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Teaching Street-crossing Skills to Special Education Students

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Abstract

Crossing the street safely has been identified as an area of need for students with special needs. This study used a task analysis of steps required to safely cross the street and included three middle school students with a variety of disabilities. A multiple baseline design across participants was used to determine the progress students made in the behaviors required to cross a street. The results of this study indicated that all three participants improved their street-crossing skills immediately after the first intervention session. These results indicate that special education students can learn the steps required to cross the street and these skills can help keep students safe. Additionally, knowing how to safely cross the street can help increase the students' opportunities to access community activities and ultimately employment.

Keywords: special education, safety skills, street-crossing, pedestrian safety

Teaching Street-crossing Skills to Special Education Students

Literature Review

Pedestrian safety is highly important for children, especially those with special needs, and according to Self, Scudder, Weheba, and Crumrine (2007), there is a need for improvement in the methods of teaching the skill. The National Highway Traffic Safety Administration (NHTSA) reported 76,000 pedestrian injuries and 4,743 pedestrian fatalities in 2012 (NHTSA 2014). Compared to 2011, this is a 6% increase. In addition to an upturn in the number of pedestrian fatalities, there has been a significant increase in the number of children identified as having special needs.

Boyle and colleagues (2011) conducted a study of the prevalence of developmental disabilities over the course of 12 years. Findings showed a 17% increase in the number of children ages 3-17 years who have been diagnosed with developmental disabilities. This hike was due to a number of factors. Those factors include better survival rates for children born with birth defects or genetic disorders, increased maternal age, and more awareness and diagnosis of disabilities (Boyle et al., 2011). An increase in pedestrian injuries and fatalities combined with a higher number of children diagnosed with special needs necessitates parent and teacher collaboration to prevent injuries and death in this population.

Parent & Teacher Collaboration

Parents have identified community safety skills, especially street-crossing, as an area of concern for their children with special needs (Self et al., 2007). These children require more explicit direct instruction to acquire skills that their non-disabled peers may learn simply through observation. Parents report community safety skills as an area of need; however, the teaching of these skills is often overlooked in special education (Dixon, Bergstrom, Smith, & Tarbox, 2010).

Academic skills tend to be the main focus of teaching in any classroom and is a possible reason why community safety skills are ignored (Wehman, 2013). Based on this information, special education teachers need to find a more balanced approach to teaching academics and safety skills to students.

Furthermore, special education teachers should create a dialog with parents regarding safety skills and community-based instruction. Gast, Wellons, and Collins (1994) suggest asking parents what concerns they have regarding their child's safety to determine what skills need to be taught. Teachers can then use the information gathered to plan lessons and better meet students' needs. In addition, long-term goals, such as employment and independent living, should be taken into consideration when determining what skills will be most beneficial for each individual (Gast, Wellons, & Collins, 1994). A high priority should be given to street-crossing for most special education students, as it is a prerequisite skill for accessing the community and ultimately for employment.

Research has shown that even simple and quick training led to immediate results in safe street-crossing behaviors (Barton, Schwebel, & Morrongiello, 2007). The training package used by Barton and colleagues (2007) lasted 15 minutes or less and researchers did not have specific training. This is important because parents and teachers have the ability to easily implement a short training on street-crossing to see immediate improvement in safety skills. Teaching children how to cross the street will improve quality of life by increasing independence. The more independent children become with age, the more likely they are to gain employment and be fully integrated into their communities (Hendricks & Wehman, 2009).

Training in Simulation vs. Training in the Natural Environment

To ensure safety, some researchers recommend using a simulated environment for training (Batu, Ergenekon, Erbas, & Akmanoglu, 2004; Miller, Austin, & Rohn, 2004; Page, Iwata, & Neef, 1976; Self et al., 2007; Winterling, Gast, Wolery, & Farmer, 1992). Page, Iwata, and Neef (1976) conducted one of the first studies on pedestrian safety skills with students who have special needs. This indicates that this has been an area of need for nearly 40 years. In this study, students used a doll to perform street-crossing procedures on an elaborate model of four city blocks. Students would then tell researchers what their doll was doing. Results revealed that students can be taught using a model and demonstrate the skills on real-life intersections with little additional training (Page et al., 1976). In more recent years, the use of technology has been used to simulate teaching safety skills. For example, Self, Scudder, Weheba, and Crumrine (2007) used virtual reality simulation to teach safety skills to students and concluded that virtual reality may be a safe way to teach a range of skills related to community safety.

