

RESEARCH ARTICLE

General education teacher preparation in core academic content teaching for students with developmental disabilities

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Abstract

We used multiple probe design with probe trials across three teacher-student dyads to examine the effects of a professional development on middle school general education teachers' accurate use of simultaneous prompting procedure and self-monitoring as well as the effects of the simultaneous prompting procedure on acquisition of academic core content of middle school students with developmental disabilities in inclusive classrooms. Moreover, we investigated the maintenance and generalization effects of professional development on teachers' outcomes as well as simultaneous prompting procedure on students' outcomes. Last, teachers' and students' opinions regarding social validity of the study were investigated. Results showed that (a) teachers acquired using simultaneous prompting procedure and self-monitoring with 100% accuracy, maintained the acquired teaching behaviors over time and generalized them across different conditions and (b) students acquired their targeted academic content, maintained them over time, and generalized them across different people. Moreover, both the opinions of teachers and the students were positive. Implication of the findings and directions for future research are discussed.

KEYWORDS

behavioral skills training, evidence-based practice, inclusion, middle school teachers, professional development, self-monitoring, simultaneous prompting

1 | INTRODUCTION

Inclusion of students with disabilities, including developmental disabilities (DD), is a widely accepted philosophical principle and practice. However, teachers often do not feel neither confident nor prepared in providing instruction for students with DD which widely includes students with intellectual disability (ID) and autism spectrum disorder (ASD; Knight et al., 2019; Spooone et al., 2019). Providing quality instruction is one of the components of successful inclusion requiring the use of evidence-based practices (EBPs) which are supported by high-quality experimental research that produce positive and consistent student outcomes (Marder & deBettencourt, 2015; Mesibov & Shea, 2011; Odom et al., 2010; Travers, 2017). Despite their potential to improve students' outcomes, there is a well-documented research-to-practice gap related with the use of EBPs in general education (GE) settings (Cook & Schirmer, 2006; Jones, 2009; Tekin-Iftar et al., 2017). Research revealed that GE teachers do not implement EBPs as they are expected (Brock et al., 2020; Odom et al., 2013; Stahmer et al., 2005) and even instead of using them some teachers may choose to use unproven, disproven and pseudoscientific interventions in their classrooms (Travers, 2017). EBP trend in special education (SE) can be regarded as response to pseudo-scientific implementations exploiting the SE area for decades (Kozloff, 2005; Travers, 2017). Teachers' knowledge about EBP is vitally important for their professional development (PD; Travers, 2017). Not only the teachers' knowledge about EBP but also inclusive education is highly important. Though research indicated that GE teachers are not well trained for inclusive practices (Burns & Ysseldyke, 2009; Cook et al., 2007; Ergul et al., 2013; Mackey, 2014; Sahin & Gurbuz, 2016), felt themselves disqualified (DeSimone & Parmar, 2006; Sahin & Gurbuz, 2016), have no sources to sustain instruction (Burstein et al., 2004; Mackey, 2014; Ross, 2002; Santoli et al., 2008), and need supports in inclusive practices (Mackey, 2014; Sahin & Gurbuz, 2016; Santoli et al., 2008). There are many institutional efforts which aim to translate research into practice by providing information about EBPs through listing them on online platforms (e.g., National Autism Center [NAC], National Professional Development Center on Autism [NPDC]). Although these efforts are highly valued, as Vyse (2015) indicated the lists of EBPs in these platforms cannot assure the teachers to use them correctly. Therefore, providing PD to teachers to utilize EBPs to ensure success for all students in inclusive education is still a critical need. Consequently, during the last 2 decades, researchers have directed their attention to suggest the effective yet low cost PD models to train teachers. It can be delivered in different forms; however, the most common form is a one-day in-service training with limited or no follow-up support. Research has shown that teachers who have been exposed to training with limited in-class support or no support experience failure to translate into their practice what they have acquired during PD training sessions (Kretlow & Bartholomew, 2010; Scheeler et al., 2004). Klingner et al. (1999) argued the possible reasons of this failure as (a) not having in-depth understanding during of a practice exposed during PD sessions, (b) forgetting how to implement them correctly, and (c) needing a refresher for the practice. Once this failure has been realized, researchers have started to address it through coaching (Lignugaris-Kraft & Marchand-Martella, 1993; Morgan et al., 1994; Peterson-Miller et al., 1991). Findings of these research showed that coaching revealed not only the accuracy of using a new practice in the classrooms but also the rate of acquisition of a new practice can increase (Kohler et al., 1997; Kretlow et al., 2011, 2012; Ploessl & Rock, 2014). Coaching can be delivered in different forms such as side-by-side (Rakap, 2017; Tekin-Iftar et al., 2017), delayed (Artman-Meeker & Hemmeter, 2013; Hemmeter et al., 2011), or online (Owiny, 2014; Tunc-Paftali & Tekin-Iftar, 2021). Both its effectiveness and providing options for delivery mode are highly promising to utilize while training teachers. However, it can be regarded as a high cost intervention (Shannon et al., 2015; Snyder et al., 2015) when especially considering the lack of resources (i.e., computer, Internet access, and time). These aforementioned drawbacks on the use of coaching provide the impetus for this study to investigate whether teachers can acquire self-monitoring and increase the correct use of EBP through self-monitoring. Cost-effective PD implementations providing to assess procedural fidelity of the targeted EBPs are important to ensure the use of EBPs with high accuracy (Marder & deBettencourt, 2015). Monitoring their own teaching behaviors and providing feedback to themselves can be an alternative to overcome the above-stated costs of coaching (Pinkelman & Horner, 2017; Simonsen et al., 2013). Research show that self-monitoring could be an option in training teachers to use of various instructional practices and classroom

management strategies (Aykut et al., 2011; Bishop et al., 2015; Mouzakitis et al., 2015; Pinkelman & Horner, 2017; Plavnick et al., 2010; Workman et al., 1982). Of these studies, very few reported students' outcomes (Pinkelman & Horner, 2017; Plavnick et al., 2010; Workman et al., 1982) and researchers are recommended to examine effectiveness of self-monitoring on different situations (e.g., different interventions, group settings [Bishop et al., 2015; Mouzakitis et al., 2015; Rispoli et al., 2017]). Besides, there have been no study aiming use of self-monitoring while utilizing SP procedure and overwhelming majority of self-monitoring research conducted with primary school students. Likewise, Wong et al. (2015) indicated that the vast majority of the studies aiming to teach academic skills were conducted with preschool and primary school students. There is an urgent need for conducting research with adolescents and young adults with ASD, likewise the same group with ID (Kuntz & Carter, 2019). Research findings have suggested that behavioral skill training consisting of instruction, modeling, rehearsal and feedback, is an empirically validated teaching method for teachers, parents and caregivers to teach new teaching methods (Brock et al., 2017; Dogan et al., 2017; Kirkpatrick et al., 2019). Furthermore, behavioral skills training has not been evaluated widely with general education teachers (Kirkpatrick et al., 2019).

