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Naturalistic Instructional Approaches in the Early Childhood Inclusive Classroom

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NATURALISTIC INSTRUCTIONAL APPROACHES IN THE EARLY CHILDHOOD INCLUSIVE CLASSROOM

A Thesis

Presented to the

Faculty of

California State University,

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by

Maranda Martinez

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ABSTRACT

As a result of the new Individuals with Disabilities Education Improvement Act (IDEIA), states are required to provide students with disabilities high quality education in the Least Restrictive Environment (LRE) to the greatest extent possible. Many students are now being educated alongside their general education peers in blended classrooms. Co-teaching has become a practical strategy to provide high-quality, individualized, and specialized education within blended classrooms. However, studies have shown that early childhood educators are not prepared to teach students with disabilities. Naturalistic instructional approaches are an evidence-based practice that can be utilized by early childhood inclusive co-teachers to teach important skills to students with and without disabilities. In the current review, I will provide an in-depth review of the literature on naturalistic instructional approaches and provide practical strategies for administrators, teachers, and paraeducators in the proper implementation of naturalistic instructional approaches.

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CHAPTER ONE

INTRODUCTION

Statement of the Problem

Many children with disabilities are now being educated alongside their general education peers in inclusive classrooms. Educators require training and support to ensure that students with disabilities are receiving high quality, specialized, and individualized instruction within the general education setting. Naturalistic instructional approaches are an evidence-based practice that educators can use to teach important skills during ongoing classroom activities. Naturalistic instructional can be utilized to teach a variety of skills including literacy, writing, math, functional, social, and communication skills. For example, authors utilized naturalistic instructional approaches to teach pre-academic skills (Rakap, 2019), phonological skills (Botts et al., 2014; Culatta et al., 2003; 2007), math skills (Daugherty, Grisham-Brown, & Hemmeter, 2001; Davenport & Johnston, 2015), and pre-writing skills (Grisham-Brown et al., 2006; 2009). Authors also taught social skills (Grisham-Brown et al., 2000; Kohler et al., 1997; 2001; Macy & Bricker, 2007) with naturalistic instructional approaches.

Naturalistic instructional approaches were introduced in the 1970s and has been heavily researched over the past 20 years; however, studies have shown that while teachers are aware of naturalistic instructional approaches, they rarely use these strategies without systematic training and support. To ensure that educators are utilizing evidence-based and high quality teaching approaches

in the inclusive early childhood classroom, administrators should provide training on naturalistic instructional approaches and then provide on the job support and feedback so that early childhood inclusive co-teachers can implement these strategies with fidelity. I will provide an in-depth analysis of naturalistic instructional approaches separated into the four main strategies that authors utilized in inclusive early childhood classrooms including: embedded instruction, naturalistic teaching, activity-based interventions, and transition-based teaching.

Purpose Statement

The purpose of this paper is to review the related literature on naturalistic instructional approaches. I will provide an in-depth analysis of the literature on four naturalistic instructional approaches including embedded instruction, naturalistic teaching, activity-based intervention, and transition-based teaching. I aim to provide educators with a greater understanding of naturalistic instructional approaches while providing practical information for implementation within the early childhood inclusive classroom.

Significance of the Project

The current project is significant due to the increasing popularity of inclusive models and studies citing the lack of training and support for early childhood inclusive co-teachers (Friend et al., 2010). Teachers who lack training are more likely to be stressed and overwhelmed, use ineffective practices, have a negative impact on the learning of students, and leave their positions. Further,

students that receive services within a poorly implemented inclusive classroom are likely to suffer adverse effects and fall further behind their peers. However, when true inclusion is supported and successful it can provide individualized education to the benefit of all students. This paper is meant to prepare administrators and early childhood educators to provide high quality naturalistic instructional approaches to help realize the vision for full inclusion in education, and society.

Limitations of the Project

It is important to acknowledge the flaws in the literature base that was synthesized in the current paper. Throughout the literature there were methodological issues such as small sample sizes. Studies failed to provide important descriptors of participants and there were a wide range of methods and data analysis utilized by authors. Many authors failed to provide an effect size, making quantitative data analysis impossible. Studies showed a lack of cohesive strategies for implementing naturalistic instructional approaches, and there was a high degree of overlap between the four naturalistic instructional approaches. Further, there were limited studies that utilized activity-based intervention and transition-based teaching in an inclusive early childhood setting.

CHAPTER TWO

REVIEW OF RELEVANT LITERATURE

Legal Foundations of Inclusion

Prior to the 1960s, many individuals with disabilities were excluded from participation in society including education. The Elementary and Secondary Education Act of 1965 (ESEA) provided grants to encourage states to create, expand, and improve programs that focused on educating underserved students including those with disabilities. While this was the first federal education law that acknowledged students with disabilities and their education, it had little effect on educational practices. Since ESEA, several laws have been passed outlining the educational rights of students with disabilities. An exhaustive review of special education law is beyond the scope of paper. Thus, I reviewed a few key laws, statements, and frameworks that have shaped special education in the United States.

Individuals with Disabilities Education Act (IDEA)

In 1975, the United States Congress passed Public Law 94-142, also known as the Education for All Handicapped Children Act (EAHCA), which outlined educational rights for students with disabilities. This law has been amended and renamed several times, with the most recent reauthorization in 2004, referred to as the new Individuals with Disabilities Education Improvement Act (IDEIA). The new IDEA mandates that all students, regardless of the severity of their disability, are entitled to Free and Appropriate Public Education (FAPE).

FAPE mandates children with disabilities are to be educated alongside their general education peers in the Least Restrictive Environment (LRE) to the greatest extent possible. As both FAPE and LRE are cornerstones of the law, the focus on high quality inclusive education services became law. As a result, many Local Education Agencies (LEAs) and districts have moved towards inclusion for students with disabilities to access high quality education. While progress has been slower than intended, inclusion has become more common.

Inclusion Statistics

According to the National Center on Education Statistics (NCES), as of 2017, 14% of enrolled students were found to receive special education services under IDEA. Further, the percentage of students that spent more than 80% of their school day within the general education setting increased to 63% in fall 2017. However, for preschoolers in 2012, 42.5% were educated in inclusive classroom settings (Barton & Smith, 2015). The number of preschoolers educated alongside their general education peers has not increased at pace with elementary and secondary levels. There are a variety of factors that influence whether preschoolers will be served in inclusive settings. As stated by Odom et al. (2004), the lack of integrated, public preschool programs aligned with elementary schools may affect whether students have opportunities for inclusion. Many states have adopted initiatives to increase the number of early childhood students within an inclusive preschool classroom. For example, California has

adopted an initiative titled SIP, which stands for Supporting Inclusive Practices initiative with the goal of increasing inclusion within local districts.

Co-Teaching as a Means of Inclusion

To meet the needs of students with disabilities in the general education environment, the use of co-teaching has become a practical teaching practice. Studies have shown that inclusion can result in positive outcomes for students (Scruggs, Mastropieri, & Mcduffie, 2007; Murawski & Swanson, 2001). Further, educators and parents have expressed positive perceptions of inclusion students (Scruggs, Mastropieri, & Mcduffie, 2007). However, many educators have expressed the lack of preparedness, and a need for more training in the implementation of the co-teaching model (Friend et al., 2010). If implemented correctly, co-teaching offers rich instructional options and maximizes learning opportunities for all students. However, educators will require training and support from administrators to learn how to properly co-teach and to implement evidence-based practices within their classroom. Naturalistic instructional approaches are an evidence-based practice for teaching important individual skills within the early childhood inclusive classroom and provides an opportunity for educators to deliver systematic instruction to teach skills for students with disabilities, or students at risk. Further, the effective use of naturalistic instructional approaches can increase access, participation, and support for students with disabilities within the inclusive early childhood classroom.

Access, Participation, and Support for Preschoolers in Inclusive Classrooms

According to the Joint Position Statement of the Department of Early Childhood (DEC) and The National Association for the Education of Young Children (NAEYC), quality early childhood inclusive programs are characterized by: access, participation, and support (DEC/NAEYC 2009, Joint Position Statement, p. 2).

Access. High quality early childhood inclusion involves providing access to a wide range of learning opportunities, activities, settings, and environments (DEC/NAEYC 2009, Joint Position Statement, p. 2). Educators should reflect upon the learning environment to ensure that students have access to a variety of learning opportunities. Access to general education peers, access to school activities including after school sports and enrichment, and access to school clubs should be designed to include all students.

Participation. Providing access to educational opportunities does not ensure that students will participate. To ensure participation, further accommodations and modifications may be necessary. Teachers should focus on tiered models of intervention providing the necessary levels of support for participation and scaffolding learning when necessary (DEC/NAEYC 2009, Joint Position Statement, p. 2). Educators can increase participation by embedding learning opportunities into fun, child-led, activities that students enjoy. Embedding activities involving student interests in another way to increase participation.

Support. System levels supports must be in place to ensure participation and access. As stated in the Joint Position Statement “family members, practitioners, specialists, and administrators should have access to ongoing professional development and support to acquire the knowledge, skills, and dispositions required to implement effective inclusive practices” (DEC/NAEYC, 2009, p.3). The integration of support is vital to the success of inclusive teams, and to ensure that students reach their full potential.