Other researchers have used simulation techniques along with a lecture style presentation and modeling to teach safety skills (Miller et al., 2004; Winterling et al., 1992). Specifically, Miller, Austin, and Rohn (2004) gave short presentations on safe street-crossing, then modeled safe street-crossing procedures on a simulated crosswalk before having students practice using the simulated crosswalk. Having students practice in a simulated environment is a great way to help students gain skills without being at risk. It is important to recognize that while simulated crosswalks are safe, the context needs to fit the students and their needs. For example, if students have very few skills, a simplistic simulation should be created and if students are more advanced, a more complex simulation can be developed.

Batu, Ergenekon, Erbas, and Akmanoglu (2004) created an elaborate simulation of a city street in the school's gym where they taught three types of street-crossing. The three types were: crossing at an overcrossing, at a traffic light, and at a non-lighted intersection. A task analysis was created for each type of street-crossing and ranged from four to nine steps. The most difficult procedure was crossing at a non-lighted intersection, which had the longest task analysis of the three types of crossing. All of the participants in this study mastered required skills with 100% accuracy and maintained skills for at least four weeks after training concluded. Participants were observed generalizing their skills to real-life intersections with 100% accuracy one week after maintenance sessions (Batu et al., 2004). Results indicate that participants taught using simulation are likely to generalize what they have learned to the natural environment.

Developing a simulated environment provides a safe place for training that might prove dangerous in the natural setting; however, some researchers believe that teaching students in the natural environment is key for learning safe street-crossing skills (Gast et al., 1994; Horner, Jones & Williams, 1985; Rivara, Booth, Bergman, Rogers, & Weiss, 1991; Wright & Wolery, 2014; Yeaton & Bailey, 1978). Research indicates that students are better able to generalize across various street-crossing situations when they have been trained using real intersections (Horner et al., 1985). Horner, Jones, and Williams (1985) as well as Rivara, Booth, Bergman, Rogers, and Weiss (1991) found streets that students would likely cross within their communities and used those streets to provide training. While the use of real-life intersections may improve a student's ability to generalize, the skill level of the student needs to be considered when choosing whether to train in the natural environment or in simulation.

Yeaton and Bailey (1978) as well as Rivara and colleagues (1991) used real-life intersections to train their participants. Both studies used a task analysis to assess students on

their performance for crossing the street. Yeaton and Baily (1978) used six steps in their task analysis: wait at curb, look all ways, watch vehicle distance, walk, continue to look, and use crosswalk. The Rivara (1991) task analysis included four steps: walk on the sidewalk, stop before entering the street or crosswalk, look left – right – left before crossing, and continue looking for traffic while crossing. Results showed a significant increase in the number of students who stopped before entering the crosswalk and those who kept looking while they were crossing (Rivara et al., 1991).

Students who are taught skills using a systematic approach, such as a task analysis, learn skills more quickly and with fewer errors than students taught using an unsystematic approach (Walls, 1985). Research revealed that a task analysis with more detailed steps enables students to learn more complex skills in less time, allowing students greater independence (Walls, 1985). Developing a task analysis that suits the activity as well as the student is important. Additionally, while planning instruction careful consideration should be given to the cognitive level and abilities of each student.

The instructional package used by Yeaton and Baily (1978) taught students how to safely cross the street using four phases: 1) "tell them", 2) "show them", 3) "ask them" and 4) "let them." The first phase, "tell them," requires the researcher to describe the steps for safely crossing the street. During the second phase, "show them," the researcher tells the student what they are doing while modeling safe street-crossing behavior. The third phase, "ask them," involves the researcher asking questions about each step. The fourth phase, "let them," allows a child to practice crossing the street while the researcher observes and collects data. Results indicated a significant increase and maintenance in students' safe street-crossing behaviors.

Research has shown that training children in pedestrian safety leads to improvement in safe street-crossing behaviors in either a simulated or natural environment (Barton et al., 2007; Batu et al., 2004; Gast et al., 1994; Horner et al., 1985; Miller et al., 2004; Page et al., 1976; Rivara, et al., 1991; Self et al., 2007; Wright & Wolery, 2014; Yeaton & Bailey, 1978). Additionally, generalization of skills should be addressed when training special education students. In order for training to be considered effective, students must be able to perform skills in a variety of settings, with a number of adults, and in different ways (Stokes & Baer, 1977). For example, students must demonstrate crossing at a stop sign, at a light, or using a non-stop sign, non-lighted crosswalk. This type of generalization is not something that naturally occurs with most students who have special needs, and therefore needs to be carefully planned when providing training.