Access to general education is another important component of the inclusive education (Browder et al., 2006; Tekin-Iftar et al., 2017). It promotes the opportunity to learn the same curriculum as their peers with typical development (Spooner et al., 2006). In this regard it is thought that learning academic skills may facilitate self-respect and independence to students with DD (Estes et al., 2011). In addition, learning academic skills may help to decrease school dropout problem experienced in students with disabilities. The lack of academic gains throughout the school years may cause school dropout problem among students with disabilities as they get older. The dropout rate for students with disabilities is almost two times higher than that of GE students (Blackorby & Wagner, 1996). Yet there is an emerging literature guiding how to teach academic skills to middle school students with ASD (Estes et al., 2011; Wong et al., 2015); particularly in GE settings by embedding the instruction in the routine (Tekin-Iftar et al., 2017). On the other hand, there are studies aiming to support students with ID in access to GE curriculum (Heinrich et al., 2016; Jimenez et al., 2012). Kuntz and Carter (2019) reviewed studies to determine the procedures for students with ID in GE settings and revealed that interventions based on applied behavior analysis were effective to teach academic skills; however, the taught skills were not parallel with the curriculum, only one skill was taught to them and only in a few studies the instructors were the GE teachers. Moreover, teachers' knowledge and experience is also insufficient in providing access to GE curriculum to students with special needs (Spooner et al., 2006) and they are expected to learn and implement EBPs to support to developmental areas of their students with DD (Koegel et al., 2012; Kuntz & Carter, 2019).

Simultaneous prompting (SP) procedure, is an EBP for teaching various skills to individuals with DD (Tekin-Iftar et al., 2019). SP procedure includes two types of trial sessions: (a) daily probe trials and (b) training trials. Daily probe trials allow students to exhibit independent responses and demonstrate students' learning level by delivering a target stimulus (i.e., a task direction) to the students and evaluating their responses to the stimuli before training trials as controlling prompt (i.e., one likely to result in a correct response) is included in every training trail (Tekin-Iftar et al., 2017). Training trials include delivering individualized controlling prompt immediately after the task direction, which ensures correct response and reinforcement. Training trials continues to be conducted until the students meet criterion. A relatively recent systematic review and meta-analysis study on SP procedure by Tekin-Iftar et al. (2019) documented that SP is (a) not only effective in acquisition of a new behavior but also facilitating maintenance and generalization, (b) effective on teaching academic skills, (c) effectively used with high accuracy by implementers (e.g., parents, peers, siblings, paraprofessionals) other than SE teachers. Moreover, the majority of the SP studies have been conducted in SE settings with preschool and primary school age students. To the knowledge of authors there is only study investigating the effectiveness of SP procedure in teaching academic skills to middle school students with ASD in inclusive settings (Tekin-Iftar et al., 2017). There still need for research examining the effects of SP procedure used by GE teachers by embedding in routine class in teaching academic skills in GE curriculum to students with DD in GE settings (Tekin-Iftar et al., 2019). Last, there is no research examining the effects of self-monitoring on teachers' use of SP procedure and other strategies to teach academic content to their students with DD. Considering all these

research needs, Travers (2017) also emphasized the importance of teachers' teaching to students with DD notice the difference between science and pseudoscience and avoidance of using interventions that have no evidence-base to protect the students with DD from ineffective or harmful interventions. Last but not least, students with DD have generally failure to acquire language skills comparing to their same age peers (Petursdottir & Mellor, 2017). Therefore, the aims of the present study are threefold. The first aim is to examine whether GE middle school Turkish language teachers can learn self-monitoring skills and use these skills to increase accurate use of steps of SP procedure gained through PD when teaching academic content to their students with DD in GE settings. The following specific research questions (RQ) are formulated related to this aim:

- RQ 1** *Will PD result in accurate use of the self-monitoring steps by middle school Turkish language teachers in teaching academic content to students with DD in an inclusive setting?*
- RQ 2** *Will these teachers use of the self-monitoring skills to increase accurate use of SP procedure they acquired through PD in teaching academic content to students with DD in an inclusive setting?*
- RQ 3** *Will the teachers maintain accurate use of the self-monitoring and SP procedure skills after their students' acquisition of their target skills?*
- RQ 4** *Will the teachers generalize the use of the self-monitoring and the SP procedures skills in teaching new academic content to the same students?*

The second aim of this study is to examine the effects of SP procedure on teaching academic skills to middle school students with DD in GE settings. The following specific research questions are asked related to this aim:

- RQ 5** *Will students with DD learn academic content taught by their teachers with SP procedure?*
- RQ 6** *Will students with DD maintain the content after training sessions completed?*
- RQ 7** *Will students with DD generalize the content across persons and natural environment?*

The third aim of the study is to examine the opinions of GE teachers and their students about the social validity of the study. The following specific research question is asked related to this aim:

- RQ 8** *Do the opinions of GE teachers support the social validity of the study?*
- RQ 9** *Do the opinions of students support the social validity of the study?*

2 | METHOD

2.1 | Participants and settings

Three GE teachers (Turkish language teachers) and three students with DD from a public middle school in Turkey participated in this study. Prior to study, the researchers obtained approval from the university review board. School counselor suggested potential teachers and students be included in the study. The first researcher met these teachers in their school to explain the study. Three language teachers accepted to participate in the study. The researchers obtained signed informed consent from the teachers and the teachers obtained signed assent from the students and consent from their parents.

2.1.1 | Teachers

Three middle school GE teachers participated in the study. Teacher 1 was 36-year-old female with 13 years of experience and had undergraduate degree in language teaching. Teacher 2 was 46-year-old female with 25 years of experience. Teacher 3 was 44-year-old female and had 23 years of teaching experience, seven years as a language teacher.

Both teachers had undergraduate degree in elementary education but had a minor degree in language teaching. The only prerequisite for the teachers to participate in the study was having a student with DD included in their classrooms and not having a training or background in SE. None of them had a learning history with PD, self-monitoring, and SP procedure. They never had a teaching history with SP either.

