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ABSTRACT

Providing opportunities to make choices has received increasing support as an antecedent intervention to improve the performance of students with disabilities. Additional research in this area is needed to determine under what circumstances the application of choice making as a curricular intervention is appropriate and produces meaningful outcomes. The present study extended this line of research and investigated how providing choice opportunities to children with autism impacted their performance during teacher-assigned homework activities. An ABAB design was utilized to evaluate the effects of choice making (student vs. tutor) on the academic performance of four children with autism. Results showed that providing students with opportunities to make choices regarding the order of task completion and use of stimulus materials improved participants' accuracy, productivity, affect, and reduced their disruptive behaviors. These findings support the use of child choice as a teaching strategy to improve the academic performance of children with autism during curricular activities. The functional properties of choice making and considerations for its use as a curricular-based antecedent intervention are discussed.

DESCRIPTORS: choice making, autism, curriculum, teaching strategies

The motivational and behavioral challenges exhibited by children with autism in teaching situations can be very difficult for both educators and families (Koegel & Koegel, 1995). As a consequence, children with autism are often precluded from more integrated educational settings. To help students with autism participate in and benefit more fully from less restrictive educational settings, it is essential to identify teaching strategies that can address their challenging behaviors and be successfully integrated within curricular activities that characterize their educational programs. In an effort to accomplish this goal, there has been an increasing emphasis on antecedent interventions for students with disabilities (cf., Dunlap & Kern, 1993; Munk & Repp, 1994). Antecedent interventions are characterized by attempts to restructure aspects of the teaching context and delivery of instruction so as to minimize the occurrence of challenging behavior that interferes with learning so that the likelihood of success is increased.

Providing opportunities to make choices has received growing support as an antecedent intervention for students with disabilities (Kern et al., in press). Providing choice of stimulus materials, academic tasks, the pace of instruction, and the order of task presentation are examples of how choice making has been incorporated into teaching contexts to improve student performance. Systematic investigations on choice making as a curricular intervention have produced favorable results (e.g., Cosden, Gannon, & Haring, 1995; Dunlap et al., 1994; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Dyer, Dunlap, & Winterling, 1990; Harding, Wacker, Cooper, Millard, & Jensen-Kovolán, 1994; Seybert, Dunlap, & Ferro, 1996). For example, Cosden et al. (1995) investigated whether students with disabilities could benefit academically from selection of rewards and academic tasks from lists of rewards and tasks generated by their

teachers. These authors found that student control over reinforcement and/or task materials increased completion and performance accuracy on academic tasks when compared to conditions where the teacher had control over reinforcement and/or task material selections. In addition, their results suggested that improved task performance under student-control conditions was not a function of different tasks or rewards chosen by the student. Instead, the opportunity to select rewards or tasks appeared to have a significant impact on task performance. Better performance was exhibited when students were given more control over program components.

A second study conducted by Dunlap et al. (1994) investigated the effects of choice making on the responding of elementary school students with emotional and behavioral challenges during academic tasks. They demonstrated that students exhibited superior task engagement and reductions in disruptive behavior when they were allowed to choose the order of presentation of the academic materials, compared to when their teacher randomly selected the order. This same pattern of results emerged in their second analysis in which they controlled for student preference by yoking the order of academic tasks in choice and no-choice conditions. One important implication drawn from this growing area of research is that we may be able to apply choice making across a broad range of curricular activities and within a variety of teaching contexts for students with disabilities in order to improve their academic performance.

To better understand the benefits of choice making, increasing attention has been given to the investigation of the underlying mechanisms of choice making that influence behavior. Much of this research has focused on evaluating the effects of choice making and its relationship to preference. The benefits of preference on the performance of students with disabilities has been well established in the literature (Dunlap, Foster-Johnson, Clarke, Kern, & Childs, 1995; Foster-Johnson, Ferro, & Dunlap, 1994). An increasing number of studies suggest that the level of preference for the options made available is the operative variable when examining the effects of choice making on behavior (Bambara, Ager, & Koger, 1994; Cole, Davenport, Bambara, & Ager, 1997; Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997). Although limited data exist, there are a few studies that suggest that choice making may have functional properties that exceed the benefits of preference alone (Dunlap et al., 1994; Vaughn & Horner, 1997). Although definitive results on the functional properties of choice making remain inconclusive, there is increasing agreement that providing opportunities to make choices is a highly efficient way for children with disabilities to express their preferences within teaching contexts (Dunlap et al., 1994; Harchik, Sherman, Sheldon, & Bannerman, 1993; Kern et al., in press). Additional research is necessary if we are going to better understand the parameters for successfully applying choice making as an antecedent-based curricular intervention across teaching contexts for a wide range of individuals with disabilities.