Conclusions

Many students in special education are not proficient in crossing the street and rely on staff members to ensure safety. Teaching students using explicit direct instruction strategies will increase abilities to safely cross the street. Additionally, using simulated crosswalks is beneficial for teaching students with disabilities because it allows them to practice skills in a safe environment (Batu et al., 2004; Miller et al., 2004; Page et al., 1976; Self et al., 2007). Different instructional strategies have been utilized to teach safe street-crossing skills, and three strategies stood out as the most advantageous for teaching students with special needs: simulated crosswalks, Rivara and colleagues' (1991) task analysis, and Yeaton and Bailey's (1976) four phases of training. However, research has shown that any training provided will improve safety skills (Batu et al., 2004; Gast et al., 1994; Horner et al., 1985; Miller et al., 2004; Page et al., 1976; Rivara, et al., 1991; Self et al., 2007; Wright & Wolery, 2014; Yeaton & Bailey, 1978).

Research Question

What impact does teaching street-crossing strategies to middle school special education students with a variety of disabilities have on their ability to safely cross the street?

Methods

Setting and Participants

This study took place in a classroom run by Monterey County Office of Education, located on a Santa Rita School District campus. Participants were students in a middle school special education class and were selected because both the parent and the teacher agreed that the student needed to learn safe street-crossing procedures

Pseudonyms were used to protect the identity of the participants. Andrew was an 11-year-old Hispanic male who had been diagnosed with speech and language impairment and autism. Jose was a 13-year-old Hispanic male who had been diagnosed with autism. Brandy was a 13-year-old Hispanic female who had been diagnosed with intellectual disability and speech and language impairment.

Dependent variable

The dependent variable measured the number of correctly completed steps of a task analysis (Rivara et al., 1991) for safely crossing the street. The task analysis included four criteria for crossing the street, and the students were measured by the number of steps correctly completed. The task analysis included four steps: walking on the sidewalk, stopping before entering the street or crosswalk, looking left – right – left before crossing, and keep looking for traffic while crossing. The researcher told students, “Show me how you cross the street” and recorded 0s for steps completed incorrectly or 1s for each step completed correctly (Rivara, et al., 1991).

To ensure that students' behavior was scored accurately, each session was video recorded and stored on a password-protected device.

Independent variable

The independent variable was instruction in safely crossing the street using a simulated environment. The Yeaton and Bailey (1978) four phases of training were used to teach the participants how to safely cross the street. During the "tell them" phase, the researcher said, "Always walk on the sidewalk if there is one. Then you need to *stop* on the curb *before* you cross the street. Look left – right – left to see if there are any cars coming. If there are no cars coming, walk inside the crosswalk to cross the street. While you are walking, you should look left – right – left one more time to make sure there are still no cars driving toward you."

During the "show them" phase, the researcher modeled walking on the sidewalk while saying, "Always walk on the sidewalk if there is one." The researcher then modeled stopping at the curb while saying, "When you are ready to cross the street, you need to *stop* on the curb *before* you cross the street." The researcher then looked left – right – left and said, "Look left – right – left. If there are no cars coming, walk inside the crosswalk to cross the street." The researcher then modeled looking left – right – left while walking inside the crosswalk. She also said, "Keep looking left – right – left one more time to make sure there are still no cars driving toward you."

The researcher asked at least one of the following questions during each "ask them" phase: 1) "Do you walk on the sidewalk or in the street?" 2) "What do you do *before* you step into the crosswalk?" 3) "Where do you look before you cross the street?" and 4) "Where do you keep looking while you walk across the street?"

During the final "let them" phase of training, the researcher told students, "Show me how you cross the street." Prompting was used for incorrect responses, and positive verbal praise (e.g. "great job looking left – right – left") was used to reinforce correct responses. To ensure safety, students practiced crossing the street using a simulated crosswalk in the classroom. If the participants mastered the four steps of the task analysis with 100% accuracy across five consecutive trials (Winterling et al., 1992), the participants would be observed using a crosswalk located near the school campus.