Naturalistic Instructional Approaches in the Inclusive Early Childhood Classroom

Naturalistic instructional approaches are an evidence-based practice that educators within the early childhood inclusive classroom can utilize to teach important academic and non-academic skills for students during on-going classroom activities. “Naturalistic instructional approaches have helped early childhood educators support children’s access to and participation within the general preschool curriculum, while giving individualized support and instruction in the context of typically occurring classroom activities” (Snyder et al., 2015). Naturalistic instructional approaches are effective in teaching a variety of skills but require training to ensure procedural fidelity. In the next chapter, I will provide an in-depth review of the literature on naturalistic instructional approaches, focusing on studies that were conducted in inclusive early childhood classrooms.

CHAPTER THREE

NATURALISTIC INSTRUCTIONAL APPROACHES

Naturalistic instructional approaches can assist educators in providing systematic, individualized instruction during ongoing classroom activities. It can also meet the goal of providing access, participation, and support for students with disabilities. Naturalistic instructional approaches can achieve this by using routine activities, targeting important functional skills for students, keeping students with their peers, and providing extensive and varied opportunities for practicing Individualized Education Plan (IEP) goals. Further, teachers, parents, siblings, and peers can learn to implement naturalistic instructional approaches in a variety of settings. However, educators will require training and support to ensure procedural fidelity.

Naturalistic instructional approaches have four components: (1) teaching occurs during routine activities; (2) skills are targeted that are necessary for students with disabilities to engage in daily activities; (3) teaching trials are child-initiated or based on student preferences; and (4) are implemented by familiar adults (Snyder et al., 2015). During their review, Snyder et al., (2015) identified six terms that were utilized to describe naturalistic instructional approaches: embedded instruction (EI), naturalistic teaching (NT), transition-based teaching (TBT), activity-based intervention (ABI), milieu teaching (MT), and individualized curriculum sequencing model. However, upon review of the included studies,

milieu teaching (MT), and individualized curriculum sequencing model (ICSM) were excluded from my review due to lack of studies that were conducted within inclusive early childhood classrooms. In the following section, the definitions of naturalistic instructional approaches (i.e., embedded instruction, naturalistic teaching, transition-based teaching, and activity-based intervention) are provided.

Defining Naturalistic Instructional Approaches

Embedded Instruction

Embedded instruction has been the most widely used naturalistic instructional approach. Embedded instruction (EI) is an "approach that emphasizes identifying times and activities when intentional and systematic instructional procedures for teaching a child's priority learning targets are implemented in typically occurring activities, routines, and transitions." (Snyder et al., 2015, p.74). Embedding is a promising approach for five reasons: it increases the learning opportunities for students; it is compatible with inclusion; it capitalizes on child interest; it can be used by parents, siblings, peers, and assistants; and it is compatible with a wide range of curriculums (Pretti-Frontzcak & Bricker, 2001). Embedded instruction into ongoing activities ensures that students are not removed from their classroom, while providing multiple opportunities to practice IEP goals and learning objectives. Further, embedded instruction can help students maintain and generalize the skills that they learn

across activities and settings because skills are taught during naturally occurring activities.

Naturalistic Teaching

Naturalistic teaching is an approach during which educator's set-up the environment to increase learning opportunities, take advantage of naturally occurring events and activities, provide instruction in natural settings, and use naturally occurring antecedents (Snyder et al., 2015; Harjusola-Webb & Robbins, 2011; Kohler et al., 1997; Kohler et al., 2001; Shepley et al., 2018). While embedded instruction focuses on teaching specific goals and skills, naturalistic teaching is a strategy that capitalizes on the student's ongoing behaviors (Harjusola-Webb & Robbins, 2011). The included studies on naturalistic teaching strategies focused heavily on teacher behaviors, and procedural fidelity of implementation rather than student performance of target skills (Harjusola-Webb & Robbins, 2011; Kohler et al., 1997; Kohler et al., 2001; Shepley et al., 2018). Further, rather than focusing on assessing student skills, they assessed overall student behaviors such as expressive communication or interactions with peers resulting from naturalistic teaching strategies.

Activity-Based Intervention

Activity-based intervention (ABI) involves embedding instruction into ongoing play activities, capitalizing on child interests, and targeting functional skills. ABI is an "approach that uses child-directed transactions, embeds children's individual goals and objectives into routine, planned, or child-initiated

activities and uses logically occurring antecedents and consequences to develop functional and generative skills" (Snyder et al., 2015, p.74). As previously described, there was a significant amount of overlap between ABI and embedded instruction. Conceptually, ABI is a combination of both naturalistic teaching, and embedded instruction. When planning ABI, educators create a group and individual activity plan prior to intervention. This plan outlines the skills that students will learn, defines correct and incorrect student behaviors, and plans learning trials. Activity-based intervention also focused more on maximizing learning during whole activities rather than the embedding of discrete learning trials.

Transition-Based Teaching

During transition-based teaching (TBT), educators delivered learning trials during naturally occurring transitions to teach IEP goals and target skills. Transition-based teaching is an "approach in which a brief instructional trial to elicit a target behavior is implemented at the beginning of a transition from one activity to another to use time spent in transitions for instruction" (Snyder et al., 2015, p.74). Transition-based teaching is an effective way to embed IEP goals multiple times throughout the day without interrupting ongoing activities. Transition-based teaching was the most easily distinguished naturalistic instructional approach because it was specific to transitions, utilized a Discrete Trial, and focused on specific academic goals (such as color, shape, and letter identification). Further, it was the easiest strategy to learn to implement.

Educators, parents, peers, and siblings to easily be taught to implement TBT during a variety of transition periods.

Research Questions

The purpose of this paper is to review the literature on naturalistic instructional approaches and to provide practical guidance for educators and administrators for implementation within the early childhood inclusive classroom. The following research questions are addressed in this paper:

1. What were the characteristics of the participants included in studies that implemented nationalistic instructional approaches?
2. What were the main characteristics of naturalistic instructional approaches (embedded instruction, naturalistic instruction, transition-based teaching, and activity-based intervention) implemented in inclusive preschool settings?
3. What skills were taught with naturalistic instructional approaches?
4. To what extent was the naturalistic instructional approach successful in student acquisition, maintenance, and generalization of the targeted skills?

Methods

Search Procedure

The literature search was conducted of published journal articles in the following databases: Educational Resources Information Center (ERIC) and

PsychINFO databases. The search period was from the beginning of each database until 2020. The computer search strategy used a combination of following descriptors: “naturalistic instruction”, “embedded instruction”, “milieu teaching”, “embedded learning objectives”, “naturalistic teaching”, “activity-based intervention”, “transition-based teaching”, “early childhood”, and “inclusion”.

Inclusion and Exclusion Criteria

The abstract and methods sections of each study were examined to determine if the study met the following inclusion and exclusion criteria:

1. The study must investigate the following naturalistic instructional approaches: embedded instruction, naturalistic instruction, activity-based intervention, or transition-based teaching.
2. Participants must be students and educators within an inclusive preschool program.
3. The study utilized an experimental research design.
4. The study was written in English and published in a peer-reviewed journal after 1985.

CHAPTER FOUR

RESULTS

Twenty-two studies met criteria for inclusion in the following review. Of the 22 included studies, 14 utilized embedded instruction (EI) (*n* = 14), four utilized naturalistic teaching (NI) (*n* = 4), two utilized transition-based teaching (TBT) *(n* = 2), and two utilized activity-based intervention (ABI) (*n* = 1). Authors, interventions, research design, and outcome measures are outlined in Table 1.

Table 1. Review of Naturalistic Instructional Approaches

Study	Intervention	Research Design	Outcome Measures
Botts et al. (2014).	ABI vs. EI.	ATD	Phonological awareness skills: producing alliteration, blending two syllable words, producing rhyming (ABI), blending, identifying alliteration, and segmenting (EI).
Culatta et al. (2003).	EI.	Crossover Design.	Targeted Phonological (rhyming) skill acquisition and letter recognition.
Culatta et al. (2007).	EI.	Crossover Design.	Phonological (rhyming) skill acquisition and letter recognition.
Daugherty, Grisham-Brown, and Hemmeter, (2001).	EI.	MPD.	Math skill acquisition (Counting) and non-targeted math skill (colors).
Davenport, and Johnston (2015).	EI.	MBD	Math skill acquisition.
Grisham-Brown, et al. (2000).	EI.	MPD.	Social interaction skill acquisition, generalization,
Grisham-Brown, et al. (2006).	EI.	MBD.	Pre-writing skill acquisition

Grisham-Brown (2009).	EI.	Study 1 & 2- MPD. Study 3- MBD	Pre-writing skills (writing letters of name, writing shapes, copying shapes) acquisition and maintenance.
Harjusola-Webb, and Robbins, (2011).	NT.	MBD	Teacher use of naturalistic teaching, Student expressive communication.
Horn et al. (2000).	EI.	MBD	Teachers use & perception of ELO, Student IEP goals (motor and speech) skill acquisition.
Kohler. et al. (1997).	NT.	MBD	Teacher behaviors: length of instructional time, number of IEP goals targeted, peer inclusion. Student behaviors: social interaction.
Kohler et al. (2001).	NT.	MBD	Teacher procedural fidelity. Student social interactions with teachers and peers.
Macy and Bricker (2007).	EI.	AB Design.	Social skills performance: Assessment, Evaluation, and Programming System (AEPS)-Social domain.
Malmskog and Mcdonnell (1999).	EI.	MPD.	Level of child engagement in activities.
McBride, B., and Schwartz, I. (2003).	ABI.	MPD.	Peer proximity, rate of instructional targets, student correct responses to targeted skills.
Pretti-Frontczak, and Bricker (2001).	EI.	Probe and Survey Design.	System of Classroom Observations for Program Evaluation (SCOPE), IEPI/IFSP Goals and Objective Rating Instrument (GORI), teacher use of ELO.
Rahn, Coogle, and Otley (2019).	EI.	Probe and Survey Design.	Educator use and perceptions of embedded instruction.
Rakap (2019).	TBT.	MPD.	Student acquisition, generalization, and maintenance of pre-academic skills.
Schepis et al. (2001).	EI.	MPD.	Educator procedural fidelity.
Shepley et al. (2018).	NT.	MPD.	Teacher use of naturalistic teaching strategies, generalization.
Vanderheyden (2005).	EI.	ATD	Educator behavior: prompts, attention, length of learning trials Student behavior: toy contact behavior.