The current study expanded upon the emerging literature on choice making that addresses when choice making is an appropriate and effective antecedent intervention. It evaluated whether providing opportunities to make choices would facilitate the performance of children with autism during teacher-assigned academic tasks. In an attempt to expand upon the current literature in a meaningful way, a variety of dependent measures were used to assess direct and collateral effects of choice making and to obtain a comprehensive understanding of the impact of choice making on student performance. In addition, this study applied choice making to a teaching context focusing on the actual homework assignments students were required to complete by their classroom teachers as part of their curriculum. Furthermore, it focused on students with autism participating in full-inclusion regular education classrooms who were having difficulties completing their assigned homework due to behavioral challenges. Both parents and teachers

expressed concerns that these children were not benefiting from this component of their curriculum and were seeking support to address this issue.

METHOD

PARTICIPANTS

Four children with autism were selected to participate in the current study. They exhibited a range of cognitive and behavioral difficulties related to academic tasks, participated in full-inclusion educational settings, and were given weekly homework assignments as part of their curriculum. In addition, selection was based on parental reports of children having difficulty completing their homework because of disruptive behaviors, lack of compliance, and/or poor quality of work during previous attempts at homework-related activities.

Charles (chronological age of 9 years, 5 months) attended a full-inclusion fourth-grade classroom. At times, he was capable of functioning at a high level on cognitive tasks, had a tested IQ of 100, and showed age-appropriate receptive and expressive language skills. Despite his age-appropriate receptive and expressive language abilities, he exhibited stereotypic and repetitive use of language (e.g., perseveration on specific topics). He also showed a restricted repetitive and stereotyped pattern of behavior associated with specific interests and activities (e.g., rapidly flipping pages while looking at books, asking repetitive questions even after answers have been given to his questions). In addition, Charles exhibited marked impairment in his use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate his social interactions with others. When presented with academic tasks, he frequently became aggressive (e.g., scratching, pinching, spitting) and disruptive (e.g., interrupting with repetitive questions, chewing on stimulus materials, ripping paper, throwing materials, leaving his seat) when they did not coincide with his own interests.

James (6 years, 9 months of age) was enrolled in a full-inclusion kindergarten class. He had a tested IQ of 96, showed a slight delay in his receptive language skills, and demonstrated age-appropriate expressive language skill. He showed qualitative impairment in his social interactions, as manifested by marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate his social interactions. He had difficulty in his ability to initiate or sustain a conversation with others due to inappropriate language use (e.g., pronominal reversals, poor articulation, perseveration on unrelated topics). James frequently pushed the teaching materials off the table, turned away from the tutor, withdrew his attention, and left his seat when academic tasks were presented to him. He also would perseverate on unrelated topics such as the furniture in the room or on things taking place outside the session room that he could hear or see out the window.

Carl (5 years, 10 months of age) attended a full-inclusion kindergarten class. He had a tested IQ of 88, showed a slight delay in his receptive language, and demonstrated age-appropriate expressive language skills. He exhibited marked impairment in the use of multiple nonverbal behaviors (e.g., eye-to-eye gaze, facial expression, body postures, and gestures) to regulate his social interactions with others. He also showed difficulty in sustaining conversations, typically engaging in restricted repetitive language use, and exhibited a preoccupation with restricted interests. When presented with academic tasks, Carl would often remain silent, push his chair away from the table, and turn away from the tutor. He also frequently left his seat, attempted to leave the room, or play on the furniture.

Chuck (8 years, 1 month of age) attended a full-inclusion third-grade classroom and required one-to-one supervision throughout his school day. He had difficulty with most cognitive

activities. He had a tested IQ of 55 and showed severe impairments in his receptive and expressive language skills. His speech was primarily echolalic but he had acquired a functional vocabulary of labels and requests (e.g., "I want more please"). In addition, Chuck showed severe impairment in the use of multiple nonverbal behaviors (e.g., eye-to-eye gaze, facial expression, body postures, and gestures) and failed to develop peer relationships. He demonstrated stereotypic and repetitive motor mannerisms, such as hand flapping and gazing at lights. During academic tasks, he had a difficult time staying on task. He would often interrupt the tutor giving instructions by repeating specific words (i.e., immediate echolalia), trying to grab and throw stimulus materials, and pushing the tutor's hands away when being prompted or redirected. Chuck frequently left his seat and would pace back and forth before returning to work at the table.

