<td>The researcher provided clarifications and responded to teacher participant’s questions, if any were asked, throughout the lesson.</td>
</tr>
<tr>
<td></td>
<td>Researcher followed and read the script as it was written.</td>
</tr>
</tbody>
</table>

## Lesson 2

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teacher participant had access to the “Questioning Note Guide” to guide them during instruction for Lesson 2.</td>
</tr>
<tr>
<td></td>
<td>The researcher defined the new question types: Character/character trait, Event, &amp; Idea and provided examples.</td>
</tr>
<tr>
<td></td>
<td>Researcher and teacher participant reviewed and discussed the 4 examples of low- to high-level questioning sequences using the new question types (Character/character trait, Event, &amp; Idea) from the Questioning Note Guide.</td>
</tr>
<tr>
<td></td>
<td>The researcher provided clarifications and responded to teacher participant’s questions, if any were asked, throughout the lesson.</td>
</tr>
</tbody>
</table>