2.1.2 | Students

Three students with DD participated in the study. Student 1 was a 13-year-old male eighth-grade student with moderate ID. Student 1 spent 88% of his school time in GE classroom the rest in SE classroom. His individualized education plan (IEP) for language class included the goals such as "reading comprehension," "use of punctuation marks," "elements of the sentence structure," and "meaning in the word." Student 2 was a 12-year-old female seventh-grade student with ASD. Student 2 spent her 80% of her school time in GE classroom and the rest in SE classroom. Her IEP included the goals for language class such as "reading and listening comprehension," "use of punctuation marks," and "mood in verbs." Student 3 was a 13-year-old male eighth-grade student with ASD. For language course his IEP included the goals such as "use of punctuation marks," "reading and listening comprehension," and "word meaning and sentence meaning." Last, all students were attending at a special education and rehabilitation center two hours in a week to receive support services in academic, daily living, and social skills. The prerequisite skills for the students to participate in the study were ability to (a) follow directions, (b) reply questions (4–5 word sentences), (c) pay attention to visual and/or audio stimuli for 5 min, and (c) comprehend content of sentences. The first researcher interviewed the language teachers regarding these skills as well as observed them in their classrooms to confirm that they had these skills. The students did not have a learning history with SP either.

2.1.3 | Settings for the teachers

The PD sessions took place either in the school counselor's office or library depending on their availability at the time of PD sessions. The first researcher delivered PD sessions in the school counselor's office for the Participant 1 and 3, while he delivered PD sessions in the library for Participant 2. The school counselor's office was 16 m² and it includes a table, a task chair behind the table, two chairs in front of the table, and a bookshelf opposite of the table. The library was 52 m² and three of its walls were occupied by bookshelves and there were three long tables with 20 chairs around the tables. The researcher and the teacher sat face to face, while the computer was located on the table beside them in both the counselor's room and the library. The other settings for teachers were their classrooms. Besides, baseline and instruction sessions for teachers were conducted in the student's classrooms.

2.1.4 | Settings for the students

There were two different settings for the students too. The baseline and generalization sessions were conducted in the school counselor's office explained above. The other settings for them were their classrooms where the teachers conducted daily probe and instructional sessions. Each classroom was 48 m² and contained 18 desks, a blackboard and a smart-board. The target students were located in front of the teachers' tables which were next to the smart-board in each classroom.

2.2 | Materials

The materials were used only for the teachers in the study. PD materials included PowerPoint slides that provided information about systematic instruction, self-monitoring, SP procedure, and data collection. Moreover, at the end of the PD sessions, each teacher had access hard copies of the PowerPoint slides, guided notes, and samples of data sheets. The researcher videotaped PD sessions via his mobile phone. Besides, the teachers used data collection sheets and self-monitoring sheet in the instructional sessions.

2.3 | Experimental design

A nested multiple probe design across teacher-student dyads with trials documented the effectiveness of PD presented to the teachers to use self-monitoring and SP procedure in teaching academic skills to students with DD and the effects of SP procedure on students' outcomes (Tekin-Iftar et al., 2017). In other words, the researchers designed the first experimental design to assess the effectiveness of PD across the teachers and the second experimental design, dependent to the first experimental design utilized to demonstrate SP procedure across the students. Experimental control was built in when the dependent variable increased after the independent variable introduced in a time-lagged manner.

2.4 | Dependent variables

There were three dependent variables in the study: (a) the GE teachers' ability to use the self-monitoring accurately at the end of a session in which they implemented the SP procedure (b) the GE teachers' ability to use the SP procedure accurately to teach academic content to the students with DD (c) acquisition of the academic target behaviors from Language class by each student with DD. The researchers used the task analysis developed by Tekin-Iftar et al. (2017) to record instructional behaviors during baseline and intervention sessions. The first researcher and an observer collected data and the teacher self-monitored on the following behaviors in all sessions: (a) use correct teaching materials, (b) deliver attentional cue, (c) deliver task direction, (d) wait 4-s response interval, (e) deliver appropriate consequences, (f) collect data on student responses, and (g) wait 4-s intertrial interval. The criterion for teachers was at least 90% accuracy in using the SP procedure and self-monitoring across five consecutive instructional sessions. When the consistent baseline data obtained from the teachers, the researchers decided to provide PD for the Teacher 1 and the phase changed for the Teacher 1 and Student 1. Moreover, phase change occurred for the next teacher and student dyad, considering the experimental design, when the target teachers performed proximate to the criteria.

The researchers worked with the teachers to determine three target behaviors for each student. They selected the target behaviors considering students' IEPs and the core content in the units of language class that would be teaching while the research was going to be conducted. The criteria were 100% correct responding on target behaviors during daily probe sessions. Table 1 displays the target behaviors for the students.

2.5 | Independent variables

There were two independent variables in the study. The independent variable for GE teachers was PD to use the SP procedure and self-monitoring. Another independent variable of the study was the SP procedure to teach academic content to students with DD.

TABLE 1 Target behaviors of the students

Student	Target skill	Response
Student 1	1. Tell me the subject in this sentence!	1. e.g., "I came home."
	2. Tell me the verb in this sentence!	2. e.g., "She bought a pen."
	3. Make a sentence with a subject and a verb!	3. e.g., "Clouds disappeared."
	4. Tell me the object in this sentence! (generalization)	4. e.g., "I bought a book."
Student 2	1. Tell me a verb with necessitative!	1. e.g., "I must go."
	2. Tell me a verb with present continuous tense suffix!	2. e.g., "I am going."
	3. Tell me a noun with plural suffix!	3. e.g., "Toys"
	4. Tell me an imperative sentence! (generalization)	4. e.g., "Do your homework!"
Student 3	1. Tell me the word used with a literal meaning!	1. e.g., "The teapot was hot."
	2. Tell me the word used with a figurative meaning!	2. e.g., "She broke my heart."
	3. Make a cause and effect sentence!	3. e.g., "As the alarm was not set, I was late for the school."
	4. Make a purpose sentence! (generalization)	4. e.g., "He took a taxi in order to go home!"

2.6 | General procedure

The study consisted of baseline, PD, intervention, maintenance, and generalization sessions. Prior to study, the first researcher conducted a pilot study consisted of two sessions with two GE teachers individually who had similar characteristics with the participating teachers to examine whether any modification was needed in the PD protocol developed by the researchers and the data collection sheets were effective to use. The researcher video recorded these sessions too. The teacher in the first pilot session made mistakes while using SP procedure and self-monitoring after being exposed to PD, the second researcher watched the video and gave feedback for both the content of PowerPoint presentation (e.g., using non-technical words), and steps of PD (e.g., providing detailed feedback right after role playing). Then, the first researcher conducted a new pilot study with the second teacher. Any modification was not adopted at the end of this session.