SETTING

All sessions consisted of academic tasks assigned by each student's teacher as homework expected to be completed outside of class as part of the curricular requirements. The sessions were conducted and videotaped at the Autism Research Center (University of California, Santa Barbara, CA) in a small study room containing a table and chairs with adequate work space. All homework sessions were conducted with a one-to-one tutor-child format while sitting at a table. Tutors were university undergraduate and graduate students. All necessary task materials (e.g., homework, writing utensils) were provided by the tutor and placed on the table within easy reach of the child and tutor.

MATERIALS

All four children brought their regular homework assignments with them each week. All stimulus items necessary for homework completion (e.g., pens/pencils, scissors, glue) were provided. Charles brought homework assignments on mathematics (e.g., addition and subtraction), geography (e.g., learning climate and physical characteristics associated with different parts of the United States), crosswords (e.g., recognition and spelling of weekly vocabulary words), and reading comprehension (e.g., brief paragraphs were read and then questions related to the text were asked). James brought printing (e.g., letters and words), counting (e.g., dot to dot), and word/sound recognition homework-related assignments. Carl brought homework assignments on printing (e.g., letters A through Z) and visual/pattern recognition related tasks (e.g., matching shapes or figures, completing the pattern from a sequence of shapes). Chuck brought homework assignments consisting of vocabulary words (e.g., recognition, matching, and printing) and counting (e.g., completing dot-to-dot pictures of animals and shapes, counting by ones, fives, and tens).

TUTORS AND OBSERVERS

All tutors and observers were advanced undergraduate or graduate students. Each observer had completed at least one upper division course in behavioral psychology. In addition, prior to recording data from any homework sessions, all observers received brief training in scoring for appropriate responding, disruptive behavior, rate of homework completion, and the use of the affect rating scales. Training for observers involved reading the operational definitions of each dependent variable followed by practice in recording each type of response or making affect ratings from a training tape of a homework activity with a child with autism. Before working with any child in this experiment, tutors were trained to an 80% criterion level on the correct use of delivering clear instructions, prompting, providing opportunities to make choices regarding

homework activities and stimulus item selections, and using effective consequences (e.g., social praise, ignoring and blocking disruptive behaviors) with children with autism.

EXPERIMENTAL PROCEDURES

With the exception of the manipulated independent variable, the teaching procedures were identical in nochoice and choice conditions. In general, after the homework activity and stimulus item selections were made, instructions for task completion were given. Then demands to complete the homework activities were given, characterized by the following types of prompting sequences: verbal prompt, verbal and gestural prompt, and verbal and physical prompt. For example, a verbal prompt would be, "Can you make an upper case A here?"; a verbal and gestural prompt would be, "Make an upper case A here" while modeling the appropriate response; and a verbal and physical prompt would be, "Make an upper case A here" while physically guiding the child through the appropriate response. All participant responses were reinforced with immediate social praise only if they were completed following a verbal or verbal and gestural prompt and within 5 sec of the prompt delivery. Failure to respond at all within 5 sec of the prompt was considered an incorrect response.

EXPERIMENTAL CONDITIONS

In the no-choice condition, the tutor chose the order of the homework activities, the sequence of items or problems within the homework activities, and the stimulus items (e.g., pens, glue, scissors) necessary for homework completion. Tutor selections for both stimulus items and order of homework activities were predetermined in two ways. For no-choice phases that were not preceded by a choice phase, stimulus item and order of homework activity selections were predetermined by random selection. Tutor selections for those no-choice phases that had been preceded by a choice phase were made in accordance with a yoked schedule, so that stimulus items and the order of the homework activities were identical to those selected by the subject in the previous choice phase. The yoking procedure was designed to control for child preference and task difficulty across corresponding choice and yoked no-choice phases. The tutor provided directions and gave the child specific demands throughout the session characterized by the prompting sequence described above.

