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Effects of Behavioral Skills Training on Preservice Teachers' Ability to Code Articles

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EFFECTS OF BEHAVIORAL SKILLS TRAINING ON PRESERVICE TEACHERS' ABILITY TO CODE ARTICLES

by

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The research-to-practice gap in education has been well documented over the decades (e.g., Abbott et al., 1999; Burns & Ysseldyke, 2009; Cook & Odom, 2013; van Ingen & Ariew, 2015). To best benefit PreK-12 student outcomes, educators must understand and implement scientifically based practices in their teaching (Elementary and Secondary Education Act, 20 U.S.C. § 6301 *et seq*., 2015; Individuals with Disabilities Education Improvement Act, 20 U.S.C. § 1400 *et seq*., 2004). However, this task can be daunting. When presented with educational research, teachers often struggle with identifying the key information, as well as applying it to their practice (Williams & Coles, 2007).

Behavioral skills training (BST) is a strategy that uses an explicit protocol for teaching new skills, practice, and providing feedback (e.g., Kirkpatrick et al., 2019; Sawyer et al., 2017). This project assessed the benefit of using BST to teach preservice teachers how to identify key information about a teaching strategy by coding academic articles. Through their coursework, special education preservice teachers were asked to read a variety of academic articles highlighting various teaching practices, and to code these articles for key aspects of the practices.

Using a multiple probe research design (Horner & Baer, 1978), consenting preservice teachers were provided with BST on how to code relevant research articles. Performance was

measured using a task analysis form. Fourteen of the 16 teachers reached mastery of the coding skill, with 13 maintaining in follow up probes.

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CHAPTER I

INTRODUCTION

The reauthorizations of the Individuals with Disabilities Act (IDEIA; 20 U.S.C. § 1400 *et seq.*, 2004) and the Elementary and Secondary Education Act (ESEA; 20 U.S.C. § 6301 *et seq.*, 2015), emphasize the use of scientifically based practices. Scientifically based practices are established through research studies that, "pose significant questions that can be investigated empirically, link research to relevant theory, use methods that permit direct investigation of the question, provide a coherent and explicit chain of reasoning, replicate, and generalize across studies, [and] disclose research to encourage professional scrutiny and critique" (National Research Council, 2002, p. 52). While the federal laws and subsequent policies were operationalized in the schools, there is still a significant and well-documented research to practice (RTP) gap. This gap has been explored by researchers for several decades (e.g., Abbott et al., 1999; Burns & Ysseldyke, 2009; Kauffman, 1996; van Ingen & Ariew, 2015), with various explanations provided as to the disconnect between the literature base and teacher practices, as well as potential solutions.

One potential cause, and direction for resolution, is teacher preparation programs (e.g., Emmons et al., 2009; McDonnough & Matkins, 2010; van Ingen & Ariew, 2015). Some suggest that teacher preparation programs could improve in how they equip preservice teachers to implement research into practice as they enter the field. To help minimize the RTP gap at the preservice level, this multiple probe single subject study examines the use of behavioral skills training (BST) to teach preservice teachers how to code research articles for key components of educational strategies and interventions.

Federal Legislation

There are two key pieces of legislation that promote the use of scientifically based practices in schools – the Every Student Succeeds Act (ESSA; 20 U.S.C. § 6301 *et seq*., 2015) and the Individuals with Disabilities Education Improvement Act (IDEIA; 20 U.S.C. § 1400 *et seq*., 2004). Both statutes outline clear guidelines for the nation's schools. They provide direction to educators, administrators, and teacher preparation programs in an effort to improve our educational system.

Every Student Succeeds Act (ESSA)

The ESSA was signed into law by President Obama in 2015 (ESSA, 20 U.S.C. § 6301 *et seq*., 2015; U.S. Department of Education, n.d.a). It was a reauthorization of the Elementary and Secondary Education Act (ESEA), enacted 50 years prior, and replaced the No Child Left Behind (NCLB) Act of 2002. The NCLB Act emphasized "proven education methods" and, in fact, used the term scientifically based research more than 100 times (Cook et al., 2008). ESSA calls schools and educators to implement "evidence-based interventions", again emphasizing the need for the interventions being implemented to be proven effective in leading to desired outcomes.

The Individuals with Disabilities Education Improvement Act (IDEIA)

The IDEIA is the federal law that mandates students with disabilities the right to a free and appropriate education (FAPE) in the least restrictive environment (LRE; IDEIA, 20 U.S.C. § 1400 *et seq*., 2004). All special education services are mandated and developed through IDEIA. The IDEIA iterates throughout the requirement for the use of research-based practices. It prioritizes not only use of these practices with students, but also the need for educators to receive professional development in this area at both the preservice and in-service levels. In its 2004

reauthorization, IDEIA worked to align its requirements to those of NCLB while highlighting two areas, low expectations and lack of evidence-based practices, as major obstacles to improving educational outcomes for students with disabilities (Emmons et al., 2009).

The Research to Practice Gap

Educational practice has too often been guided by random declarations and fads, rather than rooted in reliable data (Carnine, 1993). Researchers and scholars have long explored and analyzed the cause, and potential solutions, for this departure from scientifically validated approaches (e.g., Abbott et al., 1999; Burns & Ysseldyke, 2009; Kauffman, 1996; van Ingen & Ariew, 2015). The literature refers to the implementation of scientifically validated strategies in several ways, including research to practice, research utilization, knowledge mobilization, evidence-based practice, and evidence-informed practice (van Ingen & Ariew, 2015). Using these varied terminologies, a variety of influences on the discrepancy between research and practice have been discussed.

Potential Causes of the Research to Practice Gap

One frequently cited cause is the disconnect between the research and practice communities (e.g., Abbott et al., 1999; Greenwood & Abbott, 2001; Cook et al., 2013). This disconnect revolves around a "top-down" education research model, where researchers take the lead on targeting problems and planning solutions and practitioners are left to implement the findings with fidelity (Abbott et al., 1999). This approach has highlighted the limited relevance of educational research in the applied settings (Greenwood & Abbott, 2001), insufficient dissemination of research findings (Cook et al., 2013; van Ingen & Ariew, 2015), and an overall disregard for the value that input from practicing educators could provide (Abbott et al., 1999; van Ingen & Ariew, 2015). Furthermore, educators often struggle to implement research

findings in their applied settings, as the interventions often demand more than is realistic of practitioners (Greenwood & Abbott, 2001) and they view the usability of the research as limited (McLeskey et al., 2018). Carnine (1997) went so far as to say that educational research is often not designed to impact practice.

Educators also report that they are not prepared to implement scientifically based practices (State et al., 2019; Williams & Coles, 2007). This may be due to insufficient professional development practices (Greenwood & Abbott, 2001) and inadequate teacher preparation programs (McLeskey et al., 2018). Professional development models often include brief workshops or didactic instruction, with measures of success that lack observable changes in classroom practices and student outcomes (Abbott et al., 1999). Moreover, teacher preparation programs could be improved by including a stronger emphasis on effective practices, systematically teaching preservice teachers to implement these practices, and including a stronger role of field-based work that requires evidence of implementation (McLeskey et al., 2018).

Lastly, not to be overlooked, is the extreme shortage of educators across the country (Sucher et al., 2016). In the last three school years, all 50 states and the District of Columbia have reported teacher shortages in one or more areas (U.S. Department of Education, 2019, 2020, 2021). More specifically, 49 states and the District of Columbia currently report teacher shortages in special education (U.S. Department of Education, 2021) and special education teacher attrition rates match that of the population of students with disabilities, all while the percentage of students receiving special education services is growing (National Education Association, 2019). These staggering statistics, paired with decreases in enrollment in teacher preparation programs (Title II Higher Education Act, 2020) have no doubt impacted the limited

implementation of high-quality, scientifically based educational practices (McLeskey & Billingsley, 2008). As a result, underqualified individuals are too often placed in professional educator positions as a last resort in servicing children.

Information Literacy

As solutions to the RTP gap have been explored (e.g., Boudah et al., 2001; Herrington & Daubenmire, 2016; Schiller et al., 1995) a handful of researchers have begun to investigate the role of information literacy (IL) skills in teacher preparation programs (e.g., Emmons et al., 2009; van Ingen & Ariew, 2015). Information literacy refers to a person's ability to, "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association, 1989, para. 1). The Association of College and Research Libraries (ACRL) developed IL standards and performance indicators for use by faculty and librarians when implementing programs to teach these skills (ACRL n.d.). Included is a set of six standards designed for teacher education (ACRL, 2011). The ACRL standards for teacher education highlight the ability to organize and analyze information in the context of specific needs, synthesize, process and present information in a way that is appropriate for the purpose, and evaluate pieces of information, all as important skills for preservice teachers to master.

While current work has centered around collaboration with university librarians, it has not specified the instructional strategies used. To support teacher preparation programs in developing and delivering this instruction within their curriculums, studies that evaluate the use of specific instructional strategies to teach IL skills are needed.

Behavioral Skills Training

One specific instructional strategy that has proven successful to address a variety of skills with a range of populations, including teacher preparation, is behavioral skills training (BST;

e.g., Kirkpatrick et al., 2019; Sawyer et al., 2017). BST is a practice that trains human performance skills through an explicit instructional cycle (Parsons et al., 2012). Although the procedural steps may vary slightly among various researchers and practitioners, the fundamental steps include: 1) instruction, 2) modeling, 3) rehearsal, and 4) feedback, with a repeated cycle of practice and feedback until trainee meets the predetermined mastery criterion (Dib & Sturmey, 2012). BST is highly adaptable to a variety of purposes and settings, and therefore is a strategy worthy of evaluation for IL instruction.

Statement of the Problem

Despite established federal policy mandating the use of scientifically based practices, there remains a long standing RTP gap in the field of education (e.g., Abbott et al., 1999; Burns & Ysseldyke, 2009; Kauffman, 1996; van Ingen & Ariew, 2015). Educational researchers and professionals note a range of potential causes for this gap. Often referenced is the researcher and practitioner relationship (e.g., Abbott et al., 1999; Greenwood & Abbott, 2001; Cook et al., 2013), as well as the current nature of professional development (e.g., Greenwood & Abbott, 2001) and teacher preparation programs (e.g., McLeskey et al., 2018).

Significance of the Study

This study addressed the RTP gap by targeting preservice teachers in their teacher preparation program. With the importance of implementing scientifically based strategies in their teaching practice, it is vital that preservice teachers leave their teacher preparation programs with both a broad repertoire of practices, as well as the skills to seek out and implement unfamiliar practices when they are confronted with new situations and challenges. Teachers entering the field should feel confident in their ability to understand and evaluate research for their applied purposes.

Rationale for the Study

One way to do this is through developing preservice teachers' information literacy (IL) skills (e.g., Emmons et al., 2009; van Ingen & Ariew, 2015). Information literacy builds the skills to implement scientifically based practices thoughtfully, critically, and ethically, and therefore is a vital component of teacher preparation programs if they are to produce educators who can do so (Emmons et al., 2009). Information literacy includes a broad range of skills. Realizing that these skills must be explicitly taught, the Association of College and Research Libraries (ACRL) outlined IL standards for a variety of disciplines, including teacher education (ACRL, 2011).

Of the six standards designated for teacher education, Standard 2.B. is the focus of this study. Standard 2.B. emphasizes selecting information, including: assessing the relevance of information, choosing relevant content from a source, and utilizing features of an information source to select key information (ACRL, 2011). This project assessed the benefit of using BST, an explicit instructional method, to teach preservice teachers how to identify key information about a teaching strategy by coding research articles. Coding consists of picking out key pieces of information. In this study, special education preservice teachers were asked to read a variety of academic articles highlighting various teaching best practices and to code them for a predetermined set of key information. The study sought to answer the following questions:

Research Questions

1. Will BST increase preservice teacher's ability to identify key information in research articles?
2. Will BST decrease the time it takes preservice teachers to identify key information in research articles?
3. Do preservice teachers find coding research articles a skill of value?

4. Do preservice teachers find BST an acceptable way to learn how to code research articles?

Terms

Behavioral Skills Training. An explicit instructional cycle that consists of the following steps: 1) instructions, 2) modeling, 3) rehearsal, and 4) feedback, with a repeated cycle of practice and feedback until trainee meets the predetermined mastery criterion (Dib & Sturmey, 2012).

Coding. The process of identifying key information in a reading passage.

Cohort. A group of students that progress through their teacher education program together, including admittance to the program, course work, and field work.

Information Literacy. A person's ability to, "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association, 1989, para. 1).

Preservice Teacher. A teacher currently enrolled in a teacher preparation program who has not yet entered the professional teacher workforce.

Research to Practice Gap. The discrepancy between validated interventions published in academic journals and other research forums and the practices that are being implemented by practitioners in the field.

Single Subject Research. Single-subject experimental design is the basis for evaluation in applied behavior analysis and many other human service fields ®. Single-subject design is a method of research where the subject serves as their own control, with repeated measures taken under different conditions to determine if a functional relationship exists between the independent and dependent variables (Cooper et al., 2007; Kazdin, 2011). The subject is exposed to each condition several times over the course of the study, and measures of the subject's behavior

during each of these conditions are compared to determine the effect of the intervention. Graphic analysis is used to analyze the results of single-subject research.

Teacher Preparation Program. A postsecondary program at a college or university that works to prepare students for the teaching profession.