Woolery, Anthony, and Heckathorn, (1998).	TBT.	MBD	Duration of transition, teacher behavior during transition, child performance of target behavior.

Intervention: ABI=Activity Based Intervention, EI=Embedded Instruction, NT=Naturalistic Teaching, TBT=Transition Based Teaching. Research Design: ATD=Alternating Treatment Design, MPD= Multiple Probe Design, MBD=Multiple Baseline Design.

Participants

Child Characteristics. There were 154 student participants in the reviewed studies. Student participants included general education or "typically developing peers" (*n* = 45), and preschool students with disabilities or delays *(n* = 109). Students with disabilities included those with Speech and Language Delay or Impairments (*n* = 24), Developmental Delay/Disorder (*n* = 38), students with Intellectual Disability (*n* = 3), students with Multiple Disabilities (*n* = 19), students with Autism Spectrum Disorder (*n* =23), a student with an Orthopedic impairment (*n* = 1), and students identified as having a disability but not a member of the above categories (*n* = 1). Student participants included 81 males (52.6 %), 42 females (27.33 %), and 31 not specified (20.1 %). Student participants had a Mean age of 51.43 months (Minimum=30, Maximum=72, *SD* = 9.16).

Educator Characteristics. There were 58 educator participants in the reviewed studies including integrated teachers (*n* = 22), early childhood special educators (*n* = 20), Head Start teachers (*n* = 3), and paraeducators *(n* = 13). The sample consisted of 69% females (*n* = 40), 8.6% males (*n* = 5), and 22.4% not specified by the authors (n = 13). Adults participants age: *M* = 29.9, *SD* = 8.1.

The highest degree was a doctorate degree (*n* = 1), Master's degree (*n* = 15), Bachelor's degree (*n* = 17), and Associates degree (*n* = 9).

Research Design

The included studies mainly utilized single-subject research designs to implement naturalistic instructional approaches. The included studies utilized the following research methods: multiple probe design (*n* = 8), multiple baseline design (*n* = 6), alternating treatment design (*n* = 2), crossover design (*n* = 2) single subject design (*n* = 1), a combination of probe and survey *(n* = 2), and combination of multiple probe, and multiple baseline designs (*n* = 1).

CHAPTER FIVE

EMBEDDED INSTRUCTION

Embedded instruction was the most researched naturalistic instructional approach. Authors used the following terms to describe embedded instruction: *embedded learning opportunities, embedded instruction*, and *embedding of goals and objectives into daily activities* (Pretti-Frontczak & Bricker, 2001). Embedded instruction involves identifying a target behavior, modifying an ongoing natural activity, and then embedding teaching during ongoing activities. The goal of embedded instruction was to provide students with opportunities to practice their learning goals in a meaningful and interesting way (Pretti-Frontzcak & Bricker, 2001). Educators require training to deliver complete learning trials consisting of an antecedent, prompt, and consequence. Many of the reviewed studies included an educator-training package on embedded instruction, followed by intervention delivered to students by an interventionist, a classroom teacher, or an instructional assistant. Authors took data on student performance of focal skills, and educator procedural fidelity of implementation of embedded instruction.

Main Characteristics of Embedded Instruction

Embedded instruction was the most researched naturalistic instructional approach. Authors used the following terms to describe embedded instruction: *embedded learning opportunities, embedded instruction*, and *embedding of goals and objectives into daily activities* (Pretti-Frontczak & Bricker, 2001). Embedded

instruction involves identifying a target behavior, modifying an ongoing natural activity, and then embedding teaching during ongoing activities. The goal of embedded instruction was to provide students with opportunities to practice their learning goals in a meaningful and interesting way (Pretti-Frontzcak & Bricker, 2001). Educators require training to deliver complete learning trials consisting of an antecedent, prompt, and consequence. Many of the reviewed studies included an educator-training package on embedded instruction, followed by intervention delivered to students by an interventionist, a classroom teacher, or an instructional assistant. Authors took data on student performance of focal skills, and educator procedural fidelity of implementation of embedded instruction.

Exploratory studies were conducted to assess educator use of embedded instructional strategies. Rahn, Coogle, and Otley (2019) investigated use of Embedded Learning Opportunities (ELO) by early childhood special educators that received no explicit training or support on embedded instruction. The authors collected time sampling data which was analyzed to determine teacher use of ELO strategies and qualitative data was collected on perceptions, challenges, logistical impacts (e.g., class sizes, individualizing instruction, and access to resources), and desired supports for embedded instruction.

Pretti-Frontczak and Bricker (2001) investigated the use of embedded instruction by early childhood special educators (ECSE) in Head Start (n = 3), early childhood special educators (n = 2), and integrated early childhood educators (n = 2). Prior to interventions, educators had received training on the

use of embedded instruction and were evaluated on their use of strategies to implement IEP goals. Authors did not explicitly state training procedures for this study, and educators were not provided with extensive planning or feedback on embedded instruction.

Embedded instructional interventions are grouped into three categories based on who implemented the intervention (i.e., interventionist-led, teacher-led, and assistant-led).

Interventionist-led

Six of the 22 included studies investigated embedded instruction providing by an interventionist that was not part of the classroom staff. It is important to distinguish instruction led by interventionists rather than classroom teachers/staff as these results may not generalize. Classroom teachers may find it more challenging to deliver embedded instructional strategies due to time constraints and classroom responsibilities. Classroom teachers may not support embedded instructional strategies and may lack the necessary background knowledge to effectively implement embedded instructional strategies.

Culatta et al. (2003) utilized a combination of naturalistic instructional approaches with embedded direct instruction within Head Start classrooms containing thirty-one students including six preschoolers with the following disabilities: developmental delay (*n* = 2), language delay (*n* = 1), speech and language impairment (*n* = 3). Three Speech and Language Pathologists (SLP) were trained (with help from the classroom teachers) to target early literacy skills

by embedding rhyme and letter recognition activities throughout the day. Rhyme instruction consisted of a variety of fun and engaging activities such as making rhyming objects during craft time and then engaging in a variety of word play and rhyming activities with these items. SLPs facilitated the reading of rhyming books during small groups, allowed students to act out a variety of the rhyming activities with props, and facilitated rhyming activities during transitions and meals, including rhyming with each student's name. During letter instruction, SLPs played letter games, made letters with sensory materials, engaged in letter sorting activities, and acted on letters in thematic play. These activities included writing rhyming words on letters and mailing them.

The authors extended this research in 2007 by implementing a similar program to assess an intervention they titled *Project CALL* (Culatta et al., 2007). *Project CALL* was implemented in four Head Start Classrooms that contained both typically developing students (n = 19), and students with speech and language delays or concerns (n = 9). This project mirrored the embedded instructional strategies outlined in the previous study; however, *Project CALL* consisted of training specific instructors (trained teacher assistants funded by the grant) to implement the intervention. "CALL Instructors were used instead of classroom teachers because the instruction was intended as supplemental to regular classroom instruction" (Culatta et al., 2007, p. 221). Project CALL instructors received modeled instructional activities, online coaching, review of activity plans, discussion of children's participation, and video samples of

instruction. Instructors met with project directors for training and evaluation and spent time planning activities with the classroom teacher to coordinate activities that fit well into ongoing instruction. Further, classroom teachers facilitated language and literacy skills through a variety of evidence-based practices such as providing a rich linguistic environment, teacher-led book readings, and hands on activities to practice skills.

Daugherty, Grisham-Brown, & Hemmeter (2001) investigated embedded instruction to teach pre math skills (number and color identification) during ongoing classroom activities. The intervention was delivered to three students with speech and language delays in an inclusive public preschool program. The researcher (first author) a second-year graduate student of early childhood special education, delivered embedded instruction. The researcher provided targeted math skill instruction during a variety of activities using on-hand materials such as blocks, puzzles, stamps, utensils, art materials, and food to practice target skills. The researcher delivered an antecedent such as “give me three red blocks" when students were engaged with target materials and then waited 3 seconds (time delay) for the students to respond before delivering a predetermined prompt and then closed the learning trial with a pat in the back or praise for correct responses and ignoring incorrect responses.

Davenport & Johnston (2015) utilized embedded instruction to teach three preschool children with developmental delays math skills during free choice activities. The intervention focused on receptive math skills and were

individualized based on the student's current level of functioning and needs, which included the identification of three numbers (2, 3, and 4 for one student, and 6, 7, and 9 for another) and the identification of three shapes (triangle, rectangle, and diamond) for the third student. The interventionist created an opportunity for the target skill and provided verbal instructions ("today we are going to work together to make a tower"), embedded the goal into the activity (number blocks), presented the stimulus ("point to the two"), and provided prompts when necessary (using most to least prompting strategy) and reinforcement.