In the choice condition, the child was allowed to choose the order of the homework activities, the order of specific items or problems within those selected activities, and the stimulus materials (e.g., specific type of pens, glue, scissors). The tutor provided the child with opportunities for choice making throughout the session by asking questions such as, "Which homework activity do you want to work on next, spelling or math?" while presenting two sheets of homework. Once a homework activity selection was made, the tutor might ask, "Which math problem do you want to do first or next?" With respect to stimulus materials, the tutor might ask, "What color marker do you want to work with now, blue or red?" while holding up two markers. Spontaneous child requests for changing homework activities and/or stimulus items were accommodated during the choice condition. Once the child made a specific homework activity and stimulus item selection, the tutor gave demands utilizing the same prompting and reinforcement procedures as indicated for the no-choice condition.

EXPERIMENTAL DESIGN

An A-B-A-B design was selected for two participants and a B-A-B-A design for the other two participants. The A-B-A-B and B-A-B-A designs were selected to provide two occasions for demonstrating the effects of the treatment variable, to counterbalance the sequencing of

treatment conditions as a control for order effects, and to reduce the potential for carry-over effects commonly associated with alternating or multi-element designs. Each child was seen twice a week for a total of 20 homework sessions. Each phase consisted of five sessions. Random assignment procedures were utilized in placing participants into one of the two experimental designs prior to their first session.

MEASUREMENT OF THE DEPENDENT VARIABLES

Four dependent variables (percent of correct responding, percent of intervals with disruptive behavior, rate of homework completion, child affect) were selected to assess if providing opportunities for choice had a meaningful effect on child performance. Percent of correct responding was defined as the number of correct homework responses divided by the total number of homework demands given. Correct responses were defined as any child behavior following a homework demand consistent with the demand specifications that facilitated progress toward homework completion (e.g., sitting down to do homework when asked to do so, using the specified writing utensil, printing a specified word or letter, adding or subtracting numbers correctly, circling the correct item). Incorrect responses were defined as child behaviors following homework demands that did not meet the demand specifications and were not evaluated as disruptive behavior (e.g., failing to make a response to a demand, counting incorrectly, printing the incorrect letter or word, circling the wrong item). Each child response was recorded, independent of the tutor's consequence, as either correct or incorrect.

Percent of intervals with disruptive behavior was the number of intervals in which the child engaged in disruptive behavior divided by the total number of intervals in the homework session. Intervals were 10 sec in length. Disruptive behaviors were defined as any child behavior not directly related to a specific demand or the homework activity that disrupted progress toward homework completion (e.g., leaving seat, interrupting homework instructions, throwing pencil/pens or homework sheets, destroying homework stimulus items, hitting or kicking, playing with or on furniture, trying to leave the room, engaging in self-stimulation).

Rate of homework completion was the number of homework trials completed divided by the amount of time (in minutes) spent in that homework session. Homework trials were defined as all child output indicated on assigned homework sheets that were legible and consistent with homework instructions (e.g., printed letter or word, colored object, written math solution). Observers were given copies of completed homework assignments and independently evaluated all homework trials directly on the homework sheets as either (+) positive when legible and consistent with the instructions or (-) negative when not legible and/or inconsistent with the homework instructions.

In order to obtain data pertaining to levels of child affect, at least one observer completed three, 6-point rating scales at the end of every homework session. These scales referred to the child's enthusiasm, interest in the activity, and happiness. Scores of 0 and 1 indicated negative affect, scores of 2 and 3 indicated neutral affect, and scores of 4 or 5 indicated positive affect. Each of the scales has been shown in previous publications to be reliable and to be useful in differentiating levels of affect (Dunlap, 1984; Dunlap & Koegel, 1980; Koegel & Egel, 1979).

Dependent measures were collected only during the first 20 minutes of each homework session or until all assigned work was completed, whichever came first. Given slight fluctuations in the amount and type of homework assigned each week, and the differences in the pace at which participants completed their work, homework sessions were variable in length (range = 18 to 35 minutes). This was done to provide adequate time for participants to complete

a sufficient amount of their homework so that they could receive credit from their classroom teacher for that work they successfully completed.

