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TEACHING CORE CONTENT VOCABULARY WITH AND WITHOUT PICTURES TO STUDENTS WITH MODERATE AND SEVERE DISABILITIES

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THESIS

A thesis submitted in partial fulfillment of the
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By

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ABSTRACT OF THESIS

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This study provided an examination of a comparison of the acquisition of skills between two different instructional conditions in teaching reading of vocabulary to high school students with moderate and severe disabilities. A comparison of the acquisition between the use of words with pictures and words alone was completed. An adapted alternating treatment design replicated across 4 participants was used to evaluate the differences in efficiency and effectiveness between the two instructional strategies (words with pictures and words alone). Results indicate both strategies were effective.

KEYWORDS: Moderate and severe disabilities, reading instruction, words with pictures, picture symbols, and constant time delay

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Section 1: Introduction

A critical skill in education is the ability to read and interpret meaning from what has been read. An individual reads words or phrases printed in text and applies meaning to it, aiding in understanding and comprehension of the information read. The assimilation of this information leads to increased knowledge. Students with intellectual disabilities often have difficulties in reading, which challenges educators. These students often have severe deficits that make it difficult to learn to read (Allor, Mathes, Champlin, & Cheatham, 2009). Special educators are challenged to ensure students with intellectual disabilities are given every opportunity to succeed. Teachers are encouraged to emphasize instruction that includes reading for students with significant disabilities. Reading instruction needs to be aimed at promoting acquisition of skills enabling these students to achieve outcomes leading to more opportunities and improved quality of life (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006).

Reading instruction includes essential elements identified by the National Reading Panel, (NRP; National Institute of Child Health and Human Development, 2000). The essential elements the NRP lists are (a) phonemic awareness - awareness that words are composed of individual sounds; (b) phonics - the connection between sounds and letters; (c) fluency - recognition of words and reading with speed and accuracy; (d) vocabulary - the meaning of words; and (e) text comprehension - or understanding of what is read. The NRP defines comprehension as intentional thinking where readers interpret meaning from text and then problem solve. The NRP states how reading is a complex cognitive process and how comprehension requires interaction between reader

and text. According to the NRP, vocabulary instruction plays a significant role in increasing comprehension.

In order to comprehend text, readers need to identify and interpret meaning from individual words, or vocabulary, included in the text. When defining vocabulary, Shanahan (2005) included both word recognition, as identifying the word by sight/reading, and word meaning as the interpretation of its context. Comprehension entails not only identifying words but also being able to understand what words mean. Special educators are challenged with assisting students by building upon the research and defining and applying evidenced-based strategies which will facilitate reading for students with moderate and severe disabilities (MSD; Browder et al., 2006).

In identifying evidenced-based strategies that facilitate reading, Browder et al. (2006) reviewed literature on reading instruction. The review compared 128 studies on reading instruction to the NRP's components of reading: vocabulary (including sight words and pictures), comprehension, fluency, phonics, and phonemic awareness. The review included published studies from 1975 to 2003. The researchers examined evidence-based practices that existed for instruction on the components listed by the NRP. Included in the study were 1,123 participants with moderate intellectual disabilities and severe disabilities ranging in age from preschool to adults. The researchers reviewed study characteristics, quality indicators, and effect size. Studies reviewed used single case research designs and group designs. The review provided evidence for implementation of prompting techniques, such as time delay, in order to achieve near-errorless learning to teach students with significant disabilities to read sight words.

Browder and Xin (1998) completed a meta-analysis, which examined instructional strategies used in teaching sight words for individuals with MSD. The analysis included 48 studies, completed from 1984 to 1997, investigating characteristics of participants, interventions, and effectiveness. The studies included 269 participants ranging in age from preschool through adult with diagnoses of moderate to severe intellectual disabilities, developmental disabilities, learning disabilities, mild intellectual disabilities, emotional disturbances, and autism. IQ scores ranged from 36 to 65. The intervention used in most of the studies was constant time delay. The findings showed that instruction on sight words was effective for individuals with MSD. The researchers reported strong evidence for teaching sight words to individuals with MSD, and identified time delay as an evidenced-based strategy due to its repeated effectiveness and efficiency.

Collins (2012) provided detailed information on systematic instructional procedures which included time delay. The author described time delay in terms of progressive time delay (PTD) and constant time delay (CTD). The procedure entails the delivery of the target stimulus followed by a controlling prompt, which enhances the likelihood of a correct response. PTD instruction encompasses using a 0s delay and then extending the delay in small increments of time until a predetermined delay is reached, such as a 5s delay. CTD instruction begins with a 0s delay interval and then proceeds immediately to a predetermined delay, such as a 5s delay interval.

Lalli and Browder (1993) completed a two-part study, which compared instructional strategies for teaching sight words and investigated the use of feedback procedures in community settings. In the first part of the study researchers compared four

instructional strategies: (a) stimulus shaping, (b) stimulus fading, (c) PTD, and (d) feedback only. In Experiment Two the researchers used a feedback only procedure. The researchers taught words selected from a list of words found in the participants' home and jobs. The participants' were adults, 29 to 46 years of age, with moderate developmental delays living in a group home. Although results were not consistent across all participants, four procedures were effective for 2 of the 3 participants with slight differences in effectiveness and efficiency. The researchers determined participants were able to learn words and apply what was learned to daily living activities.