Malmskog and McDonell (1999) describe embedded instructional strategies in inclusive Head Start classrooms during play activities. Interventionists (certified early childhood special educators) delivered instruction during on-going free play activities with two students with multiple disabilities and one with a communication delay. The authors described a teacher-mediated intervention that included gaining the preschoolers attention, providing an opportunity to independently complete a task, and then provided a time delay and prompt, provided access to natural reinforcement, and then provided feedback. Authors focused on the effect that embedded instructional strategies had on student engagement with the goal to increase student active engagement in activities. Selected activities were individualized based on student needs and included: active engagement in fine motor activities, active engagement in social

interactions with peers, and active engagement with materials using exploratory and functional play.

VanderHeyden et al. (2005) investigated the implementation of embedded instruction to target student toy engagement during free choice time with two preschoolers with developmental delays and one typical preschooler enrolled in an early intervention program. Student engagement "engagement may be an important indicator of the degree to which the child is benefiting from his or her individual intervention program over time (McWilliam, Trivette, & Dunst, 1985)" (VanderHeyden et al., 2005, p.83). Interventionists included a Speech and Language Pathologist and a physical therapist; both had master's degrees and received training on implementing embedded instruction with students with disabilities. Training included descriptions, role-play, and in vivo practice with feedback provided. Interventionist approached the target child when they were engaged with a toy, provided an antecedent ("press the button") provided a time delay and then utilized least to most prompting schedules until the child correctly performed the behavior. Interventionists then closed the learning trial with praise reinforcement.

Classroom Teacher-led

Four studies trained classroom teachers to implement embedded instruction and then assessed student skill acquisition and teacher procedural fidelity. Horn et al. (2000) trained classroom teachers to utilize embedded instruction to target Individual Education plan (IEP) goals for four students within

various inclusive early childhood settings. In study one, the preschooler had cerebral palsy and had various delays (language, speech, motor, cognitive and social) and attended an NAEYC accredited employer sponsored program. In study two, two preschoolers with speech delays were being serviced within a team-teaching elementary school based preschool classroom. For study three, a preschooler with Down Syndrome (significant developmental delays) received services within an inclusive childcare center. The authors provided training to classroom staff which included three early childhood educators, an early childhood special educator, and three early childhood teaching assistants. Training on embedded instruction involved a three-step process that included identifying target goals form the child's IEP, identifying activities for intervention, and planning specific strategies to embed instruction.

Grisham-Brown et al. (2006) investigated effectiveness of embedded instruction in teaching pre-writing skills to students with various abilities enrolled in inclusive preschool programs. Pre-writing skills were taught by a classroom teacher and three paraeducators to three students: one typically developing, one with speech and language delays, and one with developmental delay. The classroom teacher met with authors to determine individual learning goals, identify appropriate activities for embedding, correct and incorrect responses, and appropriate prompting. Identified intervention opportunities included: signing in before entering a center, writing their name on artwork, and signing the attendance sheet. The classroom teacher or teaching assistant used a Constant

Time Delay of 5 seconds before consequences of prompting or reinforcement were delivered.

Grisham-Brown et al. (2009) also utilized embedded instruction to target pre-writing skills for students with disabilities within blended preschool classrooms. “In blended preschool classrooms, teachers are faced with identifying which children require intensive instruction and then must directly link or align the individualized need with early learning standards (i.e., required to show how individual goals and objectives lead to access and participation in the general curriculum/ daily activities and progress towards standards)” (Grisham-Brown et al., 2009, p.133). Blended classroom teachers completed the Assessment, Evaluation, and Programming System for Infants and Children (AEPS) and identified fine motor skills as a target for embedded instructional interventions. The lead authors trained the blended classroom teachers on procedures of embedding and prompting through written materials, role-play, modeling, and feedback. The authors also worked with the blended classroom teachers to create an intervention plan that included guidelines on addressing target skills, antecedents, behaviors, and consequences and wait time (time delay). Three instructional trials were embedded into two classroom activities: arrival time and small group during which educators delivered the antecedent “write your name”, provided a time delay (5 to 10 seconds), scored the preschoolers first attempt and then prompted the preschooler if they did not respond or responded incorrectly. Prompting continued until the preschooler

correctly performed their individualized writing target that included: writing the first three letters of their name, drawing two shapes, copying two shapes, printing their entire name, and copying a cross.

Macy & Bricker (2007) investigated embedded instruction delivered by early childhood special education student teachers and targeted two students with developmental delays, and one student with a social delay. Training was provided to student teachers that consisted of a 2-hour individual meeting to identify target social skills, routines for embedding, and planning the embedding schedule. Correct and incorrect responses were defined, and educators were asked to embed instruction at least ten times per day.

Paraeducator-led

Two studies trained paraeducators (termed instructional assistants by the authors) to implement embedded instruction interventions. Grisham-Brown et al. (2000) trained paraeducators to utilize embedded instruction to target IEP goals for students with severe multiple disabilities in integrated preschool programs. This training consisted of written instructions, video models, role-play, and feedback until assistants reached criterion level of procedural fidelity. Assistants were also trained in the following prompting procedures; constant time delay, most to least prompts, system of least prompts, and simultaneous prompts. Instructional assistants targeted skills using learning trials that included an antecedent (“put in”), waiting 5 to 10 seconds for a response (time delay), delivering a pre-planned prompt until the student correctly performed the

behavior and then closing the trial with positive reinforcement (pat on the back, praise, or access to the activity).

Schepis et al. (2001) described a training package provided to paraeducators on the use of embedded instructional strategies. Interventions were delivered within an inclusive childcare program servicing 165 students, five of which had the following disabilities: Autism Spectrum Disorder (*n* = 2), Intellectual Disability (*n* = 2), and multiple disabilities (*n* =1). This training consisted of classroom-based training and on the job training. The classroom-based training included written and verbal feedback followed by role-play, identifying, and creating opportunities to teach target skills, correct and incorrect prompting strategies, error correction, and reinforcement strategies. Training also included examples of embedded instruction into the following five classroom activities: child-initiated activities, naturally occurring staff-initiated routines, curriculum-based activities, student IEP goals/objectives, and peer-related activities. On-the-job training consisted of paraeducators demonstrating embedded instructional strategies and provided with feedback from authors. Authors assessed percentage of teaching opportunities implemented with procedural fidelity, and percentage of teaching opportunities with correct child responses. The authors also assessed paraeducator behaviors including correct prompting, correct error-correction, correct reinforcement resulting from the training package.

Targeted Activities and Skills in Embedded Instruction

Included studies on embedded instruction targeted a variety of activities including circle time, free play, center time, small group, arrival time, and meals. The included studies on embedded instruction also targeted a variety of student skills including phonological, math, writing, functional, engagement, and IEP goals. Studies also investigated teacher procedural fidelity because of training on embedded instruction. Table 2 shows targeted activities and skills for embedded instruction interventions described by included authors.

Table 2. Targeted Activities and Skills in Embedded Instruction

Authors	Targeted Activities	Targeted Skills
Culatta, et al. (2003).	Multiple activities across the school day.	Student skills literacy: phonological skills of rhyming and Letter recognition
Culatta, et al. (2007).	Multiple activities across the school day.	Student skills literacy: phonological skills of rhyming and Letter recognition
Daugherty, Grisham-Brown and Hemmeter (2001).	Center time, small group, and meals.	Student skills, target: counting (receptive or expressive); non-target: colors.
Davenport and Johnston (2015).	Free choice time in various areas, blocks, dramatic play	Math skills: point to numbers (2, 3, 4 for one student 6, 7, & 9 for other, point to shapes (diamond, rectangle, triangle).
Grisham-Brown, et al. (2000).	S1: Diapering, center, small group S2: Circle, center, g-tube feeding S3: small group, art activity, center, lunch S4: Arrival, Center, Rest time	Functional IEP goals for target students; following one-step directions with spatial concepts (put in, put on, put under), expressing needs (through sign language), switch activation (of wheelchairs), grasping small objects, indicating through gestures (for example: I want up by placing palm on hand), removing a pullover shirt, and indicating choices with eye gaze.
Grisham-Brown, et al. (2006).	Center time (dramatic play), and small group (art).	Pre-writing targets for students. Two students were expected to write their full names while one student was

		expected to learn to accurately write three letters of her first name.
Grisham-Brown, et al. (2009).	Arrival time and small group time.	Targeted individualized writing skills across three studies that included writing their full name, first few letters of name, writing shapes (circle and square), and copying a cross.
Horn, et al. (2000).	One activity per child that included free choice time for two students, and large group time for the other two students	Functional skills; pouring from a cup, sorting by function, and opening and closing grasp (cutting with scissors motion).
Macy and Bricker (2007).	Social situations: educators were asked to embed 10x per session.	Initiating a cooperative play activity, turn taking, and responding appropriately during group activities (raising hand, not interrupting).
Malmskog and Mcdonnell (1999).	Play Activities	Engagement in play behaviors. Answering *wh*- questions
Pretti-Frontczak and Bricker (2001).	Observations during a variety of classroom activities: circle snack free play.	Teacher use/ perceptions of embedded instruction
Rahn, Coogle, and Otley (2019).	Observations of circle time, free play, and mealtime.	Teachers use & perceptions of embedded instruction.
Schepis, et al. (2001).	Teacher-initiated activities like clean-up time, child-initiated activities such as free play, peer-interaction activities, and curriculum-based activities (such as a holiday craft activity).	Percentage of opportunities with correct teaching of EI strategies, percentage of teaching opportunities with independent correct responses.
VanderHeyden et al. (2005)	Play Activities	Engagement in play behaviors.