RELIABILITY

Two observers independently recorded the children's responses during 48% of the homework sessions throughout all experimental conditions. All homework sessions were recorded and time coded onto videotapes. Data were collected on correct responding and disruptive behavior via a 10-sec continuous-interval system. Data related to the rate of homework completion were collected from participants' finished homework assignments that were returned to their teachers. Data corresponding with child affect were collected from affect ratings completed following each homework session. Percent agreement for correct responding, disruptive behavior, rate of homework completion, and child affect dependent variables was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying the result by 100. An agreement on the recording of individual responses for correct responding and disruptive behavior was defined as two observers recording the same response within that 10-sec interval. Average percent agreement for correct responses was 90.5% (range: 83%-98.7%); incorrect responses, 89.3% (range: 81.3%-95.8%); disruptive behavior, 93.6% (range: 89.4%-100%); and no responses, 91% (range: 80.2%-100%). Agreements in the scoring of rate of homework completion were defined as both observers evaluating a specific response (homework task) in an identical manner. Average percent agreement for (+) positive responses was 96% (range: 91.5%-100%); and (-) negative responses, 97.3% (range: 93.4%-100%). Agreements in the scoring of affect were defined as both observers recording the identical score or recording scores within one point of each other when both scores were in the same category (positive, neutral, or negative). Average percent agreement on enthusiasm was 88.5% (range: 84.7%-97.8%); on interest, 91.3% (range: 87.6%-99.4%); and on happiness, 89.7% (range: 86.9%-98.6%).

RESULTS

Homework activity and stimulus item selections made by each participant and tutor across choice and no-choice conditions were monitored. Homework activity and stimulus material selections were identical across choice and corresponding yoked no-choice phases so that the sequence and pairing of specific academic tasks and stimulus materials were held constant. In addition, selections made by participants in choice conditions closely resembled in kind and number the selections made in the (nonyoked) no-choice conditions. The exact number of choice-making opportunities provided to each participant within choice conditions varied depending on the amount and range of homework activities assigned each week. Given these constraints, it was Carl who received the greatest number of choice-making opportunities, then Chuck and James who were provided with a comparable number of choices, whereas the least number of choice-making opportunities was provided to Charles. Choice-making opportunities regarding the specific stimulus materials to be used to complete the academic tasks were given most frequently, ranging from one to five choice opportunities per session. Opportunities for choice pertaining to the order of the assigned academic tasks ranged from one to seven choice-making opportunities per session.

The pattern of choice making tended to vary across sessions and phases for each participant within choice conditions. With respect to the order of homework activity selections, preference for a specific type of academic task was only evident for Chuck. Chuck most consistently chose to start with math (counting) tasks when they were available in session. Regarding stimulus

material selections, participants most frequently chose a pencil as the writing utensil to complete their work, with the exception of Carl. Carl only selected colored markers to complete his work, although a preference for a particular color was not evident. With respect to specific homework activity and stimulus item pairings, there were some consistencies across choice conditions for particular participants. For example, Charles always selected crayons (instead of markers) to complete his geography homework, although the colors varied across sessions. James always chose to use the large pair of scissors and a glue stick (i.e., vs. small scissors and glue bottle) when completing homework activities that required cutting and pasting.

Percent of correct responding. Results pertaining to participants' accuracy of responding are summarized in Figure 1. These data indicate that all four participants showed more favorable patterns of correct responding during choice conditions when compared to no-choice conditions. Although all participants showed more favorable patterns of correct responding under choice conditions, the magnitude of the differences between choice and no-choice conditions tended to vary somewhat across participants. The differences in correct responding across choice and no-choice conditions were very clear for Charles, James, and Carl. In contrast, Chuck showed a less robust pattern of differentiation in his level of correct responding.

Percent of intervals with disruptive behavior. Results on the percent of intervals with disruptive behavior are summarized in Figure 2. All four children engaged in less disruptive behavior in choice conditions when compared to no-choice conditions. These differences are most pronounced for James and Charles. Carl engaged in relatively low rates of disruptive behavior in both choice and no-choice conditions. For Chuck, disruptive behavior tended to remain at the near zero levels or reflected a decreasing trend under choice conditions. In contrast, during both yoked control no-choice conditions, he showed an increasing trend in disruptive behavior.

Rate of homework completion. Results on participants' productivity are summarized in Figure 3. Overall, the rates of homework completion appear to be greater in choice conditions than in no-choice conditions. In addition, it was only under choice conditions that participants completed all assigned homework within the allotted time (20 minutes) for data recording. For example, Charles completed all his assigned work in Choice Sessions 18 and 20. James was able to complete all assigned work for Choice Sessions 8, 18, 19, and 20. Carl completed homework assignments for Choice Sessions 3, 4, 11, and 15. Chuck was unable to complete his assignments during the 20 minutes allotted in either condition.