Summary

The RTP gap in the field of education has been well documented for decades. Among proposed solutions is improving the preparation of preservice teachers. One area for improved preparation is IL skills. There have been some studies beginning to explore IL instruction with preservice teachers, but they have lacked exploration of instructional methods to be utilized. Behavioral skills training is an explicit instructional strategy that has proven effective in a variety of contexts, including with preservice teachers. The focus of this study is to evaluate the use of BST on teaching IL skills to preservice teachers. Chapter II provides an overview of the current research on teacher preparation programs, IL, and BST. Chapter III describes the methodology for the study. Chapter IV shares and analyzes the findings, while Chapter V provides a summary of the results, discusses their impacts, and provides recommendations for future research.

CHAPTER II

LITERATURE REVIEW

The previous chapter provided a background and rationale for the evaluation of a behavioral skills training (BST) intervention to teach preservice teachers how to code research articles for key components of educational strategies and interventions. This chapter provides a review of the current literature pertaining to research to practice (RTP) in teacher preparation programs, information literacy, and behavioral skills training.

Research to Practice in Teacher Preparation Programs

To best benefit PreK-12 student outcomes, educators must understand and implement scientifically based practices in their teaching (Cook et al., 2008; Jones, 2009). This begins with their initial training in their teacher preparation program. Scientifically based practices are those that have been proven to positively impact student outcomes (National Research Council, 2002). With teachers' classroom practices being the largest driver of student learning (Windschitl et al., 2012), ensuring that teacher preparation programs equip preservice teachers with a strong repertoire of scientifically based practices is vital to student achievement (Council for the Accreditation of Educator Preparation, 2013).

Scientifically based practices, and the time and effort university professors put in to teaching them, have no impact if teachers do not believe that the practices work or are worth their time and effort to implement (Cook et al., 2008). It is vital that teacher preparation programs not only expose preservice teachers to scientifically based practices, but that they also understand the rationale for a practice and its intended effect. This will improve implementation, and therefore student outcomes.

Additionally, teacher preparation often occurs primarily at the university rather than the PK-12 classroom, resulting in coursework that lacks an emphasis on application (Grossman et al., 2009). When preservice teachers do spend time in the field, teacher preparation programs have limited control over their experiences, leaving exposure to effective applied practices up to chance (Grossman & McDonald, 2008). Teacher preparation programs must, therefore, be carefully designed and include systematic teaching (Forzani, 2014). Within the university classroom, teacher preparation programs can work with preservice teachers to better evaluate the support for practices in a variety of educational contexts (Emmons et al., 2009). This will empower preservice teachers to evaluate and apply scientifically based practices more effectively in their field experiences and, ultimately, in their future classroom.

Information Literacy

Information literacy (IL) refers to a person's ability to, "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association, 1989, para. 1). By focusing on preservice teachers' IL skills, they will be better prepared to identify, articulate, evaluate, and apply scientifically based practices (Emmons et al., 2009). Though there is an abundance of research discussing IL in various applications (e.g., Hammons, 2020; Tewell, 2015), research exploring IL in teacher education with a goal of bridging the RTP gap is limited (Emmons et al., 2009).

Need for Information Literacy Instruction

Although the process of academic research and publication has value, ultimately many teachers do not often access academic journals (Landrum et al., 2007; Lastrapes & Mooney, 2020; Williams & Coles, 2007). Teacher preparation programs work to prepare professional educators who can design, implement, and critically evaluate instructional practices that improve

educational outcomes for students (Emmons et al., 2009). However, when presented with educational research, a key component in being able to do so, they often struggle with identifying the key information, as well as applying it to their practice.

In 2020, Lastrapes and Mooney conducted a survey or 346 preservice and in-service teachers regarding their use of practitioner journal articles and preferences. Participants reported that they did not read journals but did read articles. On average, they read eight articles, which they most often accessed via online search engines. They reported a preference for shorter articles that were written from a practitioner perspective and favored articles that included real application vignettes and graphics highlighting outcome data.

Similarly, Landrum and colleagues (2007) compared teachers' perceptions of effective educational practices presented in two different formats—databased (formatted as research findings) and personal (formatted as personal experience of a veteran teacher). Of the 127 teachers that participated, teachers preferred the personal format, rating it as more useable. Additionally, the more experienced teachers found the information less useable overall, regardless of format. Although this feedback is important when considering dissemination of research, formatting and stylistic preferences should not be a barrier to teachers accessing research findings that could benefit their students.

Williams and Coles (2007) conducted survey and interviews were completed with a total of 390 educators regarding their use of research information and IL skills. Respondents indicated positivity and motivation towards the use of research evidence, however, their actual use of it was limited. They reported a lack of knowledge, skills, and confidence in finding, evaluating, and utilizing research information, as well as lack of time and lack of ready access resources to do so.

The Association of College and Research Libraries (ACRL) and the Council for Accreditation of Educator Preparation (CAEP) produce guidance regarding IL skills and the RTP gap, calling for teachers to use research to inform practice (ACRL, 2011; CAEP, 2013). Additionally, federal legislation (ESSA, 20 U.S.C. § 6301 *et seq.*, 2015; IDEIA, 20 U.S.C. § 1400 *et seq.*, 2004) mandates that teachers do so. Despite this, teacher preparation programs have addressed this skill set at a minimum. Given that teachers are held accountable for this, it is concerning that their education and training in this area is lacking (van Ingen & Ariew, 2015).

Guidelines for Information Literacy Instruction

Traditionally, librarians have been the ones to teach IL skills (Emmons et al., 2009). As the need for IL becomes increasingly important, however, so does the need for it to be taught by a more diverse pool of professionals. The ACRL and the CAEP have provided guidance and regulations regarding the focus on scientifically based practices in teacher preparation.

The ACRL developed IL standards, performance indicators, and outcomes to be used in in developing, implementing, and evaluating IL programs within teacher education (ACRL, 2011). The guidance consists of six standards (see Table 1). Each of the six standards is followed by one and four performance indicators and corresponding outcomes that describe specific skills to demonstrate mastery. For instance, standard one includes four performance indicators. The first, "defines the need for information" (ACRL, 2011, p. 2), is followed by five outcomes and corresponding examples. In this case the first outcome reads, "Identifying the purpose for which information is needed. Examples: for a research paper, lesson plan, oral presentation, class exercises or project, or for action research on classroom practices" (ACRL, 2011, p.2).

The Council for the Accreditation of Educator Preparation (CAEP) has also communicated the need for research to inform teacher practice (CAEP, 2013). Standard 1.2

reads, “Providers ensure that candidates use research and evidence to develop an understanding of the teaching profession and use both to measure their P-12 students’ progress and their own professional practice.” This requirement by CAEP ensures that teacher education programs who wish to be accredited must prepare their preservice teachers to utilize research and evidence in their teaching practice.

Table 1

ACRL Information Literacy Standards for Teacher Education

ACRL Information Literacy Standards for Teacher Education	
Standard 1	Defines and articulates the need for information and selects strategies and tools to find that information.
Standard 2	Locates and selects information based on its appropriateness to the specific information need and the developmental needs of the student.
Standard 3	Organizes and analyzes the information in the context of specific information needs and the developmental appropriateness for the audience.
Standard 4	Synthesizes, processes, and presents the information in a way that is appropriate for the purpose for which information is needed.
Standard 5	Evaluates discrete pieces of information as well as the entire information seeking process.
Standard 6	Knows how to ethically use and disseminate information.

Applied Research

Information literacy and teacher education programs have been explored for a variety of purposes over the years. Studies have targeted collaboration between teacher education programs and librarians (e.g.; Floyd et al., 2008; O’Hanlon, 1988; Warner & Templeton, 2010; Witt & Dickinson, 2003), the relevance of IL to teachers (e.g., Boardman et al., 2005), teaching IL skills to PK-12 students (e.g., Asselin & Lee, 2002; Branch, 2004; Witt & Dickinson, 2004; Duke & Ward, 2009; Earp, 2009), and IL skills needed for success in college courses (e.g., Crouse & Kasbohm, 2004; Floyd et al., 2008; Rockman, 2003). While there have been many studies that

have examined IL and teacher preparation, there are three that target he RTP gap through IL instruction specifically (Asselin & Lee, 2002; Emmons et al., 2009; van Ingen & Ariew, 2015).

Asselin and Lee (2002) completed a study in collaboration between a variety of library and teacher education stakeholders. They targeted preservice teachers through a required language arts course. Through this coursework they sought to increase the preservice teachers' IL skills and their ability to teach IL by observing a simulated collaborative lesson planning between a teacher and librarian, observation of a co-taught IL lesson, and opportunity to plan an IL lesson in collaboration with a librarian. As a result of these experiences, the preservice teachers were to create a unit plan. Through pre- and post-evaluations (reflective writings, concept maps and webs) they found that students improved their knowledge of IL as a critical thinking process, better understood the place of IL instruction in PK-12 classrooms as well as how to teach it, and had a greater appreciation for the expertise offered by librarians.

Emmons and colleagues (2009) developed, implemented, and evaluated a teacher preparation program that integrated IL skills. Instead of an isolated class session where the students would go to the library to complete an assignment, they worked with the librarians at their university to incorporate IL skills across a four-semester sequence of coursework and field experiences. The developed a curriculum that connected IL skills to scientifically based practices, with a goal of graduating preservice teachers who possessed strong IL skills. They found that their program improved student performance in all areas, increased retention of students, and that students, overall, rose to a greater level of challenge in coursework.

Similarly, in 2015 van Ingen and Ariew collaborated with a university librarian to deliver a workshop targeting IL skills. Specifically, they focused on preparing preservice teachers to define an information need, articulate the need, and search for a select research articles related to

that need. They found that the preservice teachers that participated in their collaborative workshop performed better in the targeted skills.

These studies have begun to develop the literature base on IL instruction with preservice teachers. They do not, however, explore specific instructional strategies to be used for teaching IL skills to preservice teachers. If teacher preparation programs are to include IL instruction in their coursework, understanding what instructional strategies are effective in teaching these skills to preservice teachers is of value. One such strategy worthy of exploration is reviewed next.

Behavioral Skills Training

In 2018, Juarez and Purper called for more research regarding university preparation of teachers in the areas of content knowledge and implementation. One training method that targets content knowledge and implementation performance is behavioral skills training (BST). BST is a widely utilized strategy that uses an explicit protocol for teaching new skills, practice, and providing feedback (Parsons et al., 2012). Stemming from the principles of applied behavior analysis (Cooper et al., 2007), it consists of instruction, modeling, rehearsal, and feedback (Kirkpatrick et al., 2019). One of the benefits of BST is that is highly customizable. Instructions can be provided through a presentation, modeling can be done in-vivo or through video, rehearsal can be done with a peer or a trainer, and feedback can be provided at varied time delays, to name a few. BST contrasts traditional, didactic instruction in that learners have the opportunity to practice the skill and receive feedback. Additionally, termination of the instructional cycle is determined by mastery of a predetermined performance criterion, rather than a time constraint or simply completion. Furthermore, when rehearsal and feedback is included in instruction, procedural integrity, generalization, and maintenance improves, adding to the benefits of BST.

BST has proven successful with diverse sets of people and for a variety of purposes. With college students, BST has been successful in improving interview skills (Barker et al. 2019; Stocco et al., 2017), conversational skills (Beaulieu et al., 2014), and teaching how to pour a standard size serving of alcohol (Hankla et al., 2018), to name a few. Teachers have also benefited from BST for a variety of purposes, including implementation of direct instruction (Sherman et al., 2021), behavior intervention plans (Hogan et al., 2015), and discrete-trail teaching (Sarokoff & Sturmey, 2004), among others.

Behavioral Skills Training with Teachers

A meta-analysis conducted by Brock and colleagues in 2017 reviewed practitioner training studies in special education. Regarding BST, they found that it resulted in the most consistent improvements in implementation fidelity across practitioners. Additionally, modeling, written instructions (e.g., implementation checklist), and verbal feedback, all common components of a BST protocol, were all associated with positive effects.

In 2019, Kirkpatrick and colleagues conducted a systematic review of studies where BST was used to teach evidence-based practices (EBPs) to preservice and in-service teachers. They found 15 studies doing so and identified two important needs in the literature base—applying the trained EBPs to school aged students and using BST with preservice teachers. In the review, only six of the 15 studies demonstrated teachers applying their newly acquired skills with their students and only one study evaluated BST with preservice teachers.

Sawyer and colleagues (2017) targeted seven preservice teachers in a BST intervention. They sought to improve preservice special education teachers' performance of evidence-based practices (EBPs) during role play scenarios. BST was delivered in a group format, consisting of didactic lecture, in vivo modeling, role play and feedback. All participants received each step of

this BST simultaneously. They found that BST resulted in high levels of accuracy on the targeted EBPs, concluding that BST may be more effective in training undergraduates' new performance skills than traditional instructional methods. Limitations to the study included a lack of maintenance data and evaluation of student performance only in role play scenarios, limiting assessment of the durability and generalization of skills. Additionally, this study had a small sample size (n=7), which may limit the external validity and scalability of the findings.

Kirkpatrick and colleagues (2020) used BST to train preservice teachers how to implement a token economy during small group instruction in their fieldwork placement. Their work built upon that of Sawyer and colleagues' by evaluating performance of the target skill was implementing with the target population (i.e., children). The BST began with a PowerPoint presentation instructing students on the target skills lasting approximately 20 minutes. An additional 25 minutes were spent modeling, rehearsing, and providing feedback. If a student did not meet mastery criteria during the initial BST individual feedback was provided during a 10-minute one-on-one meeting with the trainer. Results showed that the BST increased all participants' ability to implement a token economy system. Additionally, the one-on-one BST feedback session was successful for the three participants that required it. Social validity, which was assessed at the conclusion of the study, was positive. Preservice teachers found the training to be effective, thought the amount of time effort required was appropriate, and believed they were better prepared to implement the token economy because of the BST. Limitations of the study included, again, a lack of maintenance data, as well as implementation of the BST only in a small group setting.