2.7 | Baseline sessions

Baseline condition consisted of two different types of sessions: (a) baseline sessions for the teachers and (b) baseline sessions for the students.

2.7.1 | Baseline sessions for the teachers

During these sessions, the first researcher assessed the teachers' ability to deliver SP procedure (i.e., daily probe trials followed by instructional trials) and use self-monitoring to teach the academic content to their students with DD. The researcher deliver a task direction (e.g., "Please, teach your lesson in your routine."). Each interaction of the teacher with their student with DD was counted as a trial and the researcher collected data for the teacher behaviors presented above. An observer was ready in the sessions to collect reliability data. There were three types of possible responses during baseline sessions: (a) correct response, (b) incorrect response, and (c) no response. They defined

correct responses as performance of any of the steps of SP procedure and incorrect and no responses as either not performing the steps of SP procedure or incorrectly performing them. In both daily sessions, the observers collected data using a plus (+) for performing a step correctly, and a minus (–) for not performing a step or performing a step incorrectly. Then the researcher and observer thanked the teachers at the end of each session. The researchers calculated the percentage of correct responses out of the number of possible responses to plot the data on the graph. The researchers set the number of possible responses per session at nine trials per step (i.e., nine opportunities to provide attentional cue, a task direction, a prompt, a consequence, data collection for student behavior, and self-monitoring) considering the students' target skills and the criteria. In addition to this, the teachers collected data on their own behaviors while using SP procedure on self-monitoring form. The researchers calculated the self-monitoring data by agreement on the teachers', the researcher and the observers' data on records of teachers' their own behavior while using SP procedure.

2.7.2 | Baseline sessions for the students

The first researcher instead of teachers conducted baseline sessions with the students due to comply with the baseline protocol because the teachers have not received the PD yet about how to conduct these sessions. There were nine trials in each baseline session. The researcher delivered an attentional cue (e.g., "... are you ready?"); after receiving an affirmative response from the student he delivered the task direction (e.g., "Tell me the subject in this sentence."). Then, he waited 4-s to the student's response. Correct responses resulted in verbal reinforcement. The researcher ignored incorrect and no response and waited 4-s to provide next trial. He thanked the students for their participation and appropriate behaviors at the end of the sessions. He collected data using a plus (+) for the students' correct response and a minus (–) for incorrect response or no response within 4-s. Then, he calculated the percentage of correct responses and plotted them on a graph.

2.8 | Instructional sessions

2.8.1 | PD sessions

The first researcher provided PD following behavioral skill training (Tunc-Paftali & Tekin-Iftar, 2021) sequence on SP procedure and self-monitoring for the three teachers individually in a time-lagged manner. PD consisted of sequence of (a) verbal instruction about the concepts systematic instruction and the SP procedure, (b) modeling (video and live), (c) role playing, and (d) feedback. In the beginning, he provided a background on the systematic instruction (e.g., stimulus, response, consequence, prompting, trial, response interval, and attentional cue), SP procedure (i.e., prompting and how to fade prompt, recording data), and self-monitoring (i.e., procedural fidelity) through verbal presentation via PowerPoint slides. The following step was a three-steps modeling. First, the researcher showed video model (i.e., the first researcher was the model in these videos) then live model for correct and incorrect implementation of SP steps and self-monitoring procedure while teaching academic content individually to a student. Then, the researcher himself planned a teaching session (i.e., teaching future tense suffix) for another class in the school in which a student with DD included. The researcher provided live modeling on how to provide SP procedure via embedding class routine. At the end of the lesson, he recorded his self-monitoring behaviors. After then, they exchanged their roles. The researcher acted as a student and the teacher delivered SP procedure. The researcher provided feedback to the teachers on their performance until they reached 100% accuracy in implementing the SP procedure and self-monitoring. Each PD session lasted approximately 50 min.

2.8.2 | Simultaneous prompting sessions

After PD sessions completed, the teachers implemented the SP procedure with the included students with DD during a 90-min class for two instructional sessions per 2 days and a 45-min class for one per 1 day in a time-lagged manner. Each session consisted of nine probe trials and nine instructional trials (three trials for each target behavior). Except for the first session, in which the teachers only conducted training trials without probe trials; they conducted probe trials prior to training trials during all consequent sessions. The researchers and the teachers planned the first 20 min of the lesson for the probe sessions with three-by-three distributed trials. The teachers used verbal prompts according to teachers' and researchers' consensus on students' imitation and verbal expression performances. The teachers conducted daily probe sessions as explained below to assess whether the students acquired the target behaviors. The teacher first gave the attentional cue (e.g., "...., I am going to ask some questions. Please tell the answer, if you know. We can start when you're ready!"). When the student verbally approved that he/she is ready, the teacher reinforced her response verbally ("Great, let's get going!") and then presented the task direction (e.g., "..., tell me a noun with plural suffix!"). The teacher waited for 4-s for a response; and reinforced correct responses verbally (e.g., "Great job! You did it.") and the teacher ignored incorrect responses or no responses. The teachers, the researcher and an observer collected data on the student's responses and the researchers calculated percentage of correct responses as explained above and plotted student's data on the graphs. The criterion was 100% correct responses for all students for five consecutive probe sessions. Besides, the teachers recorded their own behaviors needed to perform during probe sessions on self-monitoring data collection sheet given by the researchers. Moreover, the researcher and an observer collected data on the teachers' behaviors, using the same data collection procedure as used during baseline sessions for the teachers. The researchers and the teachers planned the other 20 min of the lesson for training sessions with three-by-three distributed trials. Following the probe trials, the teachers conducted training trials. As the probe trials the teacher secured the student's attention (e.g., "...., are you ready?"), reinforced her affirmative response (e.g., "Great, let's start!") and delivered task direction (e.g., "Tell me a verb with necessitative") and immediately presented the controlling probe (e.g., "I must go, for example!"). The teacher then waited 4-s for a response and reinforced the correct response verbally (e.g., "Perfect!"). The teacher ignored an incorrect or no response. The teachers collected data on the student's behaviors during these sessions too; however, prompted responses did not count toward criterion and were not graphed. They used the same data collection procedure as in the daily probe trials. Likewise, the probe trials, the teachers collected data on their own behaviors on self-monitoring data collection sheet and the researcher and an observer also collected the teachers' behavior by following the same data collection procedure. Criterion was at least 100% correct responses across five consecutive sessions for all teachers.