Research design

The research design was a multiple baseline across participants. All students entered baseline at the same time. The first student entered intervention when he had three stable data points that were not moving in a counter therapeutic direction. The second student moved from baseline to intervention after the first participant accurately completed the first step of the task analysis across one intervention session. The third student entered intervention when the second participant accurately completed the first step of the task analysis across one intervention session.

Inter-observer Agreement

An independent observer watched video recordings across 25% of baseline sessions and 20% of intervention sessions. Inter-observer agreement was 73% for all sessions. Inter-observer agreement for Andrew was 75% across 25% of his baseline sessions and 83% across 23% of his intervention sessions. Inter-observer agreement for Jose was 100% across 20% of his baseline sessions and 67% across 25% of his intervention sessions. Inter-observer agreement for Brandy was 63% across 29% of her baseline sessions and 75% across 10% of her intervention sessions. The discrepancy in scoring was due to the fact that the observer scored participants as

completing more steps than the primary researcher. This is reasonable, as someone not familiar with the participants may have scored higher, giving participants the benefit of the doubt, when a skill was not *clearly* completed. Furthermore, watching the sessions on video may also have lessened the accuracy of the observations as some of the nuances may have been missed.

Procedural Fidelity

To ensure procedural fidelity, an independent observer watched the instructional sessions conducted by the researcher for 20% of sessions. The independent observer used a checklist to measure procedural fidelity (Appendix A), which was 96% across 20% of intervention sessions.

Social Validity

Parents completed a five-point Likert scale to help determine which students in the class most needed safety skills training (Appendix B). The parents of each of the three participants *strongly disagreed* that their child crosses the street safely and independently. Each of them *strongly agreed* that street-crossing is an important skill for their child to learn and that they want their child to learn how to cross the street safely.

Results

The results are presented in Figure 1 and show the number of steps each participant completed during baseline and intervention. All participants completed zero or one step of the task analysis during baseline. If they scored a one during baseline, it was for walking on the sidewalk. None of the participants independently stopped on the curb, looked left – right – left before entering the crosswalk, or kept looking during baseline.

Andrew was the first participant to enter intervention. During baseline, he completed 0-1 steps correctly for an average of 0.75 steps. During intervention, he completed 2-4 steps correctly for an average of 3.3 steps. Andrew walked on the sidewalk for three out of four