Summary

The RTP gap must be addressed by teacher preparation programs. One way to do so is by integrating IL skills into the curriculum and coursework. To do so, studies that explore instructional methods for teaching IL skills to preservice teachers are needed. One instructional method that is highly adaptable and has shown success in the college classroom and with teachers is BST. The purpose of this study is to evaluate the effect of BST on teaching preservice teachers one IL skill, coding research articles for key information. The next chapter, Chapter III, describes the methodology for the study. Chapter IV shares and analyzes the results, and Chapter V provides a summary of the findings and discusses the limitations, opportunities for future research, and impact on practice.

CHAPTER III

DESIGN AND METHODOLOGY

Chapter I introduced and provided rationale for the study and Chapter II reviewed the literature pertaining to research to practice in teacher preparation programs, information literacy, and behavioral skills training. This chapter begins with a discussion of the research foundations of single-subject research, specifically multiple probe designs. A description of the methods used in this study follows. This description outlines the participant population, setting, design, dependent variables, instrumentation and data collection, procedure, data analysis, interobserver agreement (IOA), and social validity measures.

Research Foundations

Single-subject experimental design is the basis for evaluation in applied behavior analysis and many other human service fields (Cooper et al., 2007). Single-subject design is a method of research where the subject serves as their own control, with repeated measures taken under different conditions to determine if a functional relationship exists between the independent and dependent variables (Cooper et al., 2007; Kazdin, 2011). The subject is exposed to each condition several times over the course of the study, and measures of the subject's behavior during each of these conditions are compared to determine the effect of the intervention. Graphic analysis is used to analyze the results of single-subject research. When there are multiple subjects in a study, each subject's data are graphed and analyzed separately. This contrasts with group designs, where the data are analyzed as a group and the belief is that the large group numbers account for the variability among subjects.

There are several types of single-subject research designs—reversal, alternating treatments, multiple baseline, and changing criterion designs (Cooper et al., 2007). Multiple

baseline designs are one of the most utilized single-subject designs, allowing researchers and practitioners to demonstrate experimental control and evaluate a functional relationship, or lack thereof, without having to withdraw the intervention. This is beneficial when the target behavior is likely to be irreversible or when it is undesirable, impractical, or unethical to reverse conditions (Baer et al., 1968). Multiple baseline designs can apply the intervention across subjects, across settings, or across behaviors, to evaluate its effect.

In a multiple baseline design, first, concurrent baseline data is collected across two or more identified subjects, settings, or behaviors (Cooper et al., 2007). Then, the intervention, or independent variable, is applied to each in a sequential order. The outcomes are measured and analyzed to determine the intervention effect. A functional relationship is demonstrated when the dependent measure changes only when the independent variable is applied.

A variation of the multiple baseline design is the multiple probe design (Cooper et al., 2007; Horner & Baer, 1979). This design follows the same approach as the multiple baseline design apart from the collection of baseline data. Instead of collecting concurrent baseline data, intermittent baseline probes are administered. This is done due to a concern that concurrent baseline data collection is either unnecessary, potentially reactive, impractical, or too costly. Multiple probe designs are appropriate when analyzing the effects of instruction of complex skill sequences or for behaviors that have no reasonable opportunity to occur. In some studies, the repeated measurement of a skill prior to intervention (i.e., baseline) may be aversive to subjects, leading to extinction, boredom, or other undesirable responses, furthering the rationale for use of the multiple probe approach.

Participants

Sixteen preservice teacher undergraduate students majoring in special education volunteered for this study. All participants were members of the same cohort within their program. They were in their first year of the special education program. Requirements to be accepted to the special education program include a minimum 3.0 GPA, a C/B or better in ED 2500: Human Development, a submitted letter of intent, and a minimum of 56 earned college credits (junior year status or above). Prior to the spring semester in which the study took place, the students had completed the following special education coursework: SPED 3300 *Foundations of Special Education*, SPED 3380 *Prevention and Intervention Techniques for Establishing Positive School Environments*, and SPED 3310 *Field Experience in Special Education 1: Effective Instruction*. In the spring semester during which the study took place the students were enrolled in the following courses: SPED 3700 *Introduction to Emotional Impairments*, SPED 3750 *Strategic Interventions for Social and Academic Behaviors* and SPED 3710 *Field Experience in Emotional Impairments.*

Participants were randomly assigned to one of three groups, two groups of five and one group of six. Informed consent (see Appendix A) for participation in the study was obtained from each participant and experimental arrangements were approved by the Western Michigan University Human Subject Institutional Review Board (see Appendix B).

Setting

Each session occurred in the participants' SPED 3710 *Field Experience in Emotional Impairments* course. This is a required course in the special education undergraduate course sequence, however the portion of class dedicated to this project took place in the last 45 minutes of the 140-minute class period and participation was voluntary, not part of the curriculum.

Due to the COVID-19 pandemic, the students were not able to complete fieldwork in the local schools. Alternative lessons and assignments were developed to continue their learning, this study was a part of those. Classes took place on Tuesday and Thursday mornings either in-person or synchronously online, pending COVID-19 exposure and current university policy, and were taught by a professor and doctoral candidate in the department, both researchers on this project. During classes that were held on campus, one or several students sometimes participated virtually due to Covid-19 exposure or a positive test result. They did this by logging on to Webex, the university's web conferencing software, where they were to watch, listen, and participate live, as if they were attending in-person.

Design

A multiple-probe design was used to evaluate the effect of BST on the undergraduate students' ability to code research articles for relevant information (Cooper et al., 2007; Horner & Baer, 1979). This design was selected because students had limited exposure to and experience with the targeted skill (coding a research article) and their performance was not expected to vary throughout the baseline phase. Additionally, the researchers predicted that repeated measurement of the coding skill prior to intervention would be aversive for the participants.

Dependent Measures

The primary dependent measure was the research coding score, as measured by a task analysis form. A task analysis breaks a complex behavior into smaller pieces to aide in the teaching of the skill (Cooper et al., 2007). The secondary dependent measure was the pace at which students coded the research article. This was measured to better understand if, in addition to the accuracy of their coding, the pace at which students coded an article increased through the

BST process. This was of value as one of the primary challenges with accessing research when in the field, as reported by practicing educators, was time (Williams & Coles, 2007).

Instrumentation

A task analysis form, named the Research Coding Checklist (see Appendix C) was developed by the primary researcher and was used to assess the students' performance on each coding activity. It outlined the key elements students should identify when coding a research article. The elements outlined were those that guide an educator in determining if an educational practice is a good fit for the problem or behaviors they are trying to address, the resources they have in their setting, the characteristics of their student(s), and if the practice is effective and well-liked by educators and students.

The identified elements on the task analysis form were selected based on several national resources and their guidance regarding selection of scientifically based practices, including The IRIS Center through Vanderbilt University's Peabody College (2010), the National Center on Intensive Intervention (n.d.), and Planning Realistic Implementation and Maintenance by Educators (PRIME), a project by the University of Connecticut and the Institute of Education Sciences, U.S. Department of Education (n.d.).

The task analysis included the following categories and subcategories: problem (problem, target behavior), intervention (description/steps, time/schedule, materials, staff, setting), participants (disability status, race, age/grade, gender, socioeconomic status), and efficacy (results summary, social validity). It included three columns, the first listing the broad categories, the second the subcategories, and the third probing questions related to the category (e.g., Problem—*What problem is the intervention trying to address?).*

Data Collection

Article Coding

Following the completion of each practice activity, data was collected using a feedback from created from the task analysis, titled the Research Article Coding Checklist Feedback Form (see Appendix D). The primary researcher reviewed each student's submission using the Research Article Coding Checklist Feedback Form and an answer key for the assigned article. The feedback form consisted of four columns—the first two outlined the categories and subcategories from the task analysis form, the second had a space for the student's score in that subcategory (1, 0.5 or 1), and the last left a space for comments. If the student provided a complete, correct answer with no incorrect information for a subcategory, they earned a score of 1. If they provided some correct information, but were missing other information, or if they provided some correct information and some incorrect information, they earned a score of 0.5. If they did not address a category, or they provided an incorrect answer, they earned a score of 0. This process was completed for each subcategory. At the conclusion, the points earned were totaled to provide a final score out of a total of 14. It was emphasized to students that this score was not for a course grade, but rather a quantitative score to measure their progress over time on the practice activities.

Mastery criterion was set at a score of 12 out of 14 (85.7%) across three consecutive sessions. Higher levels of mastery criterion result in better maintenance of acquired skills (Fuller & Fienup, 2018). This knowledge, in combination with the context of the study, which was teaching a somewhat subjective skill, determined the 12 out of 14 mastery criterion required the preservice teachers to demonstrate a strong understanding of the skill, while also allowing for some variability in responses against the predetermined answer key.

Pace

A secondary measure, pace of coding, was also collected. Students self-reported their start and end times for each activity. This duration was used in conjunction with the total number of words in the assigned article by dividing the total number of words by the total minutes. The resulting number represented the pace at which the student completed the activity.

Procedure

Baseline

Baseline probes consisted of the students being given a research article (see Appendix E for list of all articles used in baseline, intervention, and maintenance) and a coding sheet (see Appendix F). The coding sheet included the title of the article, a place to record their start and end time for the activity, and the following two prompts: 1) Please summarize the key points of this intervention that you would want to know if you were considering using it with your classroom/student(s). 2) Is there any information the article did not provide that you would want to know? Students submitted their responses via the course's online E-Learning system in a Dropbox.

All participants completed one baseline probe at the start of the semester. An additional probe was completed by all groups who had not yet been exposed to intervention (i.e., in baseline) before any new group began intervention (e.g., Groups 2 and 3 completed a baseline probe the session before Group 2 began intervention). In total, Group 1 completed one baseline probe, Group 2 completed two baseline probes, and Group 3 completed three baseline probes.

Intervention

Intervention began with a BST session (see Appendix G). The BST described the rationale for the coding skill, a description of the steps taken to code a research article,

introduction of the Research Coding Checklist, and modeling of the skill. The Research Coding Checklist was provided to the students in the BST, and subsequent practice sessions, because implementation checklists used in BST have been associated with positive effects (Brock et al., 2017). The BST was developed and delivered by the primary researcher. The BST was delivered in a whole group, lecture-style format.

Next, the students completed their first practice activity. They were given the Research Article Coding Checklist, a research article focusing on an educational practice, and a coding sheet for the article. They completed the practice activity independently and submitted their responses via the course's online E-Learning system in a Dropbox.

Once the students had submitted their practice activity, and before the next practice session, the primary researcher reviewed their responses and provided feedback using the Research Article Coding Checklist Feedback From. If a student earned a score of 1 in a subcategory, the researcher wrote a smiley face in the comments column. If the student earned a score of a 0.5 or 0, the researcher included the correct information from the research article that should have been coded by the student, as well as the article heading under which the student could have found this information. This feedback form was uploaded to the student's Dropbox on the course's online E-Learning system.

At the following practice session, the researcher met with each student one-on-one to review their feedback. The researcher displayed the student's feedback form and reviewed the feedback verbally. After the one-on-one feedback sessions, the group met to review the Research Coding Checklist. They then broke off to work independently on their next practice activity. This cycle of practice and feedback continued until the student met criterion, at which point they no longer participated in the practice and feedback sessions.

Maintenance

Students who met criterion were asked to complete a maintenance probe every four weeks following their last practice session. The maintenance probe consisted of a research article, the same coding sheet as was used previously, as well as the same Research Coding Checklist. Students completed the maintenance probe independently and submitted it to their Dropbox in the course's online E-Learning system. The researcher then reviewed their submission. No feedback was provided to the student. This process was repeated every four weeks until the study was complete.

Data Analysis

Data was analyzed using visual analysis of a line graph, as is standard in single-subject research design (Cooper et al., 2007). Each participant's performance was assessed for level, trend and variability. Participant data was displayed in three phases: (1) baseline probes, (2) intervention, and (3) maintenance probes.

Interobserver Agreement (IOA)

IOA data were collected independently by two researchers. The first was a doctoral candidate in special education, and the primary researcher on this project. The second was a research assistant, a masters-level special education student. The primary researcher provided IOA training to the research assistant. This consisted of a virtual meeting (Webex) where they reviewed all required materials (see Appendix H)—IOA Google Drive Folder (created to share study materials needed to conduct IOA), intervention materials (Research Coding Checklist, coding sheets, articles, article answer keys, Research Coding Checklist Feedback Form), IOA data collection spreadsheet, and the E-Learning database where the preservice teachers submitted their practice activities. The primary researcher modeled how to score an activity, using a

student's practice activity, the Research Coding Checklist, the article and answer key, and the IOA data collection spreadsheet. Time was allotted for questions and clarifications. The research assisstant then independently scored Group 1's first baseline probe (a total of five practice activities) and sent her scores to the primary researcher (these data were not included in the IOA score). The primary researcher reviewed the scores and compared them to her own. They then met to discuss any areas of disagreement. Once 80% or better IOA was reached on the training activity moved forward in conducting IOA for the project.

Forty-six participant activities (baseline, practice, or maintenance) were selected at random for IOA. For the selected activities, both researchers reviewed each student's submission and scored it using the Research Coding Checklist Feedback Form. The two researcher's scores were then compared and an IOA score was calculated. When the two observers disagreed, the score recorded by the primary observer was used.

The total count method was used to calculate IOA (Cooper et al., 2007). Total count IOA compares the total count recorded by each observer in each session. It calculates an IOA score by dividing the smaller of the counts by the larger count and multiplying by 100, resulting in a percentage of agreement between the total number of responses recorded by the two observers. For this study, the total count was the total score on the Research Coding Checklist Feedback Form.