2.9 | Maintenance sessions for the teachers and the students

Maintenance sessions occurred at 1, 2, and 4 weeks for Teacher 1 and 1, 3, and 4 weeks after intervention for the remaining teachers. The researcher asked the teachers to conduct both a daily probe session and a training session using SP procedure and self-monitoring as they did in intervention sessions. The researcher thanked the teachers for their cooperation. Maintenance sessions for the students occurred at 1, 2, and 4 weeks for Students 1 and 1, 3, and 4 weeks for Students 2 and 3 after intervention at the same time with maintenance for their teachers. The researcher and the teachers collected maintenance data on the target behaviors for the students, while the teachers' conducting probe sessions for their maintenance sessions.

2.10 | Generalization sessions for the teachers and the students

The researchers assessed the ability of the teachers to generalize the SP procedure across new content in a pretest-posttest manner. The researchers assumed the one data point at the baseline sessions as the pretest as they did not have the ability to use SP procedure yet. The researcher asked the teachers to select one target behavior from a different unit and conduct one daily probe and one SP training session. There were three trials in these sessions. Table 1 also displays the target behaviors that the teachers developed for generalization.

To assess the ability of the students to generalize the target behaviors taught in the study across persons and settings. An observer conducted one generalization session consisted of nine trials with each student in the counselor's office in a pretest-posttest manner. The observer conducted these sessions just like baseline sessions. In addition to these sessions, the first researcher also conducted a naturalistic generalization. After the maintenance and generalization session were over, the teachers held a written examination in which the teachers asked the target behaviors to the students to reply and assessed their responses on 100% grading system according to assessment principles of schools.

2.11 | Interobserver agreement (IOA) and treatment integrity

Eleven observers collected reliability data for all sessions (100%) of experimental condition with the teachers and students. The researcher taught them how to collect reliability data on SP procedure until the observers and the researcher achieved 100% agreement. The researchers calculated interobserver agreement (IOA) data using a point-by-point method (i.e., number of correct responses/number of correct plus incorrect responses $\times$ 100). IOA analysis for the SP procedure for baseline, maintenance and generalization was 100%, while IOA for the intervention sessions was 98.1% for Teacher 1 (range = 82.5%–100%), 98.9 for Teacher 2 (range = 88.9%–100%), and 99.9% for Teacher 3 (range = 98.4%–100%). IOA analysis for self-monitoring in all conditions was 100%. Treatment integrity for the SP procedure was the dependent variable for the GE teachers in this study. An observer collected reliability data for 100% of PD and observers' training sessions and treatment integrity was 100% compliance across the teachers based on the following formula: observed teacher behaviors/planned teacher behaviors $\times$ 100 (Billingsley et al., 1980). The researcher conducted baseline sessions for the students and video recorded them. The observer who collected reliability data for PD sessions and observers' training sessions collected reliability data for baseline sessions for the students and the researcher conducted these sessions with 100% treatment integrity.

2.12 | Social validity

2.12.1 | Social validity for the teachers

The researchers collected social validity data in a time series design (i.e., before, during and after the intervention) in order to provide a holistic view whether the teachers' opinions about the study changed throughout the intervention. The researchers developed three social validity forms consist of open-ended questions including 9 questions for before the intervention; 11 questions for during the intervention, and 12 questions for after the intervention. Dissertation committee members reviewed these questions and provided their feedback. The questions for social validity for before the intervention developed for assessing the teachers' expectations and opinions about the study, while the questions for social validity for during and after intervention developed for examining whether their opinions changed throughout the study. The first researcher conducted semi-structured interview with the teachers to collect social validity data.

2.12.2 | Social validity for the students

The researchers also collected social validity data from the students to assess their opinions about the SP procedure and their target behaviors. They developed a social validity question form including nine open-ended questions. Dissertation committee members also reviewed these questions and provided their feedback. The first researcher conducted semi-structured interviews with them to collect social validity data.

3 | RESULTS

3.1 | Effectiveness findings

3.1.1 | Effectiveness of PD on the teachers' use of the SP procedure

The researchers plotted the treatment integrity data as the dependent variable to show the effectiveness of PD on the teachers' use of the SP procedure. Figure 1 displays the accurate use of the SP procedure during baseline, intervention, maintenance, and generalization sessions across the participating teachers. Teacher 1 used the steps of the SP procedure during baseline condition with a mean of 6.3% accuracy (range = 0%–9.5%). Following PD, she reached criterion on third session on using SP procedure in five consecutive sessions and maintained with 100% accuracy. Teacher 2 used the steps of the SP procedure during baseline condition with a mean of 12.2% accuracy (range = 0%–26.9%) and following PD, she reached criterion in two sessions and maintained with a mean 98.9% (range = 96.6%–100%). Teacher 3, used the steps of the SP procedure during baseline condition with a mean of 15.4% accuracy (range = 4.8%–28.5%). She immediately reached criterion after PD and maintained with 100% accuracy. Teachers 1 through 3 performed 7.9%, 11.1%, and 15.3% accuracy during the generalization pretest and demonstrated 100% accuracy during the posttest.

3.1.2 | Effectiveness of the PD on teachers' use of self-monitoring

Figure 1 also displays effectiveness of the PD on the teachers' accurate use of the self-monitoring and their performances during baseline, intervention, maintenance and generalization sessions across the participating teachers. None of the participating teachers performed any correct responses during baseline sessions. Once they completed the PD sessions, their performances on the use of self-monitoring improved significantly. Teachers 1 and 3 reached the criterion on steps of self-monitoring in one session and Teacher 2 reached the criterion in three sessions. None of them performed any correct responses during the generalization pretest and demonstrated 100% accuracy on posttest.

3.1.3 | Effectiveness of the SP procedure on students' target behaviors

The researchers plotted the percentages of correct responses in daily probe sessions during SP instruction condition to evaluate the effectiveness of the SP procedure on the students' acquisition of their target behaviors. Figure 2 displays participating students' performances on baseline, intervention, maintenance, and generalization sessions. Student 1, performed his target responses with a mean of 8.8% accuracy (range = 0%–11.1%) during baseline condition. The trend and level of his data changed therapeutically after he was exposed to SP instruction. He reached criterion in 14 sessions and maintained his target behaviors with 100% accuracy. Student 2 did not perform any correct responses during baseline condition. The trend and level of her data changed therapeutically after the intervention began. She