Targeted Activities

Seven authors target multiple activities throughout the day to deliver embedded instruction (Culatta et al., 2003; Culatta et al. 2007; Daugherty, Grisham-Brown, & Hemmeter, 2001; Grisham-Brown et al., 2000; Macy & Bricker, 2007, Pretti-Frontczak & Bricker, 2001; Rahn, Coogle and Otley, 2019; Schepis et al., 2001). Activities included teacher-led activities such as clean-up

and transitions, circle time, free play, social situations, arrival time, small group, centers, and meals. Macy and Bricker (2007) identified the following activities for embedded instruction: discovery time, outside play, circle time, and group time. Schepis et al. (2001) encouraged paraeducators to implement embedded instruction into a variety of activities throughout the day and provided five possible examples; teacher-initiated activities like clean-up time, child initiated activities such as free play, peer-interaction activities, and curriculum-based activities (e.g., a holiday craft activity). Davenport & Johnston (2015) introduced embedded instruction intervention during free choice time in various areas, (e.g., blocks, dramatic play, etc.) Horn et al. (2000) embedded instruction into one activity per child that included free choice time for two students, and large group time for the other two students. Four studies embedded learning opportunities solely into play activities (Kohler et al., 2001; Malmskog & Mcdonell, 1994; McBride & Swartz, 2003; VanderHeyden et al., 2005).

Targeted Student Skills

Studies investigated embedded instruction to teach a variety of skills to students with disabilities within inclusive early childhood classrooms. The included studies taught literacy skills (*n* = 2), math skills (*n* = 3), pre-writing skills (*n* = 2), functional skills (*n* =4), communication skills (*n* = 1), and social skills (*n* =1).

Literacy Skills. Literacy skills are an important pre-academic target area for children, and the following authors utilized embedded instruction to improve

pre-literacy skills of preschoolers. Teachers focused on rhyming and letter naming during their instruction of targeted phonological skills (Culatta et al., 2003; 2007). Student rhyming skills were assessed with an activity that involved sorting picture cards into rhyme and non-rhyme groups and then choosing the rhyme and non-rhyme targets from an array of pictures. Assessments also included rhyme identification activities during which students were asked to create a rhyme with target words (e.g., tag, bug, etc.). Students were asked to identify ten letters to determine efficacy of embedded instruction in letter recognition.

Math Skills. Pre-math skills such as counting, shape identification, and number identification were taught during embedded instructional interventions. Daugherty and colleagues (2001) investigated the use of embedded instruction to teach preschoolers the math skills of counting, and non-targeted math skills of colors. For example, the interventionist would provide the antecedent “Give me three red blocks”, with the target skill being counting the blocks and the non-target skill providing the correct color of blocks. Students were taught counting skills and were reinforced and prompted for correct counting even if they did not provide the right color of blocks. Authors asserted that pairing counting with colors would help students learn multiple skills at once. Davenport & Johnston (2015) utilized embedded instruction to teach the following math skills: receptive number identification, and receptive shape identification. One preschooler was taught to point to numbers two, three, and four, while one preschooler was taught

to point to numbers six, seven, and nine and the last preschooler was taught to point to diamond, rectangle, and triangle on request.

Writing Skills. Two studies taught pre-writing skills with embedded instruction. “Pre-writing skills are the fundamental skills children need to develop before they are able to write. These skills contribute to the child’s ability to hold and use a pencil, and the ability to draw, write, copy, and colour” (childdevelopment.com/au). Grisham-Brown et al. (2006; 2009) developed and utilized a pre-writing rubric to establish developmentally appropriate pre-writing skills for preschoolers. This rubric served as a guide to determine which pre-writing skills preschoolers need to learn and allowed teachers to track progress of embedded instruction interventions on students' pre-writing skills. Grisham-Brown et al. (2006) investigated the impact of embedded instruction on the pre-writing skills of three four-year old students; two students' ability to write their full names, and one student's ability to write the first three letters of his/her name. Grisham-Brown et al. (2009) taught eight preschoolers individual writing targets that included writing the first few letters of their name, writing shapes, and copying shapes.

Functional Skills. Four studies taught functional skills with embedded instruction. Functional skills are those that help students engage and succeed in a variety of different areas such as fine motor, conversational, self-help, and attention to tasks (engagement). Grisham-brown et al. (2000) taught the following functional skills to three four-year old preschoolers; following one-step directions

with spatial concepts (put in, put on, put under), expressing needs (through sign language), switch activation (of wheelchairs), grasping small objects, indicating through gestures (for example: I want up by placing palm on hand), removing a pullover shirt, and indicating choices with eye gaze.

Horn et al. (2000) taught three four and one five-year-old students the following functional skills; pouring, sorting by function, and opening and closing grasp (cutting with scissors motion). Two studies utilized embedded instruction to increase engagement in play behaviors, an important functional skill necessary for students to engage in and learn from a variety of classroom activities (Malmskog & McDonnell, 1997; Vanderheyden et al., 2005).

Social Skills. Social skills include skills used to interact and communicate with others such as expressive and receptive communication, responding to others, and back and forth exchanges. For preschoolers, important social skills include turn taking, responding to others, sharing toys, and engaging in appropriate play behaviors. Communicative social skills include a variety of behaviors such as expressive communication, receptive communication, responding to conversations, sign language, gestures, and responding to requests. Horn et al. (2000) investigated the use of embedded instruction to teach a preschooler to answer *wh*- questions (e.g., who, what, where). Macy & Bricker (2007) taught preschoolers the following skills: initiating a cooperative activity, turn taking, and responding appropriately during group activities (raising hand and not interrupting).

Targeted Teacher Behaviors

Authors investigated the effects of training packages on teacher behaviors. This included procedural fidelity and use of strategies.

Educator Procedural Fidelity. Authors also assessed educator, interventionist, student teacher, and paraeducator procedural fidelity of embedded instructional strategies. While most authors provided some type of training on embedded instruction and then assessed educator procedural fidelity, one study simply probed educator use of embedded instruction without training or direction (Rahn, Coogle, & Otley, 2019). Pretti-Frontzcak & Bricker (2001) provided extensive teacher training on the development of appropriate IFSP/IEP goals and the use of embedded instruction to teach these goals and then assessed procedural fidelity of the trained educators however, the authors did not provide ongoing feedback nor did they allow educators to practice and role-model strategies as did most other authors.

Outcomes of Embedded Instruction Interventions

Student Skills

Culatta et al. (2003) found that systematic letter and rhyme instruction through meaningful, varied, and engaging activities produced positive early literacy effects for students. In the beginning of the intervention, many of the students were unable or unwilling to attempt rhyme generations, however, by the end of the students would proudly engage in rhyming tasks with statements like “I know how to rhyme your name!”. The authors also described positive “lifeworld”

effects of embedded instructional strategies which included the inclusion of students with language delays, increased engagement in rhyming tasks by all students, and increased interactions between students and classroom teachers. Students made progress towards rhyme generation and letter recognition tasks, however, the positive impact of embedding on access, participation, and support seems to be the real success of intervention. Culatta et al. (2007) expanded on this study and found that *Project CALL* was effective in helping students learn how to produce rhyming words and identify letters in Spanish and English-speaking children. Qualitative data was analyzed through video recording students, creating scripts, and then coding student behavior including participation, engagement, and interactions during rhyming tasks. The authors found that children made progress towards learning to produce rhymes, that they were actively engaged and participating in rhyming and letter naming activities, and that their interactions with interventionists were meaningful and varied.

Daugherty, Grisham-Brown, & Hemmeter (2001) found that learned how to count objects when provided embedded instruction, while one student learned the non-target skill of color identification. Davenport & Johnston (2015) found that preschoolers were able to learn to receptively identify numbers and shapes when provided with embedded instruction. The authors also found that educators were satisfied with student growth and believed that staff could easily embed learning trials into daily activities. This is an important qualitative result because educators

are not likely to utilize strategies that they find difficult, cumbersome, or time consuming to implement.

Grisham-Brown et al. (2000) found mixed results when utilizing embedded instruction to teach a variety of skills to four preschoolers with severe multiple disabilities. The authors taught the following skills with embedded instruction; following one-step directions, using sign language to express needs, turning on switch to activate device, grasping small objects, indicating needs (I want up), removing a pullover shirt, and making choices. The first preschooler made significant gains in learning how to follow one-step directions that showed an upward trend pattern during the intervention. The student also mastered the skills of expressive sign language; however, once the intervention was discontinued the students' performance of signing showed a downward pattern. The second preschooler showed similar patterns of performance of activating a device switch and grasping objects in probe and training sessions, indicating that embedded instruction may not have been useful in teaching these skills with this student. For the third preschooler, embedded instruction was effective in teaching the student how to sign his wants and needs, and while the data shows an upward trend of removing his shirt, the student did not master this skill (80% performance over three trial days) by the end of the intervention. The fourth child was also unable to learn how to activate the device switch and showed little improvement of performance over the embedded instructional intervention. The authors argue that the severity of disability may have influenced the lack of functional skill

acquisition, however, it is also important to note that the embedded instruction during this intervention was not a natural part of the school day, was teacher-led, and skills were not taught with fun and engaging activities as used by other authors. However, the lack of positive results in the study may elude to some target skills being incompatible with embedded instruction, and further research is needed to determine relationships between target skills and efficacy of interventions.

Grisham-Brown et al. (2006) found that embedded instruction was successful in teaching three preschoolers pre-writing skills. Two of the targeted students reached criterion levels of accurately writing their full names in 8 and 10 intervention sessions (*M* = 9), while the last student made positive gains in writing the first three letters of her name but did not reach criterion performance by the end of the school year (100% accuracy over three of four school days).