Total count IOA was used because the preservice teachers often formatted their responses on the coding sheet differently. Some wrote their responses in paragraph form, some in bullet form, while others copied the Research Coding Checklist onto their coding form and used this to organize their responses. If they formatted their response using the Research Coding Checklist, they chose a specific subcategory under which to included specific coded information. However,

the subcategory they used often varied between participant responses. For example, if a student noted that the study took place with 5th graders, they may have included this information in the "Participant Age/Grade" subcategory or in the "Setting" subcategory. For the purposes of this study, the researchers were not concerned with where (what subcategory) responses were reported, only that the student had identified the information in the article and included it in their response. Total count IOA best fit this need, as the IOA score did not account for where the information was reported, only that is what included overall.

Social Validity

Social validity examines participants' perceptions of the behaviors targeted in an intervention, whether they are socially significant and demand improvement, and if they find an intervention acceptable, without concern for its effectiveness (Mallott & Shane, 2016). A social validity survey was sent to the participants at the end of this study (see Appendix I) to measure whether participants found the skill of article coding valuable to their teaching career and whether they found the BST to be an acceptable intervention to learn the skill.

The survey was anonymous, conducted via Google Forms (sent via email), and comprised of five questions. Participant responses were requested within one week. The first two used five-point Likert scale for responding, with a score of 5 indicating "strongly agree" and a score of 1 indicating "strongly disagree." The remaining questions were open-ended, soliciting qualitative feedback. The five questions assessed the value the students saw regarding the coding skill and the perception of the BST process. Items on the survey were: 1) Identifying relevant information from (i.e., coding) research articles is a skill that is of value to me in my teaching career, 2) I liked the training process used to teach how to code research articles, 3) Please explain who you do or do not believe coding research articles is a valuable skill for your teaching

career, 4) Please explain what you did and did not like about the process used to teach you how to code research articles, and 5) Any other feedback you would like to provide?

Summary

This study used a multiple probe design to evaluate the use of BST to teach preservice teachers how to code research articles. Undergraduate special education students were recruited to participate. This chapter described participants, the setting the study took place in, the research design and dependent measures, instrumentation and data collection, procedures, data analysis, IOA, and social validity measures. Chapter IV presents the results from implementing the described methodology.

CHAPTER IV

RESULTS

The purpose of this study was to assess the effectiveness of using BST to improve special education preservice teachers' ability to code academic articles to learn about various teaching practices and strategies. The following four questions guided the study:

1. Will BST increase preservice teacher's ability to identify key information in research articles?
2. Will BST decrease the time it takes preservice teachers to identify key information in research articles?
3. Do preservice teachers find coding research articles a skill of value?
4. Do preservice teachers find BST an acceptable way to learn how to code research articles?

Chapter III outlined the methodology, participants, setting, research design, dependent variables, instrumentation and data collection, procedure, data analysis, IOA, and social validity measures. This chapter presents the data that were collected and analyzed. These results are presented using narrative, tables, and figures, and are organized by a summary of overall findings, individual participant data, IOA, and social validity.

Participant Findings

Figure 1 shows the task analysis (TA) scores on the article coding activities for all participants in all sessions. Figure 2 shows the TA scores on the article coding activities and the pace of coding, as measured by words per minute (wpm), for all participants in all sessions.

Summary of Participant Data

Table 2 summarizes the data of all participants. Of the 16 preservice teachers that participated in the study, fourteen successfully completed the BST, scoring a 12 or higher on the article coding TA form in three consecutive sessions. One participant became nonresponsive during the study and another one participant chose to discontinue participation after 10 BST practice sessions.

Participants took an average of 5.94 sessions to complete the BST. Two participants (12.5%) completed the BST in the minimum number of practice sessions possible, three. The maximum number of sessions taken to complete BST was 10, with two participants (12.5%) taking this long. Overall, participants did not show an improvement in pace of coding as a result of BST.

Eleven of the 14 participants (78.6%) who completing the BST also completed a maintenance probe. Ten of these eleven participants (90.9%) maintained criterion levels of performance (score of 12 or above) on the four-week follow up probe. One participant completed a second maintenance probe an additional four weeks (eight weeks total) after the termination of BST and maintained a criterion level of performance.

Coding pace in maintenance varied across participants. Five participants (45.5%) had a coding pace faster than during their BST sessions on their maintenance probe, while one participant (9.1%) had a coding pace slower than during BST.

Table 2

Summary of Participant Data

Participant	# BST Sessions	Met BST Criterion (yes/no)	Coding Pace in Baseline (wpm)	Coding Pace in BST (wpm)	Maintenance Probe TA Score (out of 14)	Coding Pace on Maintenance Probe (wpm)
Participant A	4	Yes	173.56	136 -232	13	123.06
Participant B	7	Yes	218.35	142 - 237	11	186.10
Participant C	10	Yes	260.35	142 - 474	12	282.59
Participant D	5	Yes	169.23	98 - 225	12.5, 12.5	158.96, 194.05
Participant E	10	Yes	157.42	129 - 276	12	305.20
Participant F	10	No	210 - 212	138 - 232	n/a	n/a
Participant G	5	Yes	182-264	114-225	13.5	231.21
Participant H	5	Yes	144 – 148	125 - 170	14	263.10
Participant I	5	Yes	161 - 284	148 - 284	12.5	272.50
Participant J	3	Yes	95 - 124	55 - 120	14	169.56
Participant K	5	Yes	124 - 224	128 - 196	n/a	n/a
Participant L	9	Yes	79 - 251	83 - 261	n/a	n/a
Participant M	3	Yes	155 - 284	143 - 284	13.5	206.22
Participant N	6	No	72 - 195	79 - 241	n/a	n/a
Participant O	3	Yes	129 - 211	124 - 143	13.5	143.96
Participant P	5	Yes	147 - 255	151 - 314	n/a	n/a

Participant A

As shown in that Figure 1, Participant A was in Group 1, completing one baseline probe prior to intervention. She scored well below criterion with a coding score of 3 out of 14. After the initial BST session, her TA score increased to 9 in the first practice session. She scored above criterion in sessions three, four, and five with TA scores of 12.5, 12.5 and 13, respectively. She completed a total of four BST practice sessions before completing the BST.

Participant A's pace of coding was 173.56 wpm in baseline and varied between 136 and 232 wpm in BST practice sessions (see Figure 2). Pace of coding was stable, overall, and did not improve throughout the BST.

Participant A completed one maintenance probe four weeks after her last practice session. She maintenance criterion levels of performance on the article coding TA, with a score of 13/14. Her pace of coding decreased slightly, with a score of 123.06 wpm. Based on the timeline of the study, Participant A should have completed a second maintenance probe, however she did not respond to requests to do so.

Participant B

As shown in Figure 1, Participant B was in Group 1, completing one baseline probe prior to intervention. She scored well below criterion with a coding score of 1 out of 14. After the initial BST session, her TA score increased to 8.5 on the first BST practice activity (session 2). Her TA score continued an increasing trend in sessions three through eight, with the last three scoring at or above criterion. She completed a total of seven practice sessions before completing the BST.

Participant B's pace of coding was 218.25 wpm in baseline and varied between 142 and 237 wpm in practice sessions (see Figure 2). Pace of coding was stable, overall, and did not improve throughout the BST.

Participant B completed one maintenance probe four weeks after her last practice session. Her TA score decreased to just below criterion levels of performance, with a score of 11 out of 14. She was the only participant who scored below criterion on a maintenance probe. Participant B self-reported that she felt the article used for the maintenance probe was the hardest throughout the study. She did not receive feedback regarding her score to prompt this comment. Her pace of coding remained within the same range, with a score of 186.10 wpm.

Participant C

As shown in Figure 1, Participant C was in Group 1, completing one baseline probe prior to intervention. She scored well below criterion, with a coding score of 1 out of 14. After the initial BST session, her TA score increased to 6 on the first practice (session 2). Her TA score had some variability across the following nine sessions, with an overall increasing trend. She met criterion in practice sessions eight, nine, and 10, with scores of 13, 13.5, and 13, respectively. She completed a total of 10 practice sessions before completing the BST.

Participant C had greater variability in her pace of coding, with a pace of 260.35 wpm in baseline and a range of 142 to 474 wpm in practice sessions (see Figure 2). Participant C performed better on the coding TA when she slowed her pace, as evidenced by her later sessions.

Participant C completed one maintenance probe six weeks after her last practice session (delayed due to initial nonresponse by student). Her TA score maintained, with a score of 12 out of 14 and she scored a pace of 282.59 wpm.

Participant D

As shown in Figure 1, Participant D was in Group 1, completing one baseline probe prior to intervention with a coding score of 3 out of 14. After the initial BST session, her TA score remained at 3 out of 14 in the first practice activity (session 2). Following the first round of feedback, she had a positive level change in TA score, scoring a 13 out of 14. She continued to meet criterion in the following three sessions (practice sessions three, four, and five), with scores of 14.5, 12.5, and 13. Although she met the goal of three consecutive sessions at or above 12 by session four, an additional practice session was added to ensure the intervention was not terminated following a decrease in performance. She completed a total of five practice sessions before completing the BST.

Participant D had overall stability in her pace of coding, with a pace of 169.23 in baseline and a range of 98 to 225 wpm in practice sessions (see Figure 2). Participant D's pace of coding did not improve as a result of BST.

Participant D was the only participant to complete two maintenance probes, the first four weeks after her last practice session and the second an additional five weeks later. Her TA score maintained, both with scores of 12.5 out of 14. Her pace of coding in maintenance probes remained within her initial range, with scores of 158.96 and 194.05, respectively.

Participant E

As shown in Figure 1, Participant E was in Group 1, completing one baseline probe prior to intervention with a coding score of 2.5 out of 14. Her TA scores had an increasing trend over the first three BST sessions, with scores of 8.5, 11, and 13, respectively. She then had some slight variability around the goal of 12 in sessions five through eight. She then met and maintained criterion in practice sessions eight, nine, and 10, with scores of 13.5, 12.5, and 12.5. She completed a total of 10 practice sessions before completing the BST.

Participant E had overall stability in her pace of coding, with a pace of 157.42 in baseline and a range of 129 to 276 wpm in practice sessions (see Figure 2). Participant E's pace of coding did not improve as a result of BST. She showed a decreasing trend in her final three practice sessions.

Participant E completed one maintenance probe four weeks after her last practice session. Her TA score maintained, both with a score of 12 out of 14. Her pace of coding on the maintenance probe increased to its highest level throughout the study, with a wpm score of 305.20.

Participant F

As shown in Figure 1, Participant F was in Group 2, completing two baseline probes prior to intervention. She scored a 1.5 and 2.5 out of a total of 14 points on her baseline probes. After beginning BST she showed an increasing trend, with a score of 8.5 on her first BST session. On the following eight BST sessions her TA scores varied around the criterion level of 12 out of 14, with scores of 13, 11, 12, 13, 11, 12, 11, 14, and 11. At the conclusion of 10 BST sessions, Participant F was given the choice to continue or terminate the BST intervention. She was the only participant to face this decision. Participant F chose to discontinue the intervention.

Participant F showed overall stability in her pact of coding, even when TA scores improved (see Figure 2). Her pace throughout the baseline ranged between 210 and 212 wpm and ranged between 138 and 232 wpm in intervention. She had one outlier in session 10, when her pace was 328.00 words per minute.

Participant F did not have an opportunity to complete a maintenance probe due to her choice to discontinue the intervention before criterion had been met.

Participant G

As shown in Figure 1, Participant G was in Group 2, completing two baseline probes prior to intervention. She scored a 1.5 and 2.5 out of 14 on her baselines probes. Upon the introduction of the BST, she had a positive level change, with a score of 11 out of 14 in session 7. Following this she scored 11, 13.5, 13.5, and 14 on the next four BST sessions. Participant G completed a total of five practice activities before completing the BST.

Participant G showed low level slight variability in her pace of coding, despite improvements in TA scores (see Figure 2). Her pace throughout the baseline ranged from 182 to

264 wpm and intervention ranged between 114 and 225 wpm. Participant G's pace of coding did not improve as a result of BST.

Participant G completed one maintenance probe four weeks after her last practice session. Her TA score maintained, both with a score of 13.5 out of 14. Her pace of coding on the maintenance probe also maintained, with a wpm score of 231.21.

Participant H

As shown in Figure 1, Participant H was in Group 2, completing two baseline probes prior to intervention. She scored a 3 out of 14 and 5 out of 14 on her baselines probes. She showed an immediate improvement in her TA score following the introduction of BST, with a score of 11 out of 14. She then scored 13, 14, 13 and 14 on the following BST sessions. Participant H completed a total of five practice activities before completing the BST.

Participant H had a stable pace of coding throughout baseline and intervention, even as TA scores improved (see Figure 2). Her pace throughout the baseline ranged from 144 to 148 wpm and in intervention ranged between 125 and 170 wpm, with one outlier in session 10 (score of 263.38 wpm). Participant H's pace of coding did not improve as a result of BST.

Participant H completed one maintenance probe four weeks after her last practice session. Her TA score maintained, both with a score of 14 out of 14. Her pace of coding on the maintenance probe improved to a level similar to the outlier score in BST session, with a score of 263.10.

Participant I

As shown in Figure 1, Participant I was in Group 2, completing two baseline probes prior to intervention. She scored a 2 and 3.5 out of 14 on her baselines probes. In BST intervention she scored a 10.5 in the first practice session, followed by 12.5, 13.5 and 12.5 in sessions eight

through 10. Although she met the criterion of three consecutive sessions with a score of 12 or above, an additional BST practice session was added to ensure intervention was terminated following a decrease in TA score. Participant I scored a 14 out of 14 on this additional session. She completed a total of five practice activities before completing the BST.