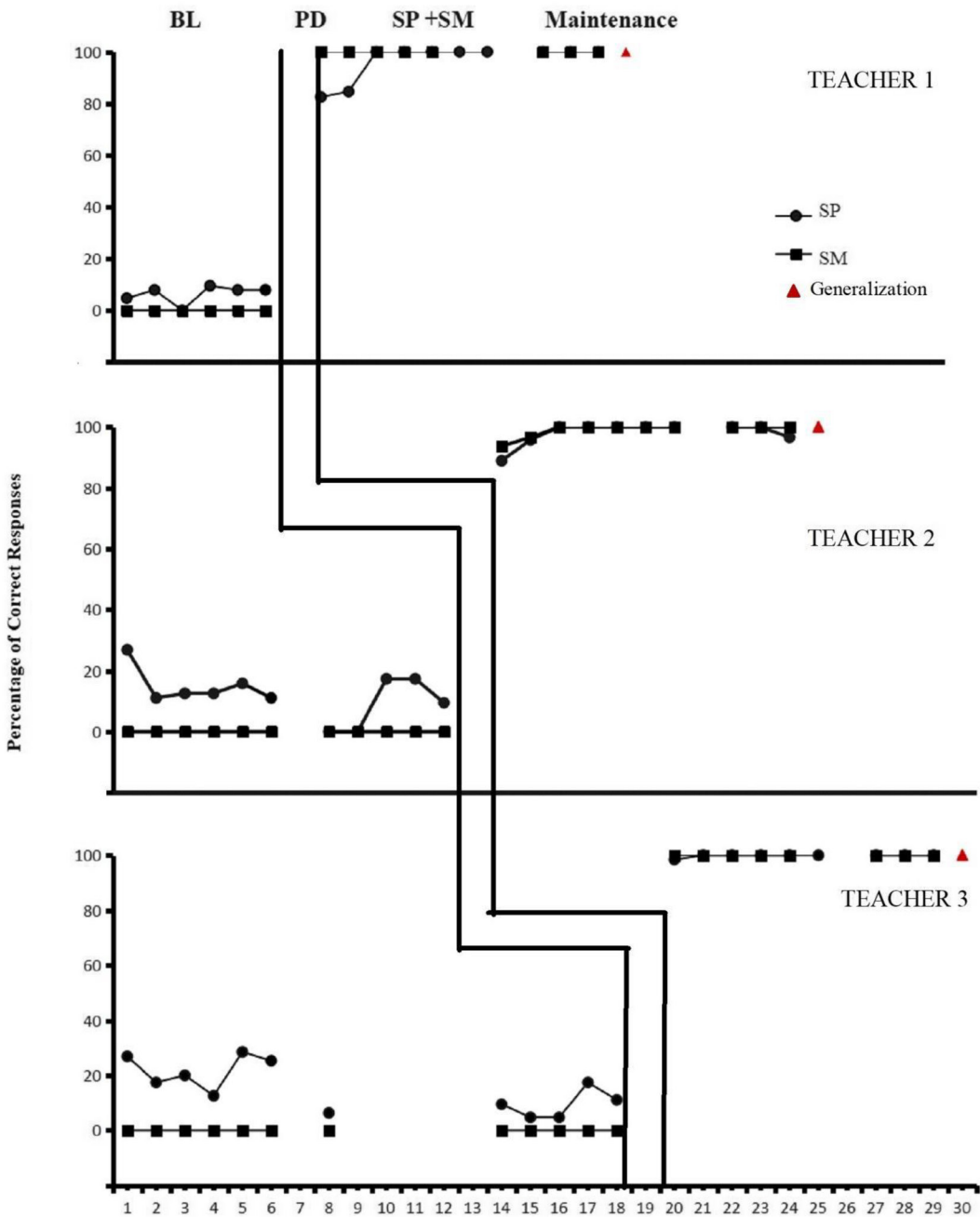


FIGURE 1 The percentage of correct response of teachers' use of SP procedure during baseline (BL), intervention, maintenance and generalization sessions. PD, professional development; SM, selfmonitoring; SP, simultaneous prompting

reached criterion in 9 sessions and maintained her target behaviors with a mean of 96.3% (range = 88.9%–100%). Student 3 performed his target responses with a mean of 8.8% accuracy (range = 0%–11.11%) during baseline condition. The trend and level of his data changed therapeutically after he was exposed to SP instruction. He reached criterion in nine sessions and maintained his target behaviors with a mean of 96.3% (range = 88.9%–100%). Except