Child affect (Happiness, Enthusiasm, Interest). Composite (average) affect ratings for both choice and no-choice conditions are summarized in Figure 4. The ordinates represent composite levels of affect with scores between 0 and 1.7 representing negative affect, scores between 1.7 and 3.4 representing neutral affect, and scores between 3.4 and 5 representing positive affect. Inspection of these data revealed a highly consistent pattern of results. For every child, the choice condition produced consistently more positive affect ratings than the no-choice condition. Charles, James, and Carl obtained positive affect ratings under choice conditions, which fell within the neutral to negative affect range under no-choice conditions. Chuck's affect ratings tended to become increasingly negative across no-choice conditions.

DISCUSSION

In the present investigation, the results indicated that the positive effects on performance were produced when the participants were given opportunities to choose the specific stimulus items to be utilized for task completion and the order in which the activities/items would be conducted during scheduled sessions. These results are consistent with previous research demonstrating the

effectiveness of choice making as a teaching strategy to reduce problem behaviors among children with autism (Dyer et al., 1990; Koegel, Dyer, & Bell, 1987). In addition to reductions in disruptive behavior and improvements in on-task behavior among participants, the rate and accuracy of participants' responses also increased substantially under choice conditions. These results contribute to recent support for the benefits of choice making on student accuracy and productivity (cf., Cosden et al., 1995) that are in contrast to previous literature documenting either very small or no effect of choice making on the accuracy and productivity of responses made by persons with disabilities (Harchik et al., 1993). Given these findings, future investigations evaluating choice making as an antecedent-based curricular intervention may want to consider productivity and accuracy as important outcomes for evaluating the quality of the academic performance for children with autism. Interestingly, results also suggest that participants appeared to enjoy the homework more when given choices, as more favorable levels of child affect were observed under choice conditions. Overall, these findings are significant because both parents and teachers identified disruptive behaviors, task completion, and quality of work (i.e., accuracy) as primary concerns limiting the potential benefits of teacher- assigned homework for participants in the current study.

There are several possible explanations for the pattern of results observed here. The more favorable pattern of results observed in the choice condition may be related to participants' ability to access reinforcing items or tasks. A substantial amount of research (e.g., Fisher et al., 1992; Foster-Johnson et al., 1994; Mason, McGee, Farmer-Dougan, & Risley, 1989; Pace, Ivancic, Edwards, Iwata, & Page, 1985; Piazza, Fisher, Hagopian, Bowman, & Toole, 1996) has shown that access to activities and/or items assessed as being preferred is associated with reduced levels of problem behavior when compared with child performance using nonpreferred activities and/or items. Therefore, providing choices to participants in the present investigation may have increased their access to reinforcing items and activities, producing more optimal teaching conditions to facilitate better overall performance.

Another explanation for the more favorable pattern of results observed under the choice condition is that having the opportunity to choose is reinforcing. When stimulus items and the order of the activity were identical across choice and yoked no-choice conditions, more favorable patterns of correct responding, rate of homework completion, disruptive behavior, and child affect were observed under the choice conditions. It is possible that choice making may have served as a conditioned reinforcer for participants in the current study, if their previous choice opportunities have consistently led to positive outcomes (Fisher et al., 1997). Given that the participants' histories with choice-making opportunities were not directly assessed, this possibility is speculative. A related hypothesis which may help to explain the positive effects of choice making demonstrated in the current study is that choice making may have served as an establishing operation (cf., Horner, Vaughn, Day, & Ard, 1996; Michael, 1982, 1993). More specifically, it is possible that providing opportunities to choose increased the valence of the stimulus items and activities made available, in turn enhancing their reinforcing value. This possibility is highly plausible given that providing opportunities to choose allowed participants to make selections that corresponded with changes in their level of interest in the options made available. The current results provide additional support for the notion that choice making may possess functional properties that exceed the benefits of preference alone (Cosden et al., 1995; Dunlap et al., 1994).