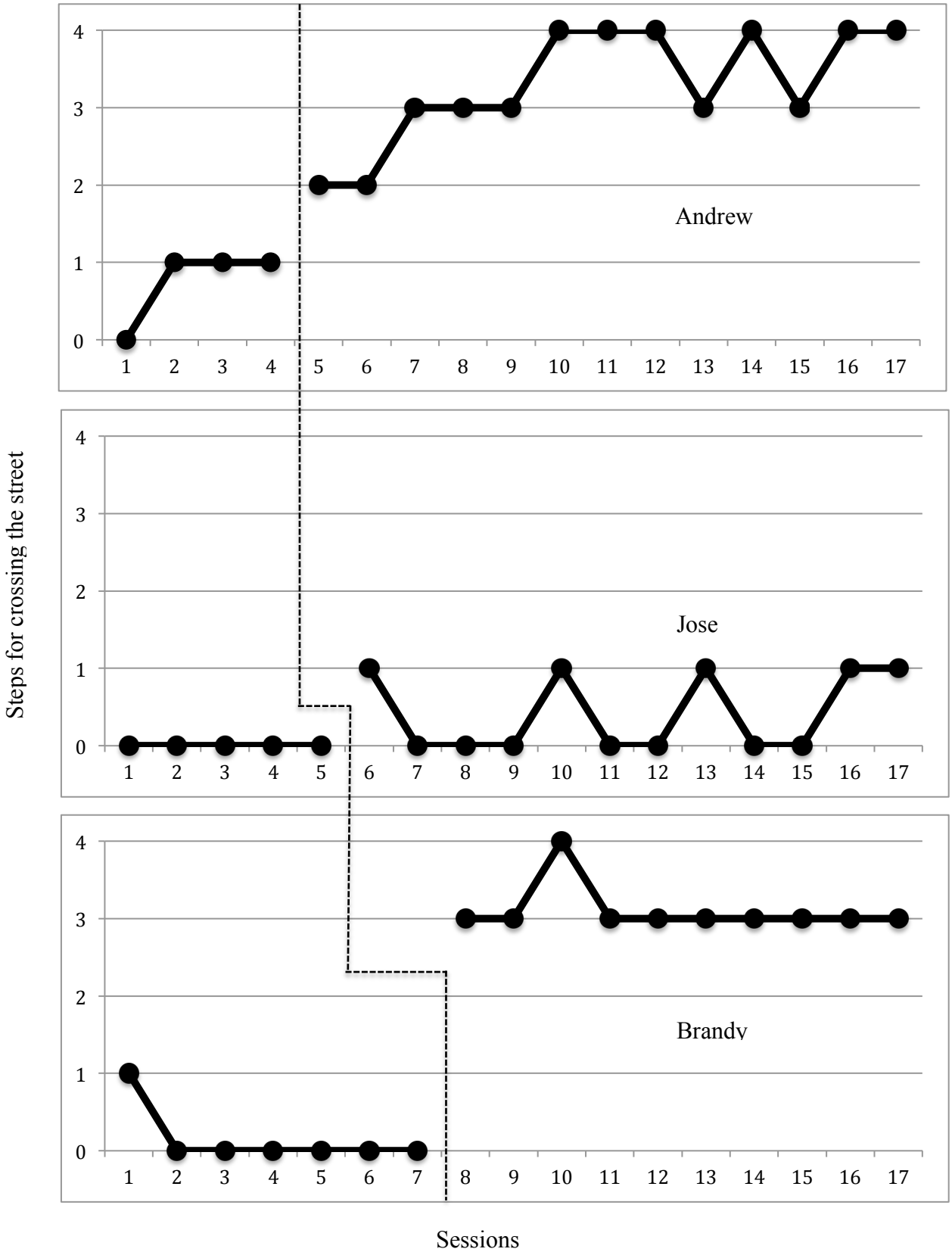

Figure 1 – Multiple baseline data on street-crossing behaviors across participants

baseline sessions and continued walking on the sidewalk for most intervention sessions. He completed two steps of the task analysis during his first two intervention sessions. Those steps were walking on the sidewalk and keep looking for both sessions. During the third and fourth intervention sessions, Andrew completed the steps of walking on the sidewalk, stopping before entering the crosswalk, and looking left – right – left before crossing. He also completed three steps during the fifth intervention session, but those steps were walking on the sidewalk, stopping before entering the crosswalk, and keep looking. Andrew completed all four steps for intervention sessions six, seven, and eight. During the ninth and eleventh intervention sessions, he did not walk on the sidewalk but completed the remaining three steps. He again completed all four steps correctly during intervention sessions ten, twelve, and thirteen.

Jose was the second participant to enter intervention. During baseline, he completed 0 steps correctly for an average of 0 steps. During intervention, he completed 0-1 steps for an average of 0.42 steps. Jose completed walking on the sidewalk during intervention session one, five, and eleven and stopped before entering the crosswalk during intervention sessions eight and twelve. He requires a high level of prompting to complete most tasks, and he completed three out of three steps of the task analysis when he was provided with verbal prompting across intervention sessions eight and nine.

Brandy was the third participant to enter intervention. During baseline, she completed 0-1 steps correctly for an average of 0.14 steps. During intervention, she completed 3-4 steps correctly for an average of 3.1 steps. After completing four baseline sessions, Brandy was absent from school for two consecutive weeks. She completed three more baseline sessions after her return to school, and she scored a zero for all steps during those sessions. During intervention sessions one, two, and four, Brandy completed three steps of the task analysis. Those steps were

walking on the sidewalk, looking left – right – left, and keep looking. She completed all four steps during intervention session number three. During intervention sessions five through ten, Brandy completed three steps, which were walking on the sidewalk, stopping on the curb, and keep looking while crossing. She failed to look left – right – left before stepping into the crosswalk.

Discussion

This study was designed to examine how specific instruction for safely crossing the street impacted students with disabilities. There was a functional relation demonstrated and replicated in this study. Andrew showed immediate improvement in his street-crossing skills after his first intervention session, which is consistent with Barton, Schwebel, and Morrongiello's (2007) research. He continued to improve his skills after each intervention session and performed the steps with 100% accuracy six times during the study, but he did not meet the criteria of completing the steps with 100% accuracy across five consecutive sessions. Brandy also showed immediate improvement in her street-crossing skills after her first intervention session and continued to improve her skills after each intervention session. She performed the steps with 100% accuracy one time during the study. During intervention sessions 5-10, she consistently forgot to look left – right – left before stepping into the crosswalk. Jose showed immediate improvement in his street-crossing skills as he went from completing zero steps during baseline to completing one step, walking on the sidewalk, during his first intervention session. He completed one step during four subsequent intervention sessions; walking on the sidewalk two times and stopping before entering the crosswalk two times. There are no overlapping data points for Andrew and Brandy. Jose's data had some overlap, but the last two data points show promise in skill acquisition.