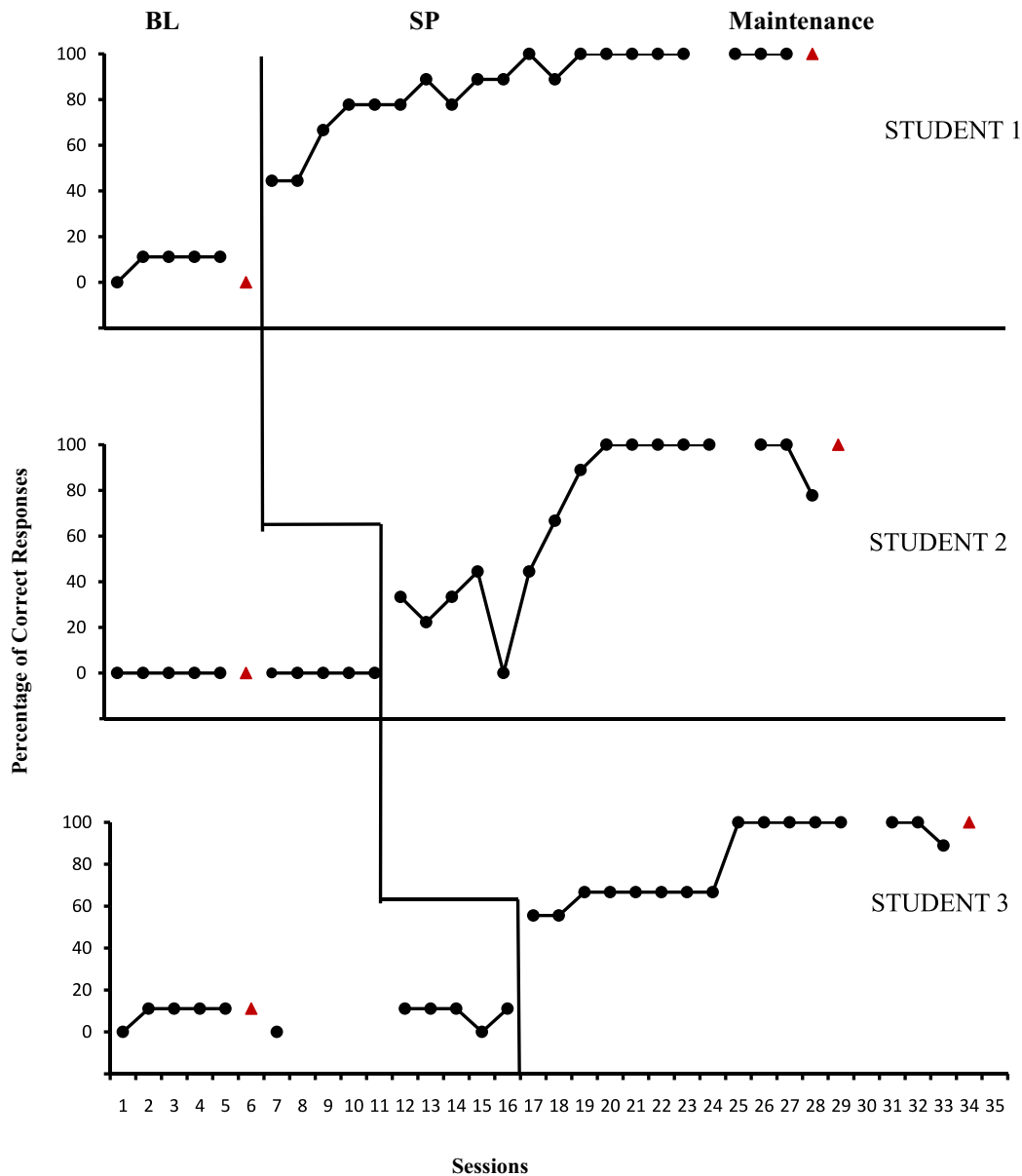


FIGURE 2 The percentage of correct responses of students during baseline (BL), intervention, maintenance and generalization sessions. PD, professional development; SP, simultaneous prompting

Student 3 neither Student 1 nor Student 2 performed any correct responses on their target responses during generalization pretest across persons and settings (Student 3 performed 11.1% accuracy). All participating students performed on their target responses with 100% during the posttest generalization sessions. Last but not least, data showed that all participating students answered each question about their target behaviors with 100% accuracy when participating teachers asked them in written exam as a natural generalization probe.

3.2 | Social validity findings

3.2.1 | Teachers' opinions before the intervention

The researchers asked questions about social validity of the study to the teachers before, during, and after intervention to demonstrate whether the study made a change in their opinions. Before the intervention all participating teachers stated that they (a) needed to learn effective teaching practices to support their students with DD, (b) they felt lucky to learn them with expert support, (c) did not have any idea about self-monitoring (d) expected to support their students with DD, (e) are open to accept new PD opportunities to develop themselves, and (f) expected to generalize the systematic instruction practice that they were going to learn to the different students and skills. They also expressed that they liked to be going to learn a new teaching procedure and to be going the support their students. Last, they stated there were anything they did not like about the study yet. However, Teacher 3 uttered that she had concerns about classroom management.

3.2.2 | Teachers' opinions during the intervention

The researchers asked questions about the study to the teachers after they completed the initial training and started to deliver intervention. They said having learned SP procedure is important as they saw that it was effective for their students. They stated that the three most liked parts of the SP procedure were (a) SP's being short and explicit, (b) helping to affiliate to their students with DD, and (c) their students' learning. They expressed that there was nothing that they did not like about SP procedure but only Teacher 2 said that it would be more easier one-on-one because of the crowd of the class. They all stated that self-monitoring helped them to see their correct and incorrect teaching behaviors and they liked it and would prefer to use it with other teaching procedure in future. When the researcher asked whether their opinions changed throughout the study; they responded the question as the change was positive. Moreover, Teacher 3 said that there was no need to be concerned about the classroom management. Last, the researcher asked to the teachers' opinions about delivering trials in a distributed format and they presented different opinions. Teacher 1 stated that both had advantages because distributed format helped Student 1 to include in class while massed trial was more practical for teacher to see the outcomes. Teacher 2 said that delivering trials in a distributed format was hard while teaching rest of the class in a group teaching arrangement, thus she preferred massed format. Teacher 3 conducted all training sessions in a distributed format and she expressed that it was more practical for her not to break the normal ongoing class routine.

3.2.3 | Teachers' opinions after the intervention

The researchers asked questions about the study to the teachers after the intervention sessions were completed. First, they stated that they were happy about using SP procedure and self-monitoring with accuracy and about their students' performances on their target behaviors. Besides, Teacher 2 stated that Student 2 made long sentences different from controlling prompt and Teacher 1 expressed that Student 1 easily forgot everything but surprisingly he maintained his target behaviors. In addition, all three teachers maintained their positive opinions they presented during the intervention. The teachers reported that PD was goal oriented, explicit, understandable; required reasonable time and contributed to their practices. Besides, the teachers presented their opinion about self-monitoring as easy, practical, user friendly, be done in a short time.

3.2.4 | Students' opinions

The students reported that they liked the whole process and the study, they learned what they taught and the process was easy. They stated that they could answer the questions in the written exam. There was nothing that Student 1 and Student 2 did not like in the study; however, Student 3 complained about his friends because of making noise. Except Student 2 they expressed that they would like their current and prospective teachers to teach the contents in the classroom routine. Last, when the researchers wanted to learn that students' opinions about massed and distributed trials, Student 1 said he liked distributed trials, while Student 2 said she liked massed trials and Student 3 said he liked both of them.

4 | DISCUSSION

The researchers aimed to investigate the effectiveness of (a) PD to the GE teachers' accurate use of SP procedure with self-monitoring in teaching academic content included in the GE curriculum to middle school students with DD and (b) the SP procedure in teaching the academic content to students with DD in this study. They also examined maintenance and generalization effects of PD on the teachers' use of SP procedure and self-monitoring and of the SP procedure on the students' acquired academic skills. Last, they assessed the social validity of PD before, during, and after the training, while assessing social validity of SP procedure after training in the study. The PD was effective in training GE teachers to use the SP procedure and self-monitoring accurately, and the students acquired the targeted academic skills from their language class. Additionally, both the teachers and students maintained the acquired skills over time. The teachers generalized the use of SP procedure in teaching new academic skills to their students, and the students generalized the acquired academic skills across persons and to the written examination.