It is important to note that participants' selections within the choice condition tended to vary across sessions. Also, the strength and durability of their preferences for the stimulus items and

activities made available to them were not directly assessed, thus making it difficult to clearly distinguish between the functional properties of choice making and preference on participants' performance in the current study. Several authors (e.g., Bambara et al., 1994; Fisher et al., 1997) have found that the relative preference for a task was an important variable in their investigation of the effectiveness of choice making for individuals with severe disabilities. Their results suggested that the positive effects of choice making may diminish as the level of preference for the items/activities made available decreases. Therefore, future research attempting to distinguish between the functional properties of choice making and preference may need to control for the strength and durability of preferences over time.

Results also suggest that specific child variables may be particularly important when interpreting the benefits of choice making in this study. For example, the magnitude of the differences observed across choice and no-choice conditions on the dependent measures appeared to be largest for Charles, James, and Carl who had significantly higher cognitive test scores and a lesser degree of assessed language impairment than Chuck. The children in this study with higher cognitive capabilities may have been able to recognize that choice-making opportunities were a means of gaining immediate access to potential sources of reinforcement, such as preferred activities and stimulus items, or of exerting control over the teaching situation. In addition, participants with higher expressive/receptive language abilities may have simply been able to more effectively communicate their preferences to exhibit control over stimulus items and tasks utilized during the homework sessions. Although these interpretations are speculative, they may represent limitations with choice-making interventions used for children with more severe impairments. Nonetheless, previous investigations have demonstrated that even students with profound impairments can be taught to efficiently make choices through teaching procedures that use augmentative communication systems (Kennedy & Haring, 1993; Wacker, Wiggins, Fowler, & Berg, 1988). Therefore, preintervention training on teaching choice making through augmentative communication systems might be an important component in future research on choice-making interventions with students with more pervasive impairments.

Although the benefits of choice making were evident in the present investigation, the independent variable consisted of choice-making opportunities for stimulus items and assigned academic tasks. Therefore, the effects of each element on performance cannot be separated. Despite the inability to determine the relative contributions of each choice-making component, the ease in which it was integrated into participants' curricular assignments and the marked improvements in participants' performance support the use of such an intervention for students with autism who are required to complete assignments outside of the classroom as part of their curriculum. An important feature of the current choice-making intervention is that it was designed to assist educators who need to establish curricular goals for students with special needs who participate in their classrooms. Participants in the current study were given tasks assigned by their teacher as part of their curriculum and utilized stimulus materials to complete these assignments that were consistent with those provided in their classrooms. Given that most educational programs for students with disabilities who are integrated have such constraints on what options can be made available, providing highly preferred activities and items may not always be possible. Working within these types of constraints in teaching situations, providing the opportunity to choose may have procedural advantages and serve to help identify what activity or stimulus item is most reinforcing at that particular time within that teaching context (Dunlap et al., 1994; Fisher et al., 1997; Foster-Johnson et al., 1994; Mace & Roberts, 1993; Wacker, Peck, Derby, Berg, & Harding, 1996). Therefore, choice making may be a particularly

useful intervention in teaching situations where student preference for options made available is relatively low or options available change frequently.

Although the results of the current study suggest that choice making facilitated participants' performance, there are numerous variables to consider when attempting to determine the benefits of choice making for students with disabilities. As a consequence, further systematic investigation on the application of choice making within the constraints of various teaching contexts, exploring what options can be made available, and relating outcomes to specific child characteristics is warranted (Dunlap et al., 1994). This is important for understanding how to best apply choice making within teaching contexts where choices have not been considered possible before while still producing positive direct and collateral effects. The current choice-making strategy is consistent with a widespread movement to identify effective antecedent-based interventions as an alternative to traditional teaching formats that are characterized by a high degree of external control and coercion (Horner et al., 1990). Clearly, the identification of effective teaching strategies is critical to ensure that students with autism can be integrated into less restrictive educational settings and benefit fully from their participation.

ADDED MATERIAL

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Figure 1. Results of the reversal comparison of no-choice and choice conditions for all four participants during homework sessions depicting their percent of correct responding.

Figure 2. Results of the reversal comparison of no-choice and choice conditions for all four participants during homework sessions depicting the percentage of intervals with disruptive behavior.

Figure 3. Results of the reversal comparison of no-choice and choice conditions for all four participants during homework sessions depicting their rate of homework completion (trials completed per minute).

Figure 4. Results of the reversal comparison of no-choice and choice conditions for all four participants showing composite affect rating scores (Happiness, Enthusiasm, and Interest scores averaged). Scores between 0-1 represent negative affect, 2-3 represent neutral affect, and 4-5 indicate positive affect.

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