Grisham-Brown et al. (2009) found strong positive gains in pre-writing skills for students with six out of eight students reaching criterion levels during intervention and maintenance phases. In study one, one preschooler learned to write the first three letters of her full name and maintained this skill over time, one student improved his ability to write a square and a cross without a model, while the third child also made significant progress in copying a square and a cross during embedded instructional interventions. In study two, one child learned how to copy a cross, one learned to write his entire name, and the final child made slight gains in learning to write the first three letters of his name. In study three

one child reached the criterion level of writing the first two letters of his name, while the second student made significant progress in copying a cross (80% accuracy during follow up probe). While one student did not show significant progress towards various pre-writing goals, on average students learned pre-writing skills with the use of embedded instructional interventions.

Horn et al. (2000) trained educators to implement embedded instruction with four children with various disabilities (one with multiple disabilities, two with speech and language impairments, and one with intellectual disability). Preschoolers were taught the following skills: pouring, sorting, and opening and closing grasp (cutting with scissors motion), attention to task and active engagement, answering *wh*-questions, and counting. The authors found positive gains with three out of five students having increased their performance of skills to above 80%. It is noteworthy that there was a main effect of increased opportunities for students to practice the skills due to the teacher training on embedded instruction strategies. The authors found positive gains in teacher behaviors of presenting antecedents, prompting, and reinforcing of student behaviors resulting from the teacher-training package on embedded instruction.

Macy & Bricker (2007) found strong positive effects on student performance of social skills of turn taking, activity selection, and appropriate behavior during large groups (raising hands and not interrupting) resulting from embedded instruction. The authors taught preschoolers to initiate cooperative play, take turns, and follow directions with embedded instruction. Malmskog &

Mcdonnell (1997) used embedded instruction to increase active engagement in three students with disabilities. All three students increased the amount of time that they engaged with people and materials in their classroom. VanderHeyden et al. (2005) found that the use of embedded instruction with full learning trials (antecedents, prompting, and praise) led to increased student engagement in play behaviors in three students with varying abilities.

Educator Behaviors

Studies investigated teacher use of embedded instruction, and the impact that educator training had on teacher procedural fidelity. Rahn, Coogle, & Otley (2019) investigated educator use of embedded instruction (they used the term Embedded Learning Opportunities) by educators that received no training on embedding strategies and found that teachers used ELO infrequently. Interestingly, when asked to describe their use of ELO strategies, educators reported that they used them often, and that they were effective in teaching learning goals. Pretti-Frontzcak & Bricker (2001) provided training on educators on writing quality IFSP/IEP goals and utilizing embedded instruction to teach these goals. Authors found that teachers were able to learn how to write meaningful, high quality IFSP/IEP goals when provided with training, however, educators did not significantly increase their use of embedded instruction. Authors did not provide opportunities for practice and feedback, which was a necessary component of successful training cited by other included authors. Further, authors investigated teacher behaviors and perceptions of embedded

instruction and found that prompts and error correction were reduced during maintenance phases, and that educators had positive opinions on the appropriateness and effectiveness of embedded instruction (Malmskog & Mcdonell, 1997). Schepis et al. (2001) showed that educators significantly increased procedural fidelity of embedded instruction after receiving extensive classroom and on-the-job training of strategies including error correction, prompting, and reinforcement during embedded instruction (Shepis et al., 2001). In other words, paraeducators were able to learn how to implement embedded instruction with fidelity, and that students increased their response to staff members during interventions. The authors did not provide information on which skills were taught to students and whether these students acquired these skills.

The included studies found that embedded instruction was a successful tool to teach students a variety of skills such as name writing, word rhyming, counting, engagement in activities, turn taking, and letter recognition. Further, studies found that classroom teachers and paraeducators (instructional assistants) can be taught to implement embedded instructional strategies, with procedural fidelity. However, extensive training packages with ongoing written and verbal feedback from authors were necessary to ensure procedural fidelity. Some classroom teachers and paraeducators expressed frustration in learning embedded instructional strategies. If educators are going to be taught to use embedded instructional strategies, there needs to be significant planning, classroom, and in vivo training and feedback provided with ongoing support.

Administrators may also need to provide sound rationale in embedded instructional strategies to get classroom teachers support.

Generalization and Maintenance of Target Skills

Daugherty, Grisham-Brown, & Hemmeter (2001) found that embedded instruction resulted in students maintaining counting skills over time. Davenport & Johnson (2015) found that student performance of receptive number and shape identification improved during maintenance phases. “Visual inspection of the data points revealed significantly higher performance on targeted skills during the maintenance and generalization probes on target math skills” (Davenport & Johnston, 2015). Grisham-Brown et al. (2000) investigated maintenance data on functional IEP goals during embedded instruction. Authors indicate that data that was mixed, one student maintained moderate gains in functional skill acquisition, while two students returned to near baseline levels during maintenance phases, authors did not collect generalization data. Grisham-Brown et al. (2006) conducted one maintenance probe during embedded instruction intervention with one student due to time constraints and the end of the school year. It is promising to note that the student maintained 100% performance of the targeted skill seven days after reaching criterion levels of the pre-writing (writing his name) skill. Grisham-Brown et al. (2009) collected maintenance data for five out of eight students that showed that students-maintained pre-writing skills after embedded instruction interventions were discontinued.

CHAPTER SIX

NATURALISTIC TEACHING

Naturalistic teaching involves child centeredness, embedded learning opportunities, responsive interactions, and utilizing the natural environment as the learning context (Harjusola-Webb & Robbins, 2012). There was a high level of overlap between embedded instruction and naturalistic teaching strategies. However, naturalistic teaching requires higher levels of moment to moment capitalization on ongoing activities to promote learning rather than focusing on embedding specific skills and targets into routines. Further, studies on naturalistic teaching focused on training classroom teachers to use strategies rather than plan specific learning trials. All authors in the included studies on naturalistic teaching strategies provided educator training and then assessed educator use of naturalistic teaching strategies. Some authors assessed student learning of skills while some focused solely on educator use of naturalistic teaching strategies.

Main Characteristics of Naturalistic Teaching

Kohler et al. (1997) provided a training package on naturalistic teaching to encourage integrated preschool teachers and paraeducators to utilize naturalistic teaching with students with Autism. The naturalistic teaching strategies included encouraging teachers to embed instruction into naturally occurring events, capitalize on children's interests to provide instruction, provide natural

antecedents and consequences, and encourage peer engagement in teaching trials. It is important to note that educators were not provided explicit instruction on implementation nor were they provided feedback on their own or student performance during intervention. Further, the authors did not investigate if target students learned the focal IEP goals/objectives, focusing solely on how many IEP goals were introduced during observed activities.

Harjusola-Webb & Robbins (2012) investigated the effects of a teacher-training package on use of naturalistic teaching communication strategies, and the effect on teacher behaviors and child expressive communication. This study was implemented with seven integrated preschool teachers and three students with Autism. The teacher training package included a manual with eight specific teaching strategies including commenting, labeling, modeling, imitating, expanding, positive feedback, joint attention, responding to child's initiations, and asking questions (Harjusola-Webb & Robbins, 2012). After providing the manual, researchers worked closely with teachers to identify student targets, enhance teacher procedural fidelity, and to provide ongoing feedback.

Kohler et al. (2001) investigated the effects of teacher training on seven naturalistic teaching strategies to facilitate social interactions of students with Autism Spectrum Disorder. These seven naturalistic teaching strategies included: using novel materials, joining the play activity, providing choices, using incidental strategies (placing items out of reach, blocking the student, using materials in an unexpected way), commenting and asking questions, expanding on student

comments, and inviting interaction with peers. After a 45-minute training session on these seven tactics and educators identified target social goals for focal students. Teachers received daily feedback provided by the authors to the educators on how to increase social interactions with the seven tactics. Educators also received technical assistance in the form of a feedback form checklist identifying the educator use of the seven tactics during observations. The authors assessed student social interaction (with peers or adults), educator prompts, and teacher procedural fidelity of naturalistic teaching strategies as the result of training.

Shepley et al. (2018) provided a training package of naturalistic teaching strategies to two teachers within a community-based early childcare and education program. These teachers both serviced typically developing students and students with developmental delays and had less than five years teaching experience. The study described an extensive training package on naturalistic teaching that included *Teach-Model-Coach-Review*. The training began with a PowerPoint and handout providing background and descriptive information on naturalistic teaching. Interventionists then modeled strategies while allowing teachers to practice strategies with non-target children prior to coaching. During the coaching phase, teachers were asked to use naturalistic teaching strategies and they received prompting, praise, and corrective feedback until they reached criterion level of performance of the naturalistic teaching strategy. Educators worked with authors to identify target student skills (academic, social, and

communication) and then implemented naturalistic teaching strategies during arrival and playtime to help students learn their target skills.

Targeted Activities and Skills in Naturalistic Teaching

The included studies on naturalistic teaching strategies varied in their implementation of strategies by activity. Educators used naturalistic teaching strategies across the day, during play time, and during morning routines. For a breakdown of activities and skills by study, see Table 3.

Table 3. Targeted Activities and Skills in Naturalistic Teaching

Studies	Targeted Activities	Targeted Skills
Harjusola-Webb and Robbins (2011).	Across the day.	Teacher procedural fidelity and student expressive communication.
Kohler et al. (1997).	Play time.	Length of instructional episodes, number of IEP objectives addressed, student social interactions, talking, touching, offering toys.
Kohler et al. (2001).	Free choice play time.	Teacher behavior: teacher prompts, engagement with focal child, use of strategies.
Shepley et al. (2018).	Morning routine, art, and exploratory activities.	Student behavior: social interactions. Teacher behaviors: procedural fidelity, ecological and social validity perceptions of teachers.