We followed the behavioral skill training steps to train middle school GE teachers to use the SP procedure and self-monitoring during PD. There are a few study investigating the effectiveness of SP procedure delivered by middle school the GE teachers to DD (Kuntz & Carter, 2019; Wong et al., 2015). With its' positive outcomes being parallel with findings of the previous studies (Fidan & Tekin-Iftar, in press; Tekin-Iftar et al., 2017; Tunc-Paftali & Tekin-Iftar, 2021), this study, which is one of the few studies examining the effectiveness of SP procedure in teaching academic skills (Kuntz & Carter, 2019) may enrich the related literature. In addition to this, Teacher 1 and Teacher 3 could use SP procedure with distributed trials and this finding differentiated from previous studies findings (Fidan & Tekin-Iftar, in press; Tekin-Iftar et al., 2017; Tunc-Paftali & Tekin-Iftar, 2021). It could be a result of performing live modeling step in the natural classroom environment conducted by the first researcher who had used SP procedure in distributed format as Tekin-Iftar et al. (2017) recommended. This is one of the strong findings of this study in terms of meeting an important parameter of inclusive education as distributed format does not allow teachers' getting out of natural class routine.

Another significant finding of this study, consistent with previous studies (Hager, 2012; Oliver et al., 2015) aimed to investigate effectiveness of self-monitoring was teachers' accurate use of self-monitoring from the first training session (even they did not perform %100 criterion on using SP). Within this context, this study enlightens the search for alternative and economic PD that grants and measures high-procedural fidelity to extend EBPs (Marder & deBettencourt, 2015; Pinkelman & Horner, 2017; Simonsen et al., 2013). Besides, the GE teachers maintained use of self-monitoring four weeks after the training sessions ended, which is also consistent with previous studies (Plavnick et al., 2010; Workman et al., 1982). The finding of teachers' generalization of SP procedure and self-monitoring to different academic skill lasted after four weeks is important. Moreover, the generalization of the GE teachers' use of self-monitoring is consistent with previous studies findings (Hager, 2012; Keller et al., 2005; Lylo & Lee, 2013).

We collected the social validity data from the teachers before, during and after the intervention in order to provide a holistic view about the PD. Additionally, demonstrating social validity with a time-series design contributes researchers to reflect changes of view about the process, which may be better than collecting only after the

intervention. Before the PD, each of the GE teachers had positive approach the PD, and did not have any knowledge about systematic instruction and self-monitoring. Before the PD, only Teacher 3 expressed her concern about classroom routine. These findings are consistent with previous studies findings that the GE teachers are not well trained for inclusive practices, felt themselves disqualified have no sources to sustain instruction and need supports in inclusive practices (Burstein et al., 2004; Cook et al., 2007; DeSimone & Parmar, 2006; Mackey, 2014; Sahin & Gurbuz, 2016; Santoli et al., 2008).

Social validity data collected from the GE teachers during and after the intervention was consistent with one another. They expressed that PD was understandable and they told about their satisfaction, which shows that acceptableness of the PD used in this study for consumers. Moreover, the teachers also stated their positive opinions about SP procedure, which is consistent with previous studies (Tekin-Iftar et al., 2017). Additionally, expression of the teachers' about self-monitoring providing them to realize their corrects and mistakes and being user-friendly consistent with other studies in self-monitoring literature collected social validity data (Bishop et al., 2015; Mouzakitis et al., 2015). However, this finding is different from the findings of the study conducted by Shannon et al. (2015), in which the teachers said they had difficulties in the process since absence of an expert supporting or being accounted to. Importance of teaching use of self-monitoring occurs at this point. In addition to all these, we asked their opinions about massed and distributed trials to the GE teachers. Teacher 3 delivered all the trials in a distributed format; while Teacher 1 used both of them and Teacher 2 used only massed format. Teacher 3 said that distributed trials had made her to manage classroom more effectively. Teacher 2 shared the same opinion about distributed trials with Teacher 3 and she stated distributed trials included the student in the classroom. Last, Teacher 2 said that she could not achieve distributed trials. Consequently, different from Tekin-Iftar et al. (2017), teachers reported positive opinions about distributed trials. Distributed trials required to be extended in inclusive practices since it makes classroom management more successful.

The findings of the study show the effect of SP procedure when teaching students with DD. The participating students acquired their target behaviors right after the teachers started to deliver SP procedure and maintained them over time, and generalized them across persons and written examination. Merely, plateau in Student 3s' performance after the increase draws attention. This may be result from one of his target skills ("Make a cause and effect sentence!"), of which controlling prompt longer than his other two target skills. These findings are consistent with previous studies (Tekin-Iftar et al., 2017; Tunc-Paftali & Tekin-Iftar, 2021). Besides, the students generalized their target skills across written examination. This is very precious for students with DD to access GE curriculum. Furthermore, all of the students expressed their happiness about the study.

Last but not least, two of the students' had a diagnosis of ASD, while one had ID and while two of the students was eighth-grade, one was seventh. Although the characteristics of the students were similar, these differences should be considered. This was the result of that the researchers could not find a school that had students with DD at the same grade and number of participants. This is based upon the dropout rate of students' with disabilities in middle schools. The dropout rate of students with DD at middle and high school grades increases because of the reasons as follow: (a) as stated above, middle school teachers are not well trained for inclusive education (DeSimone & Parmar, 2006; Ergul et al., 2013; Sahin & Gurbuz, 2016), (b) inadequate peer interaction (Carter, 2018; Feldman et al., 2016), and (c) complexification of the curriculum gradually (Kuntz & Carter, 2019). Extending the research like our study, the dropout rate of the students with DD may decrease.

Considering the limitations of the study is important. First, the findings of the study were limited with three teacher-student dyads. Second, we analyzed the teachers' behaviors only in terms of dependency (DiGennaro-Reed & Coddington, 2014) we did not assessed qualification of their behaviors. Lastly, teachers' delivering format could affect students' learning level or speed.

We recommend that researchers may examine the effectiveness of SP procedure in teaching chained academic behaviors related to other class (e.g., Maths) with using other type of prompts (e.g., modeling) in future studies. Researchers may develop a web-based PD including teaching other EBPs with self-monitoring to support teachers to make PDs cost effective. Besides, it will be important to design a study, which compare the effectiveness and

efficiency of distributed trials and massed trials in GE settings. Future studies may include video self-monitoring to promote procedural fidelity. As a cost effective intervention the effects of behavioral skills training and self-monitoring can be examined in larger group with different experimental methods (e.g., group experimental research) to generalize the findings. The researchers also recommend researchers to examine the effectiveness of self-monitoring used by parents, siblings, and peers.

CONFLICT OF INTEREST

We have no conflict of interest to disclose. The first author completed this study in partial fulfillment of the requirements of a Doctorate of Philosophy Degree in Special Education at Anadolu University, Eskisehir, Turkey.

ETHICS STATEMENT

The authors also acknowledge that all procedures performed in this study involving human participants were in accordance with the ethical standards of the university's Institutional Review Board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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