Participant I had a stable pace of coding throughout baseline and intervention, despite improvements in TA scores (see Figure 2). Her pace throughout the baseline range between 161 and 284 wpm and between 148 and 284 wpm in intervention. Participant I's pace of coding did not improve as a result of BST.

Participant I completed one maintenance probe four weeks after her last practice session. Her TA score maintained, both with a score of 12.5 out of 14. Her pace of coding on the maintenance probe remained within her range, with a score of 272.50 wpm.

Participant J

As shown in Figure 1, Participant J was in Group 2, completing two baseline probes prior to intervention. She scored a 2 and 3.5 out of 14 on her baseline probes. Upon the introduction of the BST, she immediately performed at criterion level, with a score of 13.5 out of 14 in session 7. She continued to meet criterion in the following two sessions, with scores of 14 in both. Participant J completed a total of three practice activities, the minimum required, before completing the BST.

Participant J had the lowest pace of all participants throughout the study (see Figure 2). Her pace in baseline ranged between 95 and 124 wpm and between 55 and 120 wpm during intervention. Participant J's pace of coding did not improve as a result of BST.

Participant J completed one maintenance probe four weeks after her last practice session. She earned all possible points with a score of 14 out of 14. Her pace of coding on the maintenance probe was the fastest of all sessions, with a score of 169.56 wpm.

Participant K

As shown in Figure 1, Participant K was in Group 3, completing three baseline probes prior to intervention. She scored a 5, 1, and 2, respectively, on baseline probes. After beginning BST she showed an immediate increase, with a score of 9.5 on her first BST session. On the following four BST sessions her TA scores continued to increase and then stabilize, with scores of 10, 12, 12 and 12. Participant K completed a total of five practice sessions before completing the BST.

Participant K showed a slight decreasing trend in pace of coding as TA scores improved (see Figure 2). Her pace throughout baseline ranged between 124 and 224 wpm and 128 and 196 wpm in intervention. Her pace of coding decreased as a result of BST.

Participant K did not complete BST in time to complete a four-week maintenance probe prior to the conclusion of the study.

Participant L

As shown in Figure 1, Participant L was in Group 3, completing three baseline probes prior to intervention. She scored a 2, 0, and 1.5, respectively, on baseline probes. After beginning BST she showed a positive level change, with a score of 7.5 on her first BST session. On the following eight BST sessions her TA scores continued to increase with slight variability around the goal of 12 out of 14 (scores of 11.5, 11.5, 10.5, 13, 9.5, 12, 12, and 12). Participant L completed a total of nine practice sessions before completing the BST.

Participant L showed a decreasing trend in pace of coding with high variability throughout the study (see Figure 2). Her pace throughout baseline ranged between 79 and 251 wpm and between 83 and 261 wpm in intervention. Overall, her pace of coding decreased as a result of BST.

Participant L did not complete BST in time to complete a four-week maintenance probe prior to the conclusion of the study.

Participant M

As shown in Figure 1, Participant M was in Group 3, completing three baseline probes prior to intervention. She scored a 2.5, 3, and 2 on baseline probes. Upon introduction of BST she immediately hit criterion levels of performance with a score of 12 out of 14 in session 13. She maintained criterion levels on the following two practice activities, with scores of 12 out of 14 and 14 out of 14. Participant M completed a total of three practice sessions before completing the BST, the minimum required.

Participant M had variability in her pace of coding (see Figure 2). Her pace throughout the baseline ranged between 155 and 284 wpm and ranged between 143 and 284 wpm in intervention. Her pace of coding did not improve as a result of BST.

Participant M completed one maintenance probe four weeks after her last practice session. She maintained criterion levels of performance with a score of 13.5 out of 14. Her pace of coding on the maintenance probe maintained, with a score of 206.22 wpm.

Participant N

As shown in Figure 1, Participant N was in Group 3, completing three baseline probes prior to intervention. She scored a 2.5, 2, and 1.5 on baseline probes. After beginning BST she showed an immediate increase in performance, with scores of 10.5, 11.5 and 13 in sessions 13

through 15. Her performance showed greater variability in the following three BST sessions (sessions 16 through 18), with scores of 7.5, 11.5 and 8. Following practice session six, Participant N became nonresponsive. She did not complete the study.

Participant N had showed some variability in her pace of coding (see Figure 2), with a range of 72 to 195 wpm in baseline and range of 79 to 241 wpm in intervention. Her pace of coding did not improve as a result of BST.

Participant N did not have an opportunity to complete a maintenance probe due to her nonresponse before criterion had been met.

Participant O

As shown in Figure 1, Participant O was in Group 3, completing three baseline probes prior to intervention. Her baseline probes were stable, with scores of 2, 2.5, and 2. Upon introduction of BST she immediately hit criterion levels of performance in three consecutive sessions, with scores of 12, 13, and 13 out of 14. Participant O completed a total of three practice sessions before completing the BST, the minimum required.

Participant O had a stable pace of coding (see Figure 2). Her pace throughout the baseline was 129 to 211 wpm and in intervention ranged between 124 and 143 wpm. Her pace of coding did not improve as a result of BST.

Participant O completed one maintenance probe four weeks after her last practice session. She maintained criterion levels of performance with a score of 13.5 out of 14. Her pace of coding on the maintenance probe maintained, with a score of 143.96 wpm.

Participant P

As shown in Figure 1, Participant P was in Group 3, completing three baseline probes prior to intervention. Her baseline probe scores decreased over time, with scores of 6, 2, and 1,

respectively. After beginning BST she showed a slight increase in practice session 1 (session 13), with a score of 7 out of 14. On the following five BST sessions her TA scores increased and stablilized at or above criterion levels, with scores of 12, 13, 12.5, and 14 (sessions 13 through 17). Participant P completed a total of five practice sessions before completing the BST. Three consecutive sessions at or about criterion (12 out of 14) was achieved after four practice sessions, however an additional practice session was added to ensure intervention was not terminated after a decrease in performance.

Participant P showed no improvement in coding pace as a result of BST (see Figure 2). Her pace throughout the baseline phase was 147 to 255 wpm and ranged between 151 and 314 wpm in intervention.

Participant P did not complete BST in time to complete a four-week maintenance probe prior to the conclusion of the study.

Interobserver Agreement

IOA data were collected independently by two researchers using the Research Coding Checklist. Total count IOA was used to calculate agreement between the two researchers. Total count IOA is calculated by dividing the smaller of the two observer's counts (i.e., Research Coding Checklist score) by the larger, and multiplying by 100 (Cooper et al., 2007).

IOA data were collected for 33% of participant practice sessions (n=46) with an overall agreement of 96%. The Research Coding Checklist scores recorded by the two researchers matched perfectly (i.e., 100% agreement) 47.8% of the time (n=22), differed by one point or less 45.7% of the time (n=21), and differed by more than one point 6.5% of the time (n=3). When the two observers disagreed, the score recorded by the primary researcher was used.

Figure 1

Participant Task Analysis Scores

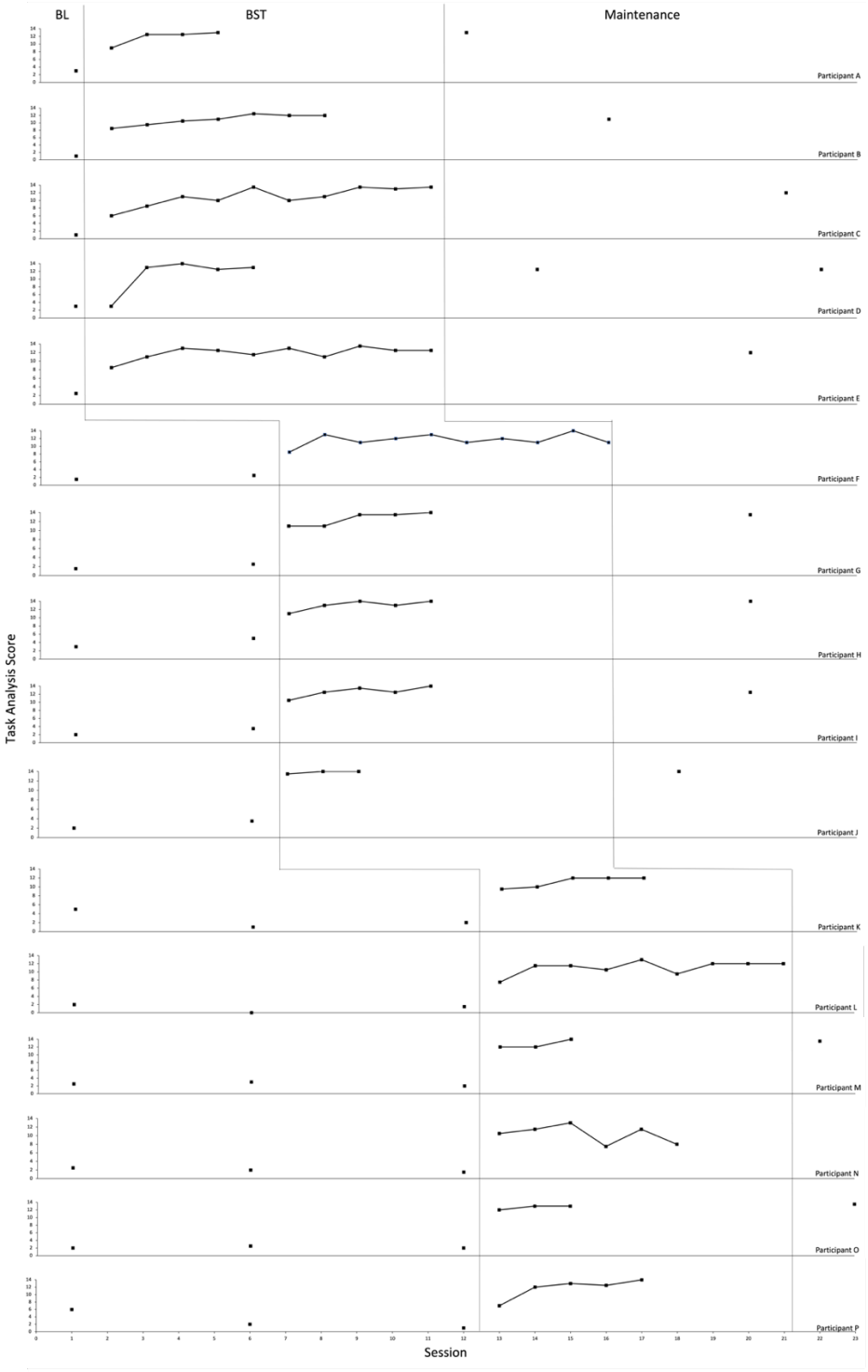
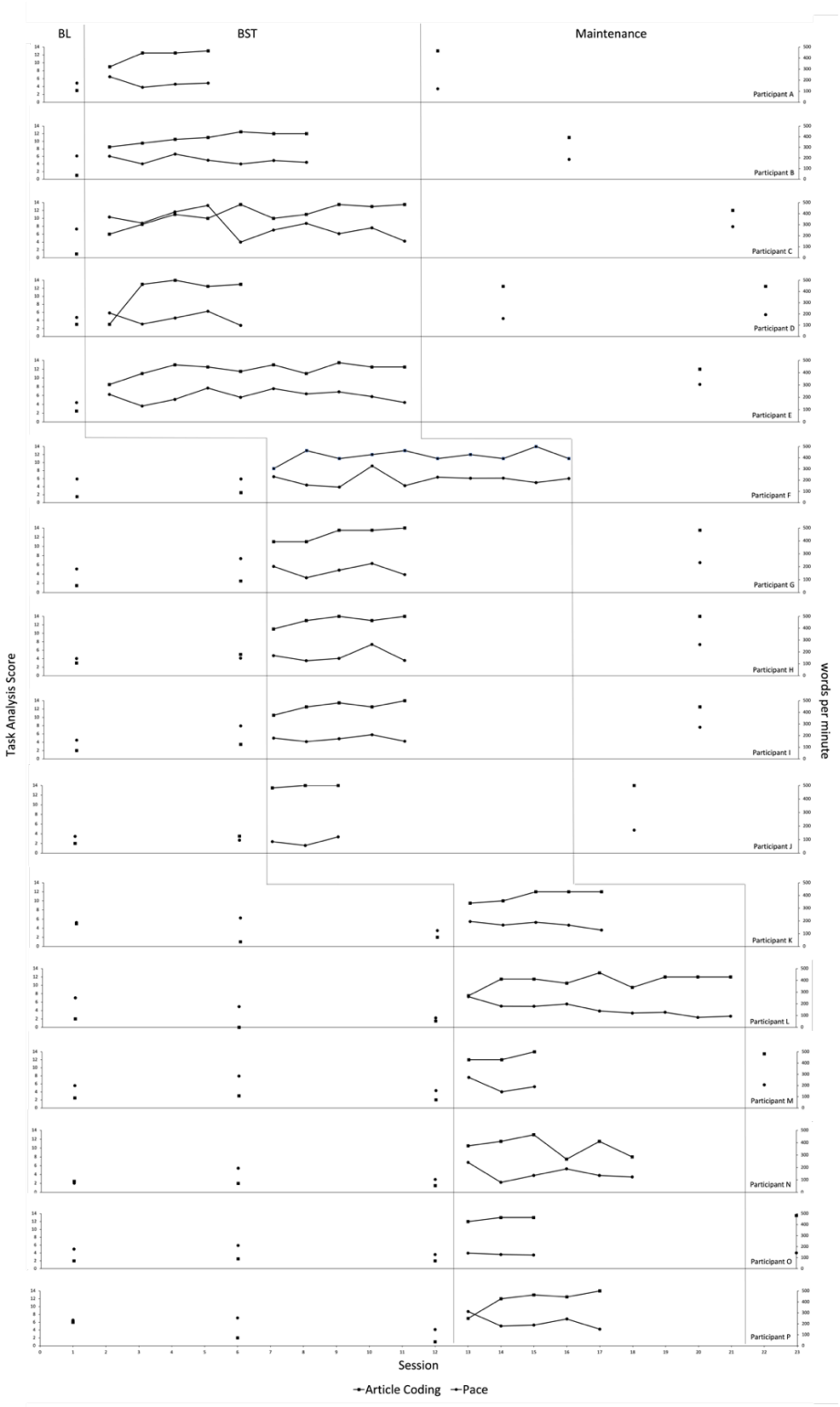


Figure 2

Participant Task Analysis & Coding Pace Scores



Social Validity

The social validity survey was completed by ten out of sixteen participants (62.5%). The results for the quantitative questions (questions 1 and 2) are depicted in Figures 3 and 4 and Table 3. Question 1 asked participants if identifying relevant information from (i.e., coding) research articles is a skill that is of value to them in their teaching career. Of the ten participant responses, the average score was a 4.8 out of 5, indicating strong agreement. Scores ranged between four and five, with a mode of five and no outliers (median=5).