Targeted Activities

Harjusola-Webb & Robbins (2012) targeted teacher use of naturalistic communication strategies (NT) across the school day. Rather than focusing on specific activities, educators were asked to embed the naturalistic teaching

communication strategies throughout the day. Kohler et al. (1997) utilized naturalistic teaching strategies to practice individual objectives during discovery, centers, and snack time. Kohler et al. (2001) observed students and educators during free choice play time. Shepley et al. (2018) targeted morning routine, art, and exploratory activities.

Targeted Student Skills

The included studies on naturalistic teaching focused on student skills of communication and social interactions, and targeted teacher behaviors of procedural fidelity of implementation.

Communication. Harjusola-Webb & Robbins (2012) assessed preschooler's expressive communication resulting from teacher training in naturalistic teaching strategies. Authors took time sampling data and coded all communicative behaviors of children including gestures, word approximations, words, multi-word utterances. It is important to note that in this study, the authors did not focus on teaching students directly; they used naturalistic teaching strategies and then assessed the impact of these strategies on the student's expressive communication.

Social Interactions. Kohler et al. (1997) provided training to teachers on naturalistic teaching strategies and then assessed procedural fidelity by analyzing: use of strategies, length of instructional episodes, educator prompts, number of objectives targeted, and student interactions with peers. Kohler et al. (2001) investigated the use of seven naturalistic teaching strategies on target

children's social interaction during free choice playtime. Social interactions consisted of any exchange between target children and peers including talking to, touching, and sharing toys.

Targeted Teacher Behaviors

Use of Strategies. Harjusola-Webb & Robbins (2012) trained educators to use the following eight naturalistic teaching communication strategies; commenting, labeling, modeling, imitating, expanding, positive feedback, asking questions, providing choices, responding, following the child's lead, joint attention, turn taking, and time delay. After training, authors measured educator procedural fidelity and the impact that this had on the student's expressive communication. Kohler et al. (1997) investigated the effect of educator training on naturalistic teaching on length of teaching trials, number of objectives targeted, and facilitation of peer interaction. The authors investigated length of instructional episodes, the percentage of teacher directions, and the focus of these directions (imitation, cooperation, or verbalization) during the naturalistic teaching intervention. Kohler et al. (2001) focused on educator engagement with the target child and percentage of sessions with correct procedural fidelity of the seven naturalistic strategies. Shepley et al. (2018) investigated the effects of a teacher-training package on educator use and perceptions of naturalistic teaching. The authors assessed percentages of teacher procedural fidelity, efficiency (number of events and duration to mastery), and perception of social and ecological validity of naturalistic teaching strategies.

Outcomes of Naturalistic Teaching Interventions

Harjusola-Webb & Robbins (2012) found that the teacher-training package had a positive effect on teacher use of the following naturalistic teaching strategies: commenting, labeling, modeling, imitating, expanding, positive feedback, praise, asking questions, providing choices, responding, following the child's lead, joint attention, turn taking, and time delay. Authors also found positive impacts on student's expressive communication resulting from the teacher-training package. All three educators increased their use of naturalistic teaching strategies, which then increased student's expressive communication. Kohler et al. (1997) found that educators learned how to use naturalistic teaching with a high degree of procedural fidelity. Data reveal significant increase in length of instructional episodes and increased number of targeted objectives. Meaning that utilizing naturalistic teaching strategies extended the amount of time educators spent working on IEP goals. Further, educators were able to target more goals during instructional episodes because of the teacher-training package on naturalistic teaching strategies.

Kohler et al. (2001) found significant positive effects on social interactions of students after teachers received feedback and technical assistance in delivering naturalistic teaching strategies. It is important to note that the increases in student social interactions were only seen after high levels of feedback and support were provided to educators, and that educators believed it was difficult to implement naturalistic teaching strategies. Shepley et al. (2018)

investigated the effects of an extensive training package provided to classroom teachers on naturalistic teaching. Authors found that the training package had a significant positive impact on educator procedural fidelity of naturalistic teaching. Authors found that educators required individualized practice, prompting, and feedback to reach criterion levels (100% over three trials days), however, were able to learn to correctly implement naturalistic teaching strategies.

All included studies on naturalistic teaching involved an educator-training package. While the authors found that educators were able to successfully implement naturalistic teaching strategies, training needed to include high levels of support and feedback, as with embedded instruction described earlier. Naturalistic teaching is meant to target broader areas such as communication and social skills, but it can be used to help educators increase their interactions with students, increase instructional trials, and increase the number of targeted IEP goals. Further research is necessary to identify whether naturalistic teaching is effective to teach specific student skills such as literacy, math, writing, functional, and social skills. Naturalistic teaching is a promising strategy to assist teachers in providing instruction to students within inclusive classrooms, while teachers may require support to implement with fidelity, once learned, it is a strategy that can be utilized alongside other naturalistic instructional approaches to ensure high quality, systematic, and individualized instruction to students with varying abilities.

CHAPTER SEVEN

ACTIVITY-BASED INTERVENTIONS

Activity-based interventions include embedded instruction, capitalizing on student interests, targeted functional skills, and require responsive adults, and environmental arrangements. As with naturalistic teaching, there was a high degree of overlap between activity-based interventions and other naturalistic instructional approaches.

Main Characteristics of Activity-Based Interventions

McBride & Swartz (2003) investigated the effects of activity-based intervention (ABI) training package on teacher procedural fidelity, and child performance of target skills (IEP goals) and non-target skills of responsiveness, engagement, and proximity to peers. Participants included three female educators that taught in an integrated early childhood special education program, and three students one four-year-old boy with Down syndrome, a six year old boy with Autism, and a three year old girl with pervasive developmental delay. The training package consisted of reviewing student IEPs with teachers and identifying two target objectives to address during free playtime. Teachers were then provided with a classroom activity matrix to identify when objectives could be targeted. Educators were provided with didactic training followed by practice with non-target students with feedback, until educators reached 80% criterion performance of the target behavior. The ABI intervention was combined with

Discrete Trial Training (DTT) during which educators provided antecedents and consequences related to contrived learning trials.

Targeted Activities and Skills of Activity-Based Interventions

Mcbride & Swartz (2003) investigated teacher rate of instruction, type of interactions, and prompts resulting from a teacher-training package and ongoing feedback regarding activity-based intervention. Teachers were trained to utilize Discrete Trial Teaching (DTT) during ABI. The authors targeted individualized learning goals for students, however, they did not explicitly state which goals would be taught. Authors took data on student engagement, proximity to peers, responsiveness to targets, and percentage of correct responses to learning targets resulting from ABI.

Botts et al. (2014) compared ABI to embedded instruction in an inclusive university-based language classroom. It is noteworthy that this study was completed in a classroom that was designed to utilize ABI and contained two certified SLP's and eight graduate students rather than early childhood educators. The classroom consisted of 11 students, including five target children that ranged from four to five years old with moderate language impairments. The classroom also contained typically developing and at-risk students. During ABI, educators embedded goals into meaningful, routine, planned and child-initiated activities and introduced skills one at a time. For ABI, antecedents are pre-planned and determined by educators during initial implementation phases and included educator-led, scripted verbal prompts unrelated to the ongoing task that

were distributed among ongoing activities such as snack, circle, and play time. During EDI (embedded direct instruction) the interventionist elicited attention from the student, present the prompt, provide wait time to answer, and provide feedback such as praise for correct or a verbal correction prompt if incorrect.

Student Target Behaviors

Literacy Skills. Botts et al. (2014) utilized activity-based intervention to target phonological awareness skills. The intervention targeted producing alliterations (saying a word that begins with the same sound as the target word), blending two syllable words (for example, ice and cream), and producing rhyming. The EDI (embedded direct instruction) targeted blending words presented in onset and rime (prompt; what word do these sounds make b….ag), identifying alliterations, and segmenting compound words.

Outcomes of Activity-Based Interventions

McBride & Swartz (2003) found that teacher training on activity-based intervention (ABI) produced increases in educator interactions with target children and instruction per minute. ABI with DTT (Discrete Trial Teaching) was effective in increasing engagement, proximity to peers, and correct performance of targeted IEP objectives. Botts et al. (2014) evaluated treatment efficacy by evaluating the number of treatment objectives (targeted language goals) met by the students, and by determining the number of trials, errors, and percentage of errors to criterion. The authors found that EDI (embedded direct instruction)

resulted in greater effectiveness and efficiency of gaining targeted skills than did activity-based intervention (ABI).

CHAPTER EIGHT

TRANSITION-BASED TEACHING

Transition-based teaching (TBT) is a naturalistic instructional approach that involves delivering brief instructional trials within normal daily transitions between activities. Rakap (2019) described an extensive pre-service educator training on TBT and the effect that this training had on student performance of targeted IEP goals, generalization and maintenance of the target goals, and pre-service teacher perceptions of TBT. The first step involved identifying an appropriate learning target based on the students' IEP and interviews with the classroom teachers. The pre-service teachers then received extensive training on TBT that included; a manual, videos modeling, role- playing with educators, practicing on typically developing children, practicing with other pre-service teachers while receiving feedback, and in vivo practice with feedback until educators met criterion performance. The author then investigated the relationship between TBT and student correct performance of three target behaviors: naming colors, shapes, and written words.

Main Characteristics of Transition-Based Teaching

Wolery, Anthony, & Heckathorn (1998) trained four teachers in a faith based inclusive preschools to utilize TBT to deliver learning trials to students with disabilities. A brief training session was provided during which the use of Constant Time Delay (CTD) was explained, modeled, role played, with feedback

provided. Authors then investigated length of transitions to ascertain if TBT lengthened transition time. Authors then assessed teachers' interactions with children, interactions with adults, monitoring, and management of materials to determine the effect of TBT training. They also assessed student correct responses to learning targets (identification of letters, shapes, words, and dinosaurs) to determine whether TBT was effective in teaching receptive identification skills.