As with any new skill being taught to special education students, learning the steps for street-crossing takes repetition and practice. The number of sessions required to independently master the steps for street-crossing will vary by student as will the level of prompting needed. This is likely due to the fact that special education students have a variety of disabilities, and each disability has unique characteristics that affect the way students learn. Students with the same disability may also learn in different ways. Additionally, the cognitive level of students affects the way in which they learn skills. The results of this study suggest that students with speech and language impairment and intellectual disabilities may learn the skills needed to cross the street more quickly than a student with autism. Although the three participants in this study learned at different rates, they all made progress toward learning the steps for safely crossing the street.

The researcher intended to move successful students to a crosswalk in the community if they completed all steps for five consecutive trials. Unfortunately, none of the participants met that criteria during the course of this study. Time limitations did not allow the researcher to observe the participants crossing actual streets in the community, so it is unknown if the participants would be able to generalize the skills they learned in simulation to real life intersections. Batu and colleagues (2004) discovered that students who are trained in street-crossing should be able to generalize across situations whether they were taught in simulation or in the community; therefore, the participants of this study should be able to generalize what they have learned to other street-crossing situations. However, further research using actual crosswalks would be beneficial to evaluate the generalization of their skills.

Rivara and colleague's (1991) task analysis proved to be an effective tool for measuring and teaching the procedure for safe street-crossing to students in special education. The most

consistent finding from the use of this task analysis was that two out of three students were regularly stopping before entering the crosswalk and continuing to look while they were crossing. This supports the results from the original study. Andrew stopped before entering the crosswalk for 11 out of 13 intervention sessions, and Brandy stopped before entering for 7 out of 10 sessions. Andrew kept looking while crossing for 11 out of 13 intervention sessions, and Brandy kept looking for 10 out of 10 sessions. Furthermore, Yeaton and Bailey's (1976) four phases of training was a useful strategy as it allowed participants to hear, see, speak, and perform safe street-crossing procedures. The most beneficial part of this strategy was modeling appropriate street-crossing behaviors for participants before they crossed using the simulated crosswalk.

It is recommended that future research use these strategies in combination with video recordings of instructional sessions. The use of video recordings allowed the researcher to see errors in implementing the intervention strategies. It may be useful for participants to watch the video recordings in order to see their mistakes, and therefore improve their street-crossing performance. Additionally, video recordings could be used to show parents and other caregivers how to teach their children safe street-crossing skills.

Although the strategies utilized during this study have provided promising results with special education students, formal training is not required to teach children how to safely cross the street. Teachers or parents will need to explain the steps of safely crossing the street and allow children to practice those steps under their supervision. If teachers and parents collaborate on safety skills training for students, it could potentially decrease the number of pedestrian injuries and fatalities among students with special needs. Furthermore, students who learn to cross the street safely will likely become more independent as adults. Hendricks and Wehman

(2009) reported that adults with disabilities who are independent have more friends and are more involved in their community, which enhances their quality of life. They are also more likely to maintain employment than individuals who are more dependent upon their caregivers (Hendricks &Wehman, 2009; Wehman, 2013). Therefore, teaching special education students how to cross the street safely may afford them a more successful and rewarding future.

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Appendix A

Procedural Fidelity Checklist

Procedural Fidelity				
Andrew				
Date:				
Tell them				
Show them				
Ask them				
Let them (prompt & reinforce)				
Procedural Fidelity				
Jose				
Date:				
Tell them				
Show them				
Ask them				
Let them (prompt & reinforce)				
Procedural Fidelity				
Brandy				
Date:				
Tell them				
Show them				
Ask them				
Let them (prompt & reinforce)				

Appendix B

Parent Survey on Street-crossing Skills

Parent Survey – Street-crossing

My child crosses the street safely and independently.

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly Agree

I feel that learning how to cross the street safely is an important skill for my child to have.

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly Agree

I would like my child to learn how to cross the street safely.

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly Agree