Question 2 asked participants if they liked the intervention process used to teach how to code research articles (i.e., BST). Participant responses were positive overall, with a mean score of 4.6 out of 5, indicating strong agreement. Scores ranged between two and five, with a mode of five. There was one outlier, a score of two, and the median was five.

Figure 3

Responses to Social Validity Survey Question 1

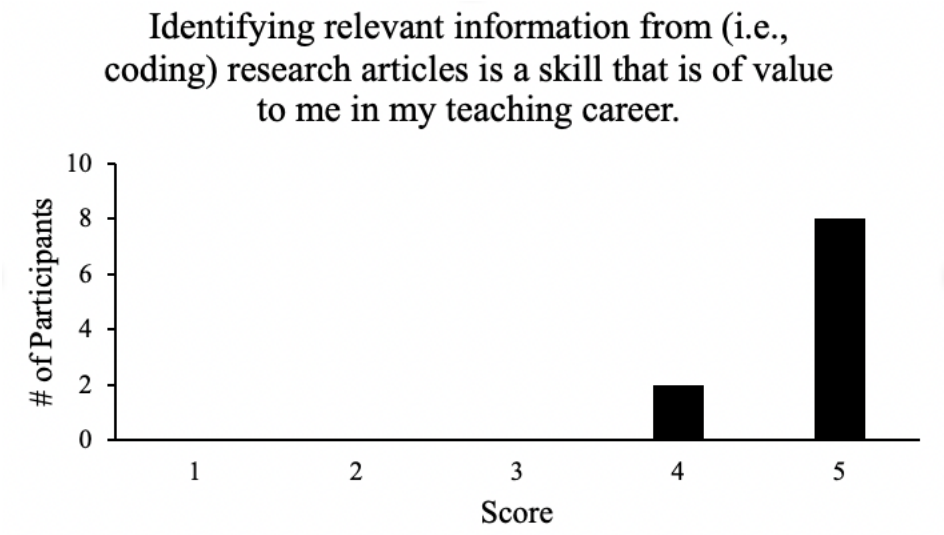


Figure 4

Responses to Social Validity Survey Question 2

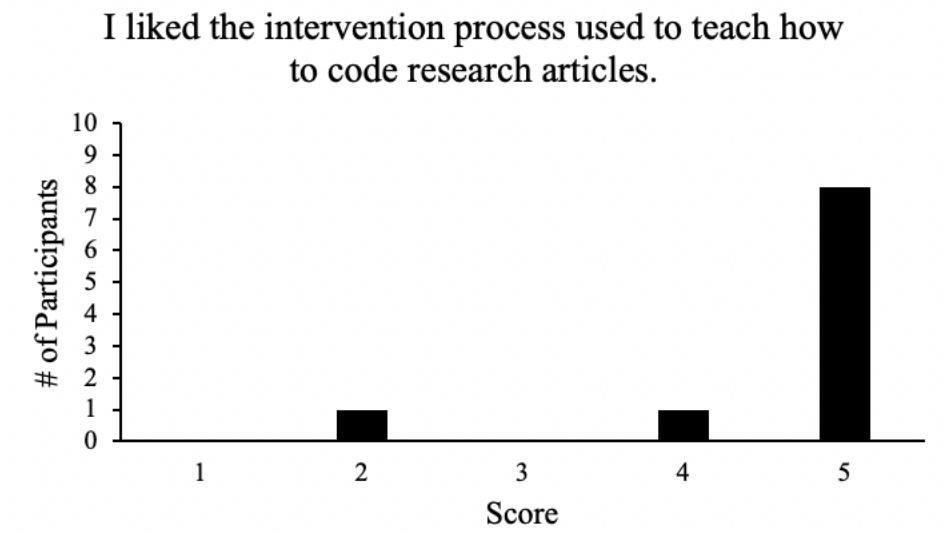


Table 3

Social Validity Results

Question	Mean Score	Median	Mode	Minimum	Maximum	Range
1) Identifying relevant information from (i.e., coding) research articles is a skill that is of value to me in my teaching career.	4.8	5	5	4	5	1
2) I liked the intervention process used to teach how to code research articles.	4.6	5	5	2	5	3

The remaining questions asked participants to give qualitative feedback. Question 3 asked participants to provide comments regarding the value of the coding skill to their teaching career. Responses to Question 3 included five main themes. Listed in order of prevalence they

were: 1) coding helps to find interventions for students, 2) coding helps me to read articles quickly and efficiently, 3) coding helps me to find the important information in a research article, 4) coding helps me further my knowledge of interventions, and 5) coding helps me understand if an intervention with my effective with my student(s).

Question 4 prompted participants to respond with thoughts on what they did and did not like about the process used to teach coding (i.e, BST). Participant responses to this prompt were more varied and included both likes and dislikes of the BST intervention. Responses regarding positives of the BST intervention included the Article Coding checklist, teaching participants where to look for information in the articles, better understanding what information is important in an article and better organization of thoughts, the ability to use this skill with other articles and in other classes, coding allows quicker access to information. Students also noted that the BST process was easy to understand/learn, and they liked that completion of the learning activities was individualized based on student mastery. Some negatives students reported about BST was that the process was redundant and long, the feedback was too specific to the practice article being discussed, and that more initial instruction on what information should be coded would have been beneficial.

Lastly, Question 5 allowed participants to share any other feedback they had regarding the study. Three of the ten student respondents chose to answer this question. They noted that they enjoyed being in the study and that they thought it would help them in their academics and career as an educator.

Summary

Chapter IV presented the findings from the single-case evaluation of the BST instruction on coding research articles. The data on both accuracy of coding (i.e., TA coding scores) and

pace of coding was reviewed. Data were presented using figures, tables, and narratives to organize, summarize and describe the results.

Chapter V provides an overview of the study, a summary of the results, and a discussion of the future implications of this research. A discussion of the limitations of the project and suggestions for future projects will be included.

CHAPTER V

DISCUSSION

Chapter IV reviewed the results of the study. This chapter will discuss the results. The chapter will conclude with an overview of the study, summary of the results, discussion of the findings, considerations of the limitations of the project, suggestions for future projects, and implications for practice.

Overview of the Study

This study evaluated the use of behavioral skills training (BST) to teach preservice teachers how to code research articles for key components of educational strategies and interventions. A multiple probe design was used across three groups of preservice teachers to examine the effects of the intervention and to answer the following questions:

1. Will BST increase preservice teacher's ability to identify key information in research articles?
2. Will BST decrease the time it takes preservice teachers to identify key information in research articles?
3. Do preservice teachers find coding research articles a skill of value?
4. Do preservice teachers find BST an acceptable way to learn how to code research articles?

Summary of the Results

Based on the results of the data analysis, the following findings surfaced. First, the majority of preservice teachers mastered the article coding skill, taking an average of 5.94 BST sessions to reach mastery. Additionally, preservice teachers maintained the article coding skill

over time. Conversely, the BST did not show an effect on the pace at which preservice teachers coded articles.

Regarding preservice teachers' opinions of the article coding skill and the BST instructional cycle, preservice teachers overwhelmingly agreed that coding research articles is a valuable skill for their teaching career. They noted that coding helps them to find interventions for students, helps to read articles quickly and efficiently, helps to find important information in a research article, and helps to understand if an intervention will be effective with their students. Overall, they liked the BST process as an instructional strategy. Specifically, they liked the Article Coding Checklist, thought that the BST instruction was easy to understand, and liked that the completion of the learning activities was individualized and based on student mastery. The preservice teachers did not like everything about the BST, however. Some noted that the process was redundant and long, the feedback was too specific to the practice article being discussed, and that more initial instruction on what information should be coded would have been beneficial.

Discussion of the Findings

The findings from this study suggest that BST is an effective strategy for teaching preservice teachers information literacy skills. BST has been shown in prior studies to effectively improve preservice teachers' skills in the acquisition of evidence-based practices (EBPs; Kirkpatrick et al., 2019; Kirkpatrick et al., 2020; Sawyer et al., 2017). This study adds to the support for the use of BST with this population and the expansion of its use to skills beyond EBPs.

Preservice teachers responded that they value IL skills and see them as applicable to their teaching practice. Additionally, they reported a benefit of their acquired IL skills in their other

college courses. This has been an area of research in prior studies (e.g., Crouse & Kasbohm, 2004; Floyd et al., 2008; Rockman, 2003), where IL instruction was shown to benefit students' college performance. Emmons and colleagues (2009) also found that the preservice teachers in their study demonstrated better academic skills both in and across coursework in their teacher preparation program following IL instruction.

While prior studies have investigated IL instruction in collaboration with university librarians (Asselin & Lee, 2002; van Ingen & Ariew, 2015), this study demonstrated the ability to provide IL instruction within a content area course taught by department faculty. Further, Emmons and colleagues (2009) investigated IL instruction with preservice teachers across a four-semester course sequence. Although this macro-level planning is important at the departmental and program levels, it is necessary to explore how IL instruction can be taught within the courses. This study did so.

Limitations

As in all applied research, limitations emerged throughout the course of this study and analysis. As the semester progressed, some inconsistencies emerged in the BST instructional cycle. The study took place throughout the COVID-19 pandemic, which led to inconsistencies in the modality in which students attended class. The class regularly met in-person for the first 11 weeks of the semester. Within these weeks, some students would participate virtually, per university policy, due to COVID-19 exposure or a positive test result. These virtual instruction days varied between participants. The remaining four weeks of the semester were held entirely virtually, per university policy. This may have impacted the BST instruction and feedback cycle, particularly for the third group. Based on these factors, the impact of virtual versus in-person BST instruction is not known.

Other limitations of the study included inconsistencies in the time delay between the BST steps. This most often impacted the time delay between feedback and the following practice session. Some students stayed in class and completed the next practice activity within 30 minutes of their one-on-one feedback sessions. Others, most often due to a student's work schedule or if a student was participating virtually, would wait until anywhere from one to 48 hours following a feedback session to complete their practice activity. This may have impacted their response to the intervention. For example, Participants C and E both left for work and completed their practice activities later in the day or the following day. Both participants took the maximum number of practice sessions, 10, to reach mastery.

Another consideration is the variability in reading levels of the articles. The articles chosen for the study were chosen based on their intervention topic and were not screened for format or reading level. This was done to mimic the scenario in which a teacher may use the article coding skill. For example, if a teacher had a student who was struggling with on-task behavior, they may look for articles that discuss interventions for this challenging behavior. The goal of this study was to provide preservice teachers with the skills to read any article that the encounter on that topic effectively and efficiently, regardless of format or reading level. However, these variances may have impacted participants' performance.

The BST intervention included the use of the Research Coding Checklist because implementation checklists used in conjunction with BST have been associated with positive effects (Brock et al., 2017). This study did not, however, assess the preservice teachers' ability to code for the identified key information without the use of the coding checklist. As the goal of the study is to equip preservice teachers with the skills to access the literature base in their applied practice, working to fade the use of the Research Coding Checklist would be of value.

Finally, participants who completed a maintenance probe (68.8%) performed well, with all but one maintaining mastery. However, maintenance probes were complete four to eight weeks following completion of the BST instruction. This maintenance data is limited, as four weeks is not a substantial amount of time.

The social validity survey was also of limited value as the response rate was low (62.5%). The social validity survey was sent at the end of the semester and participants had one week to respond. The end of the semester is a busy time for most students as they have final projects, papers, and exams, and are often fatigued from the work of the semester. This low response rate leaves to question the feedback that may have been provided by the non-respondents.

Further Exploration

Based on the limitations that were encountered, as well as overall discussion of the study, there are several opportunities for further exploration. First, in response to the variance between in-person and virtual BST instruction, it would be of interest to control for the modality of instruction and assess results. This may be especially important as many universities, even post COVID-19 pandemic, are moving more classes to virtual formats.

This study should also be replicated and more tightly control for the time delay between the steps of the BST. Performance by Participants C and E suggest that extended time between BST steps, particularly feedback and following practice sessions, may have an impact on response to the intervention. Formal evaluation of this should be conducted.

The variability in articles' reading level and formatting is another area with potential for exploration. Although preservice teachers should be prepared to evaluate articles of varied levels and formatting, tailoring instruction and feedback for different types may allow the BST to be more precise. This would also respond to some of the criticisms of the BST that were provided

in the social validity survey. Particularly, that the BST process was redundant and long and that more initial instruction on what information should be coded would have been beneficial. Addressing these criticisms may improve participant opinion of and investment in the intervention.