Targeted Skills and Activities in Transition-Based Teaching

Rakap (2019) utilized TBT to target a single skill for each target child, however, these skills varied based on their IEP goals. One student was taught colors, one student was taught shapes, and one student was taught word identification. Further each student learned three target objectives (three colors, three shapes, and three separate words). Wolery, Anthony & Heckathorn (1998) introduced multiple targets per child including letters, colors, shapes, and dinosaurs. Students were asked to verbally identify the target from an index card.

Outcomes of Transition-Based Teaching

Transition-based teaching was a successful approach to teach receptive skills to students. Rakap (2019) showed that extensive teacher training on TBT was successful in aiding students to learn target IEP goals of color, shape, and word identification. Students also maintained the learned skill over time. Further,

pre-service teachers found it acceptable and effective to provide transition-based teaching to students. It is important to note that the interventionist/provider of the strategy was not a classroom teacher. Wolery, Anthony, & Heckathorn (1998) utilized a brief training to instruct classroom teachers to use transition-based teaching. These teachers effectively implemented transition-based teaching and students learned targeted skills quickly. Further TBT did not increase the length of transitions and increased educator engagement with students during transitions. Rakap (2019) found that TBT of target IEP goals led to generalization of skills across activities, educators, and environments and maintenance of learned skills over time.

CHAPTER NINE

DISCUSSION

The included studies showed promise for the use of naturalistic instructional approaches for teaching preschoolers in inclusive classrooms a variety of important skills. With the use of naturalistic instructional approaches, preschoolers were able to learn pre-academic skills, functional skills, and social skills. Further, students that received embedded instruction generalized and maintained these skills over time. It is noteworthy that the most successful preschoolers were those that were taught by interventionists. Further, students with severe multiple disabilities were not as successful in learning the taught skills as students with milder disabilities. Further research is needed to determine compatibility of naturalistic instructional approaches with a broader range of students, activities, providers, and skills.

Teacher Perceptions of Naturalistic Instructional Approaches

Harjusola-Webb & Robbins (2012) reported that educators found ongoing feedback and support helpful in implementing naturalistic strategies and that database performance feedback helped them to identify patterns in their own behavior and make the necessary changes to improve procedural fidelity. Horn et al. (2000) reported that educators had mixed perceptions of strategies, while some teachers had positive views regarding ease of implementation and effects on students, others believed it was difficult to implement and singled out students

with disabilities. Authors note that teachers felt that the three-step process of training (description, ELO at a glance, and feedback) was helpful in guiding embedded instructional activities. Kohler et al. (2001) noted that the four teachers involved in the study expressed frustration with learning naturalistic teaching strategies and implementing them successfully into teaching trials. However, with feedback and technical assistance all educators were able to successfully implement naturalistic teaching strategies.

It is noteworthy that interventionists, rather than classroom teachers, implemented strategies in most of the included studies. Further, teachers that implemented strategies with fidelity required extensive training, practice with other educators and students, and feedback from the authors including written and verbal feedback to reach mastery levels of performance. As noted by Pretti-Frontczak & Bricker (2001), educators reported using embedded learning opportunities more frequently than they did. If administrators want to introduce these methods into their programs, they will need to provide their teachers with in-class and on the job, training coupled with coaching and feedback to ensure procedural fidelity of strategies.

Educator Training

The first step in the process of introducing naturalistic instructional approaches into the classroom involves training classroom teachers, interventionists, service providers, and paraeducators on the strategies (embedded instruction, naturalistic teaching, transition-based teaching, and

activity-based interventions). These training packages should include didactic classroom trainings with handouts and manuals provided. During classroom, training educators should be given the opportunity to practice the strategies with other educators and children that will not be targeted for naturalistic instruction. During these initial stages, educators should receive prompting and feedback until they reach criterion levels of performance of the target skill (100% over three trials).

Following classroom training, teachers should conduct assessments to identify individual student skills to teach with naturalistic instructional strategies. Identification of skills should involve assessments such as the Desired Access Desired Result Developmental profile (DRDP) utilized in California preschools. Educators can then select target goals and skills for students. Targeted skills should be meaningful and help students' access and participate in a variety of activities throughout their school day. Once targeted skills are selected educators should then utilize an activity matrix to identify when these targeted skills can be taught. This will vary based on the strategy chosen, for example embedded instruction can occur during a wide range of activities while transition-based teaching will occur during transitions. Once skills and activities have been selected educators can then arrange the environment, identify materials for use during teaching, and identify natural antecedents, prompts, and consequences.

Teaching Strategies

Antecedents. Educators should be aware of natural antecedents and how

to contrive learning trials. For example, if the targeted skill is requesting items, educators can place a highly desired item out of reach of a student, encouraging requesting from the student. Antecedents can be simple such as “show me the red block” or “put in” and should be naturally embedded into the ongoing activity. Behavioral Targets. Many authors described the importance of operational definitions or target student behaviors. It is important that educators whether it be a teacher, an assistant, or a service provider, to know exactly what behavior constitutes correct performance of the target skill, and what behaviors will require further prompting.

Prompting. Correct prompting is an important aspect of delivering learning trials. Educators need specific training and should plan systematic prompting procedures to ensure that students acquire and maintain targeted skills.

Constant Time Delay. This strategy includes getting a student’s attention, providing an antecedent (“give me the red block”), and then immediately prompting the student. Immediate prompting continues for three trial days, and then educators provide the time delay during which they provide the antecedent, wait for a specific amount of time (typically 5 to 10 seconds), and then provide a prompt if necessary or reinforcement if the student responded correctly.

Most-to-Least Prompting. During most to least prompting, the educator creates a hierarchy of prompting for example, a verbal prompt (repeating the antecedent) followed by a gestural prompt (such as pointing), a partial physical prompt (such as putting the students hand on the item) and a full physical prompt

(hand over hand grasping). Educators then begin teaching a target skill with the highest prompt (in this case full physical prompting) fading down to lower prompts until the student is independently performing the behavior without prompts. Educators provide positive reinforcement for correct behaviors while acknowledging incorrect responses with lesser praise or “Let’s try again”.

System of Least Prompts. This strategy involves the reverse of most-to-least prompting where students are provided the antecedent “remove your shirt”, provided 5 seconds to respond, and then the lowest level prompt is provided, moving up in prompting until the student responds correctly. Students receive praise or correction as the consequence.

Consequences. Educators should receive training on providing natural and appropriate consequences. Once students have correctly performed the target behavior educators can provide praise “Great job, you took you’re shirt off!”, an edible reinforcer (a small M&M), a tangible reinforcer (a sticker or stamp), access to an activity or item (such as a toy or a free play activity) depending on the needs of the student and the activity.

Once educators have received training on learning trials consisting of antecedents, behaviors, prompting, and consequences they practice strategies and be provided with feedback until they reach criterion levels of performance of all target strategies. Feedback should be ongoing throughout the intervention to ensure maintenance and generalization of educator skills across students, targets, and activities.

Data Collection

Educators should also receive training on proper data collection and should be encouraged to collect data every day during the initial implementation of Naturalistic Instructional strategies. This data will determine when a target has been learned, when to move onto the next target, whether a specific intervention is working or needs to be adapted further, and it can be used for student progress on IEP reports. Data sheets should be placed in all areas and activities during which the skills will be targeted, and educators should ensure that all team members are taking data consistently.

Feedback to Educators

As described by Schepis, et al. (2001), feedback should include; a general positive empathetic statement about the teaching session, praise for identifying and creating opportunities to teach skills, identifying incorrect use of strategies and describing correct use of strategies, a final positive encouraging statement. Written checklists of educator use of strategy can also be provided. Further practice and modeling may be necessary for some educators to achieve 100% performance criterion.

Planning and On-Going Support

Educators will need time to plan naturalistic Instructional approach strategies and on-going support will need to be provided by trainers and administrators to ensure implementation and treatment fidelity. Booster training

sessions, maintenance and generalization probes should also be collected and provided to educators.

CHAPTER TEN

CONCLUSIONS AND LIMITATIONS

Conclusions

Naturalistic instructional approaches are a promising evidence-based practice to teach students with various abilities important skills during on-going classroom activities. Teachers and paraeducators can be trained to implement naturalistic instructional approaches within the inclusive early childhood classroom. Further, naturalistic instructional approaches can help to achieve the goal of providing access, participation, and support to students with and without disabilities. While educators will require extensive training, feedback, and support to learn to implement naturalistic instructional approaches, it is an effective tool to provide systematic, high-quality, individualized instruction to students within the inclusive early childhood classroom.

Limitations

There are several noteworthy limitations of the current review on naturalistic instructional approaches. First, small sample sizes of the included studies call into question generalization of findings. While many authors included all students within the classroom/program in the participants section, they typically targeted and analyzed only a few preschoolers with disabilities for the strategy. While there were a variety of disabilities, educators, and background of participants between studies, further research is needed to ensure generalization

of the findings to students. Second, many authors left out important information in their analyses, making it difficult for this review to include all necessary pieces of information. Researchers should ensure to include all necessary information in their studies. Further, authors should utilize systematic methodologies during investigations of naturalistic instructional strategies, which was not the case in many of the included studies. This is necessary for meta-analyses and unfortunately limited the qualitative data available for review in the current paper.

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