Working to fade the use of the Research Coding Checklist may also be of interest. This supplemental support was well like by the preservice teachers, as reported in the social validity survey. However, its use may not be realistic in the applied setting. Preservice teachers' ability to maintain the coding skill in the absence of this support should be explored.

As the semester in which the study was conducted was only fifteen weeks long, opportunity for maintenance data was limited. The article coding skill is especially important as preservice teachers enter the field. Collecting maintenance data at a longer time delay, perhaps even a year or more after as preservice teachers complete their end of program internship or enter their first year of teaching, would be of interest. Additional feedback regarding the value of the article coding skill at these times would be of interest as well.

As several participants reported a benefit of the article coding BST for their ability to read and evaluate articles in their other coursework, more formal evaluation of this effect should be explored. This should include evaluation on assigned readings and activities in other courses, but also may include performance on more formalized assessments, such as teacher certification tests.

With that in mind, additional work should be done in preservice teachers' application of the skills learned. As pointed out by Kirkpatrick and colleagues (2019) and Kirkpatrick and colleagues (2020), these skills are not of value if they are not applied beyond the college classroom. Whether or not preservice teachers implement the interventions and strategies that

learn about through their article coding, and to what level of fidelity they implement, should be explored.

Along these lines, evaluation of this BST protocol could be done with in-service teachers. As reviewed in chapter two, many practicing teachers report a lack of skills and confidence in accessing research (e.g., Landrum et al., 2007; Lastrapes & Mooney, 2020; Williams & Coles, 2007). These teachers are the ones currently in the field and federally mandated to implement scientifically based practices (ESSA, 20 U.S.C. § 6301 *et seq.*, 2015; IDEIA, 20 U.S.C. § 1400 *et seq.*, 2004). It is vital that they, as well as preservice teachers, have these skills.

Finally, the BST variables of the protocol could be altered and evaluated. One idea is to teach one component of the Article Coding Checklist at a time, rather than all items simultaneously. For example, participants could first be taught how to identify the problem and target behavior. Once they have mastered this, they would be taught to code for intervention characteristics (description/steps, time/schedule, materials, staff, setting). It would be interesting to see if this level of scaffolding would accelerate the BST process or delay it.

The BST protocol in this intervention did not influence pace of coding. Pace is important because time spent accessing and evaluating research articles is one of the reported barriers by practicing teachers (Williams & Coles, 2007). Even if teachers have mastered coding for all items on the checklist, if it requires a substantial amount of time, they are unlikely to engage in the behavior.

Lastly, two students required 10 BST practice sessions to meet mastery and one student never reached mastery. This is a considerable amount of time if IL instruction is being integrated into existing content courses. Exploring additional interventions that could be combined with the BST for participants who are not responding, or are responding more slowly, may be of value.

Implications for Practice

The evaluated BST protocol was effective in teaching preservice teachers how to code articles for key components of educational research articles. BST is a highly adaptable instructional strategy (Kirkpatrick et al., 2019). With the demonstrated need for IL instruction with preservice teachers (ACRL, 2011; CAEP, 2013; Landrum et al., 2007; Lastrapes & Mooney, 2020; Williams & Coles, 2007) it is only sensible that this work be integrated into preservice education courses. As programs of study and courses vary greatly between teacher preparation programs, it may manifest differently amongst them. However, dedicated time and efforts to preparing teachers with IL skills is needed. This work could be integrated into fieldwork or practicum courses, where it could then be extended to include application of the strategies found in the research base. It could also be integrated into theory and methods coursework, where preservice teachers are required to cover a large load of content and have extensive reading assignments.

This study also provided another example of the effectiveness of BST with preservice teachers (Brock et al. 2017; Kirkpatrick et al., 2019; Kirkpatrick et al., 2020; Sawyer et al., 2017). BST sets itself apart from didactic instruction due to its opportunities for practice and feedback, as well as a mastery criterion based on performance (Kirkpatrick et al., 2019). Integrating these components into traditional content area courses may help to improve preservice teachers' acquisition of new content and skills, as well improve procedural integrity, generalization, and maintenance.

Conclusion

This study examined the effect of a BST intervention of preservice teachers' ability to code research articles for key components of educational strategies and interventions. Results

suggest that the BST intervention was successful in improving preservice teachers' coding skills. Additionally, most of the preservice teachers found the coding skill of value to their teaching career and found the BST instructional strategy to be beneficial. The BST intervention did not effect the pace of the preservice teachers' pace of article coding, an area for further exploration. This study supports the use of BST with preservice teachers and the integration of IL instruction in teacher preparation programs.

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Appendix A

Informed Consent

Western Michigan University
Department of Special Education and Literacy Studies

Principal Investigator: Dr. Sarah Summy, Ed.D.
Student Investigator: Rena VanDerwall, M.A.
Title of Study: Using Behavioral Skills Training to Teach Preservice Teachers How to Code Articles and Apply New Strategies

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. The purpose of the research is to assess the effectiveness of using behavioral skills training to learn about and apply various teaching practices. If you take part in the research, you will be asked to perform your regular course assignments. There is no time commitment above and beyond the time you're required to spend on these assignments during regular course activities. There are no identified potential risks for participating in this study. Potential benefits of taking part may be the development of skills to be an effective teacher. Your alternative to taking part in the research study is not to take part in it.

You are being invited to participate in this research project titled "Using Behavioral Skills Training to Teach Preservice Teachers How to Code Articles and Apply New Strategies " and the following information in this consent form will provide more detail about the research study. Please ask any questions if you need more clarification and to assist you in deciding if you wish to participate in the research study. You are not giving up any of your legal rights by agreeing to take part in this research or by signing this consent form. After all of your questions have been answered and the consent document reviewed, if you decide to participate in this study, you will be asked to sign this consent form.

What are we trying to find out in this study?
The purpose of this project is to assess the effectiveness of using behavioral skills training to teach preservice teachers about various teaching practices. We are trying to figure out if learning how to code education focused research articles benefits teaching knowledge and practice. We want you to immediately benefit from your involvement in this study. We also want preservice teachers and faculty that are not directly involved in the project to benefit from the findings obtained from this study.

Who can participate in this study?
You are being invited as a participant because you are an undergraduate special education preservice teacher currently enrolled in SPED 3710 and SPED 3750.

Where will this study take place?
The project will take place within the SPED 3710 and SPED 3750 courses (on-campus and/or online, pending Covid-19 restrictions).

WESTERN MICHIGAN UNIVERSITY

IRB Approved

DEC 23 2020

WMU IRB Office

If you are willing to have your data used for this project, then please indicate your consent by signing and dating in the space provided below. Your decision whether or not to take part will not affect your current or future involvement with the Special Education program or coursework. If you decide to participate, you are still free to change your mind and discontinue participation at any time. Should you have any questions prior to or during the study, you can contact researchers, Dr. Sarah Summy or Rena VanDerwall at (269) 352-3045, (269) 377-2605 or at sarah.summy@wmich.edu or rena.m.livingston@wmich.edu. You may also contact the Chair, Human Subjects Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.

I have read this informed consent document. The risks and benefits have been explained to me. I provide consent for the following information to be used by Dr. Sarah Summy and Rena VanDerwall:

_____

Please Print Your Name

_____ _____

Participant's signature Date

What is the time commitment for participating in this study?
There is no time commitment above and beyond the time you spend on regular course activities and requirements.

What will you be asked to do if you choose to participate in this study?
If you choose to participate in this project, you will not be asked to do anything above and beyond regular course requirements.

What information is being measured during the study?
Data will be collected on your engagement in target behaviors, as observed through your course assignments.

What are the risks of participating in this study and how will these risks be minimized?
Participation in this project does not involve any known risks, discomfort, or inconvenience.

What are the benefits of participating in this study?
The primary objective of this project is to assess impact of participating in behavioral skills training on your teaching knowledge and practice.

Are there any costs associated with participating in this study?
There are no costs associated with participating in this study.

Is there any compensation for participating in this study?
There is no compensation for participating in this study.

Who will have access to the information collected during this study?
The researchers listed above will be collecting data for this project. For any individual, identifiable information will not be disclosed. The researchers will keep your records for this project private in a secure location at Western Michigan University. We may present the information for this project at meetings, conferences, trainings, in publications, for grant applications, or for doctoral dissertation. All participant data will be de-identified.

What will happen to my information or biospecimens collected for this research after the study is over?
After information that could identify you has been removed, de-identified information collected for this research may be used by or distributed to investigators for other research without obtaining additional informed consent from you.

What if you want to stop participating in this study?
Your participation in this project is voluntary. You do not need to sign this consent form in order for you to continue in your coursework. You can choose to stop participating in the study at any time, for any reason, and you will not suffer any prejudice or penalty. The investigator can also decide to stop your participation in the study without your consent.

Appendix B

Human Subject Intuition Review Board Approval Letter

WESTERN MICHIGAN UNIVERSITY

Human Subjects Institutional Review Board

Date: December 23, 2020

To: Sarah Summy, Principal Investigator
Rena VanDerwall, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair

Re: IRB Project Number 20-12-23

This letter will serve as confirmation that your research project titled "Using Behavioral Skills Training to Teach Preservice Teachers How to Code Articles and Apply New Strategies" has been **approved** under the **expedited** category of review by the Western Michigan University Institutional Review Board (IRB). The conditions and duration of this approval are specified in the policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved.
You must seek specific board approval for any changes to this project (e.g., ***add an investigator, increase number of subjects beyond the number stated in your application, etc.***). Failure to obtain approval for changes will result in a protocol deviation.

In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the IRB for consultation.

The Board wishes you success in the pursuit of your research goals.

A status report is required on or prior to (no more than 30 days) December 22, 2021 and each year thereafter until closing of the study. The IRB will send a request.

When this study closes, submit the required Final Report found at https://wmich.edu/research/forms.

Note: All research data must be kept in a secure location on the WMU campus for at least three (3) years after the study closes.

251 W. Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293, FAX: (269) 387-8276

Appendix C

Research Coding Checklist

Research Article Coding Checklist

Problem	☐ **Problem**	*What problem was the intervention trying to address?*
	☐ **Target Behavior**	*What behavior(s) did the intervention target?*
Intervention	☐ **Description/Steps**	*What steps or guidelines were provided for implementing this intervention?*
	☐ **Time/Schedule:**	*How often was the intervention implemented? How long does it take?*
	☐ **Materials**	*What materials were used?*
	☐ **Staff**	*What staff were involved?*
	☐ **Setting**	*In what setting was the intervention implemented (type of classroom, whole group/small group/one-on-one, etc.)?*
Participants	☐ **Disability Status**	*Did the article provide information on the disability status of the students? If so, what disabilities were they identified with?*
	☐ **Race**	*Did the article provide information on the race of the students? If so, what were they?*
	☐ **Age/Grade**	*Did the article provide information on the age or grade of the students? If so, what were they?*
	☐ **Gender**	*Did the article provide information on the gender of the students? If so, what were they?*
	☐ **Socioeconomic Status (SES)**	*Did the article provide information on the SES of the students? If so, what were they?*
Efficacy	☐ **Results Summary**	*In a few words, what were the results of the study? Was the intervention effective or not?*
	☐ **Social Validity**	*Did the article discuss if the participants liked the intervention? If so, what did they like or not like?*

Appendix D

Research Article Coding Checklist Feedback Form

Research Article Coding Checklist

Scoring Key	
1	Complete, correct answer with no incorrect information
0.5	Some correct answer but missing parts of the answer OR Some correct answer with some incorrect answer
0	Did not address OR Incorrect answer

Problem	☐ **Problem**		
	☐ **Target Behavior**		
Intervention	☐ **Description/Steps**		
	☐ **Time/Schedule:**		
	☐ **Materials**		
	☐ **Staff**		
	☐ **Setting**		
Participants	☐ **Disability Status**		
	☐ **Race**		
	☐ **Age/Grade**		
	☐ **Gender**		
	☐ **Socioeconomic Status (SES)**		
Efficacy	☐ **Results Summary**		
	☐ **Social Validity**		
Score: /14		**Time: wpm**	

Appendix E

Research Article Library

Research Article Library

Activity	Article Citation
Baseline Probe 1	Aspiranti, K. B., Bebech, A., Ruffo, B. & Skinner, C. H. (2018). Classroom management in self-contained classrooms for children with autism: Extending research on the color wheel system. *Behavior Analysis in Practice*, *12*(1), 143–153. https://doi.org/10.1007/s40617-018-0264-6
Baseline Probe 2 & Maintenance Probe 2	Floress, M.T., Rock, A.L. & Hailemariam, A. (2017), The caterpillar game: A classroom management system. *Psychology in the Schools, 54*(4), 385-403. https://doi.org/10.1002/pits.22000
Baseline Probe 3	Robacker, C. M., Rivera, C. J., & Warren, S. H. (2016). A token economy made easy through ClassDojo. *Intervention in School and Clinic, 52*(1), 39–43. https://doi.org/10.1177/1053451216630279
Practice Activity 1	George, C. L. (2010). Effects of response cards on performance and participation in social studies for middle school students with emotional and behavioral disorders. *Behavioral Disorders, 35*(3), 200–213. https://doi.org/10.1177/019874291003500302
Practice Activity 2	Blood, E., Johnson, J., Ridenour, L., Simmons, K. & Crouch, S. (2011). Using an iPod touch to teach social and self-management skills to an elementary student with emotional/behavioral disorders. *Education and Treatment of Children, 34*(3), 299-321. https://doi.org/ 10.1353/etc.2011.0019
Practice Activity 3	Axelrod, M. I., Bellini, S.,& Markoff, K. (2014). Video self-modeling: A promising strategy for noncompliant children. *Behavior Modification*, *38*(4), 567–586. https://doi.org/10.1177/0145445514521232
Practice Activity 4	McDaniel, S.C., Bruhn, A.L. & Troughton, L. (2017). A brief social skills intervention to reduce challenging classroom behavior. *Journal of Behavioral Education, 26*(1), 53-74. https://doi.org/10.1007/s10864-016-9259-y
Practice Activity 5	Ramsey, M., Jolivette, K., Patterson, D. & Kennedy, C. (2010). Using choice to increase time on-task, task-completion, and accuracy for students with emotional/behavior disorders in a residential facility. *Education and Treatment of Children, 33*(1), 1-21. https://doi.org/10.1353/etc.0.0085.
Practice Activity 6	Rush, K.S., Golden, M.E., Mortenson, B.P., Albohn, D. & Horger, M. (2017). The effects of a mindfulness and biofeedback program on the

	on- and off-task behaviors of students with emotional behavioral disorders. *Contemporary School Psychology, 21*(4), 347-357. https://doi.org/10.1007/s40688-017-0140-3
Practice Activity 7	Fabiano, G.A., Vujnovic, R.K., Pelham, W.E., Waschbusch, D.A., Massetti, G.M., Pariseau, M.E., Naylor, J., Yu, J., Robins, M., Carnefix, T., Greiner, A.R., & Volker, M. (2010). Enhancing the effectiveness of special education programming for children with attention deficit hyperactivity disorder using a daily report card. *School Psychology Review, 39*(2), 219–239. https://doi.org/10.1080/02796015.2010.12087775
Practice Activity 8	Collins, T.A., Hawkins, R.O., Flowers, E.M., Kalra, H.D., Richard, J. & Haas, L.E. Behavior bingo: The effects of a culturally relevant group contingency intervention for students with EBD. *Psychology in the Schools, 55*(1), 63-75. https://doi.org/10.1002/pits.22091
Practice Activity 9	Losinski, M., Ennis, R. P. & Shaw, A. (2021). Using SRSD to improve the fraction computations of students with and at-risk for EBD. *Behavioral Disorders, 46*(2), 108–119. https://doi.org/10.1177/0198742920912737
Practice Activity 10	Schoenfeld, N.A., & Mathur, S.R. (2009). Effects of cognitive-behavioral intervention on the school performance of students with emotional or behavioral disorders and anxiety. *Behavioral Disorders, 34*(4), 184–195. https://doi.org/10.1177/019874290903400401
Maintenance Probe 1	Denune, H., Hawkins, R., Donovan, L., Mccoy, D., Hall, L. & Moeder, A. (2015), Combining self-monitoring and an interdependent group contingency to improve the behaviors of sixth graders with EBD. *Psychology in the Schools, 52*(6), 562-577. https://doi.org/10.1002/pits.21846

Appendix F

Sample Coding Sheet

Title of Article: THE CATERPILLAR GAME: A CLASSROOM MANAGEMENT SYSTEM

Start Time:
End Time:

Directions:
Read the assigned article and answer the questions below. Feel free to mark up the pdf of the article any way you would like (e.g., highlight, margin notes, etc.). Submit your marked article and answers to the following questions to the assigned Dropbox.

Don't forget to write the start and end time to record the time you worked on this assignment!

1. **Please summarize the key points of this intervention that you would want to know if you were considering using it with your classroom/student(s).**

2. **Is there any information the article did not provide that you would want to know?**

Appendix G

Behavioral Skills Training Protocol

Behavioral Skills Training:

Research Article Coding

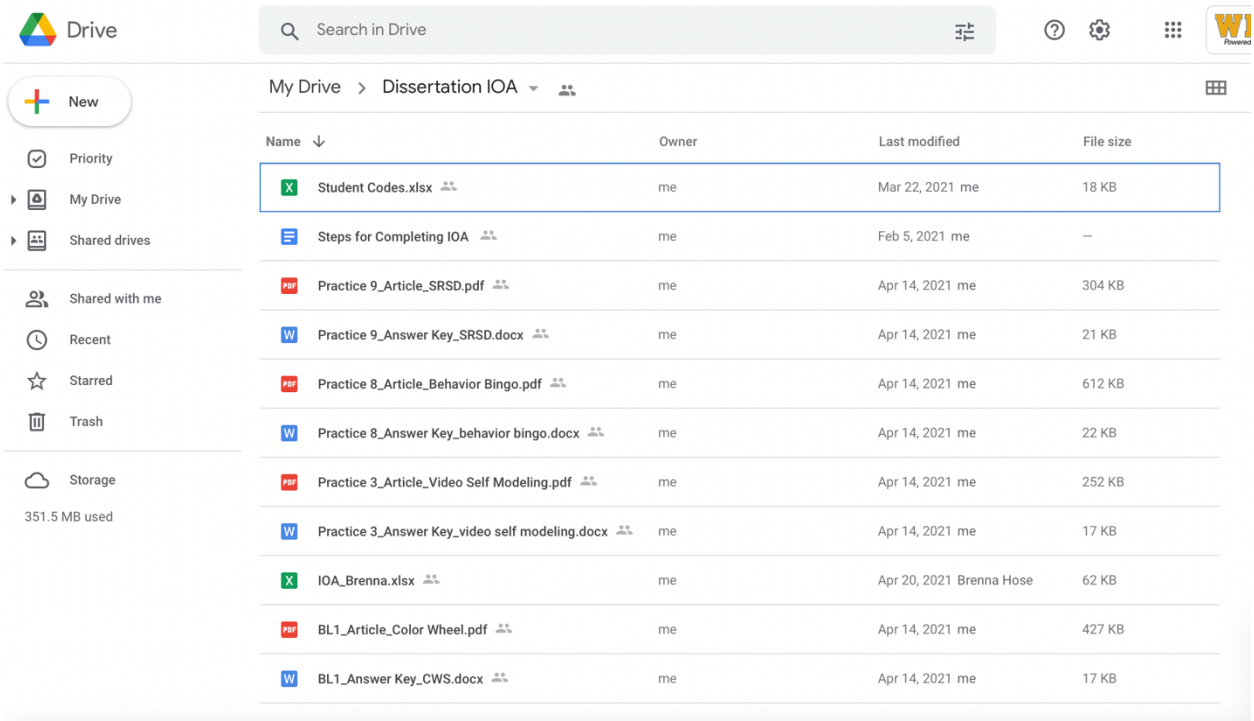
BST Steps		Trainer Response
1	**Rational**	• Documented research to practice gap in the field of education • You will encounter new challenges all the time as a special educator, need to have a way to add to your toolbox • Research provides us with evidence of which strategies are successful, when, how, and with who • Teacher time is limited • Research articles can be intimidating • Need to be able to access and implement research-based practices quickly
2	**Description** of target skills	Review checklist for coding a research article. • Allows us to focus on key information for implementation • Allows us to be quick/efficient

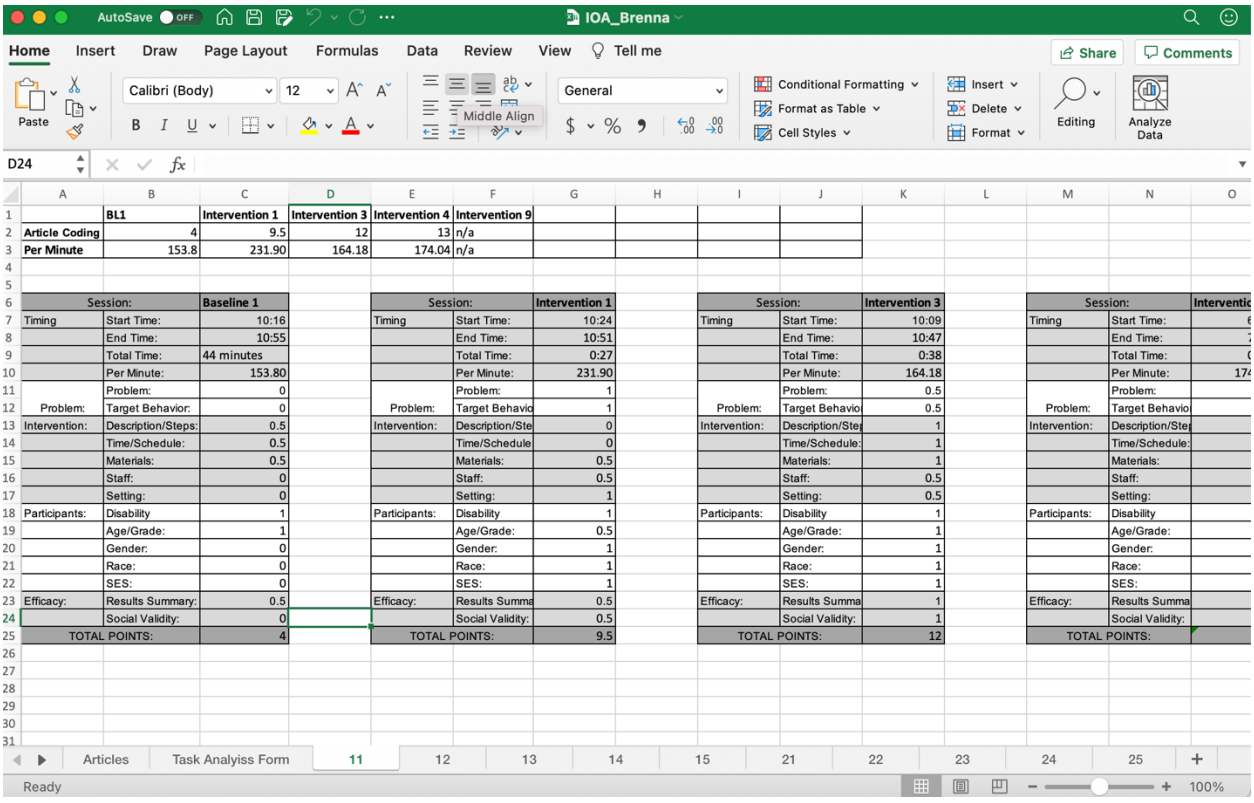
3	**Model**	• Orient to article
		  ○ title and abstract
		  ○ headings
		• Where to find info in article
		• Highlight/notes in margin → Write down in blank form

4	**Practice/Rehearsal**	• Have them practice with article • Turn in for feedback
5	**Feedback** [Positive and corrective]	Give time to review and discuss next class period • Use checklist to provide feedback • Positive feedback comments • Corrective feedback comments • Upload to E-Learning Dropbox
6	**Repeat** steps 4 & 5 until mastery	

Appendix H

Interobserver Agreement Training Materials





	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		BL1	Intervention 1	Intervention 3	Intervention 4	Intervention 9									
2	Article Coding	4	9.5	12	13	n/a									
3	Per Minute	153.8	231.90	164.18	174.04	n/a									
4															
5															
6	Session:		Baseline 1		Session:		Intervention 1		Session:		Intervention 3		Session:		Intervenic
7	Timing	Start Time:	10:16		Timing	Start Time:	10:24		Timing	Start Time:	10:09		Timing	Start Time:	
8		End Time:	10:55			End Time:	10:51			End Time:	10:47			End Time:	
9		Total Time:	44 minutes			Total Time:	0:27			Total Time:	0:38			Total Time:	
10		Per Minute:	153.80			Per Minute:	231.90			Per Minute:	164.18			Per Minute:	174
11		Problem:	0			Problem:	1			Problem:	0.5			Problem:	
12	Problem:	Target Behavior:	0		Problem:	Target Behavio	1		Problem:	Target Behavio	0.5		Problem:	Target Behavio	
13	Intervention:	Description/Steps:	0.5		Intervention:	Description/Ste	0		Intervention:	Description/Ste	1		Intervention:	Description/Ste	
14		Time/Schedule:	0.5			Time/Schedule	0			Time/Schedule:	1			Time/Schedule:	
15		Materials:	0.5			Materials:	0.5			Materials:	1			Materials:	
16		Staff:	0			Staff:	0.5			Staff:	0.5			Staff:	
17		Setting:	0			Setting:	1			Setting:	0.5			Setting:	
18	Participants:	Disability	1		Participants:	Disability	1		Participants:	Disability	1		Participants:	Disability	
19		Age/Grade:	1			Age/Grade:	0.5			Age/Grade:	1			Age/Grade:	
20		Gender:	0			Gender:	1			Gender:	1			Gender:	
21		Race:	0			Race:	1			Race:	1			Race:	
22		SES:	0			SES:	1			SES:	1			SES:	
23	Efficacy:	Results Summary:	0.5		Efficacy:	Results Summa	0.5		Efficacy:	Results Summa	1		Efficacy:	Results Summa	
24		Social Validity:	0			Social Validity:	0.5			Social Validity:	1			Social Validity:	
25	TOTAL POINTS:		4		TOTAL POINTS:		9.5		TOTAL POINTS:		12		TOTAL POINTS:		
26															
27															
28															
29															
30															
31															

Appendix I

Social Validity Survey

Research Project Feedback

Please answer the following questions to provide your feedback on the research project. Your answers are anonymous. I appreciate you taking the time!

* Required

1. Identifying relevant information from (i.e., coding) research articles is a skill that is of value to me in my teaching career. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

2. I liked the intervention process used to teach how to code research articles. *

Mark only one oval.

	1	2	3	4	5	
Strong Disagree	◯	◯	◯	◯	◯	Strongly Agree

3. Please explain why you do or do not believe coding research articles is a valuable skill for your teaching career. *

4. Please explain what you did and did not like about the process used to teach you how to code research articles. *

5. Any other feedback you would like to provide?