Schuster, Griffen, and Wolery (1992) conducted research using a parallel treatments design to investigate the effectiveness and efficiency of simultaneous prompting (SP) and CTD in teaching sight words to elementary students with moderate intellectual disabilities. There were 4 participants, ages 10 to 11 years, with IQ scores ranging from 36 to 42. The purpose was to determine if SP and CTD were effective procedures and if there were differences in efficiency. The SP procedure was defined as a prompting strategy, which does not give the opportunity to respond independently during instruction but with probes conducted to assess acquisition. The researchers taught words found on shopping and grocery store lists. The results indicated the differences in efficiency of the two procedures were small. According to the authors, both procedures were effective in teaching sight words. The authors concluded that SP may be slightly more efficient but results show no general differences, citing the need for more research using both procedures. Examination of maintenance data again showed mixed results, with two students performing higher with SP and two students performing lower.

Riesen, McDonnell, Johnson, Polychronis, and Jameson (2003) also compared CTD and SP. They implemented an alternating treatments design in comparing the effectiveness of CTD and SP when used in embedded instruction for students with moderate to severe disabilities. The study examined the acquisition and generalization of targeted vocabulary words identified as part of general education classes for middle school students. The study was implemented by paraprofessionals in the general education science, German, and history classes. Results showed both procedures were effective in teaching reading and defining of the targeted vocabulary words. Both procedures enhanced acquisition.

In research conducted on implementation of the CTD procedure, Cohen, Heller, Alberto, and Fredrick (2008) examined the effects of a three-step decoding procedure with CTD, using a multiple probe across students design. Participants ranged in age from 9 to 14 years of age with IQ scores of 40 to 61. Participants attended either an elementary school for students with mild intellectual disabilities or a middle school classroom for students with moderate intellectual disabilities. The purpose of the study was to determine if CTD would be effective for teaching reading of words. The researchers implemented the CTD procedure with a 4s delay interval using a one on one instructional format. The results showed all students were successful in reaching criteria using the CTD procedure with the decoding strategy. The authors suggested further research should investigate both CTD and PTD with the decoding strategy.

Hua, Woods-Groves, Kalenberg, and Scheidecker (2013) investigated the use of CTD in teaching vocabulary acquisition. The researchers conducted a study using an alternating treatments design to investigate the effects of using CTD in teaching

vocabulary and reading comprehension to young adults with intellectual disabilities. The study compared two conditions: CTD and a control condition. The researchers wanted to answer questions in relation to teaching vocabulary using CTD and its effects on acquisition and retention. In addition, the researchers questioned the effects on comprehension. The participants attended a university program for young adults with disabilities. The results indicated the participants learned more words using CTD than in the control condition. Implementation of the CTD procedure resulted in the participants retaining more vocabulary knowledge and provided motivation for the participants. This study was significant in that, when preparing students for life after high school, it is necessary that educators provide instruction that will afford these students the skills needed if students with moderate to severe disabilities are to be successful.

In providing instruction that will prepare students to be successful, Mosley, Flynt, and Morton (1997) compared the effectiveness of teaching functional sight words in classroom instruction and community-based instruction using CTD. Implementing instruction in the community as well as in the classroom provides instruction that has the potential to enhance the quality of life as students are being connected to the real world or real life experiences. The researchers questioned whether there would be a difference in acquisition of sight word vocabulary in the classroom versus the community-based instruction. Participants ranged in age from 13 to 17 years with moderate intellectual disabilities and IQ scores of 37 to 50. Results indicated the students acquired the words in both settings with no significant difference between the two settings.

Browder, Ahlgrim-Delzell, Spooner, Mims, and Baker (2009) provided further evidence for the use of time delay in teaching sight words. The purpose of the literature

review was to determine if time delay is an evidence-based instructional strategy to teach students with severe disabilities word and picture word recognition skills. The review included analysis, based on Horner's quality indicators, of 30 research experiments, published from 1975 to 2007, which used time delay to teach sight words. The quality indicators included descriptions of participants and settings, dependent and independent variables, baseline measures, and validity. The researchers found support for CTD as an evidenced-based practice for teaching students with moderate and severe disability word identification with the use of picture with symbols.

In defining instructional practices in terms of providing effective and meaningful instruction that is successful for students, focus is directed on reading instruction that includes the strategies identified by NRP, including vocabulary. As previously mentioned, to comprehend text, readers need to identify and interpret meaning from individual words or vocabulary included in the text. The Browder et al. (2006) review revealed using pictures or symbols for students with severe intellectual disabilities increased literacy skills.

In investigating strategies, which could enable students with moderate to severe disabilities to improve reading skills, the literature includes studies that include pictures with words. Fosset and Mirenda (2006) compared paired associate (pairing of pictures with unfamiliar text) and picture to text matching. The study evaluated the effectiveness of picture to text matching and paired associate instruction in teaching sight word vocabulary using an adapted alternating treatments design. The study incorporated the use of the Picture Communication Symbols in the form of line drawings to assess acquisition of sight word vocabulary to evaluate the abilities of the participants in

matching pictures to text. The research provided evidence to support using pictures in instruction on sight word reading. Incorporating pictures resulted in instructional efficiency and generalization of reading skills.

Shurr and Taber-Doughty (2012) used a multiple probe across participants design to investigate the effects of pairing text with picture symbols on reading comprehension of 4 participants, ages 12 to 14 years, with IQ scores ranging from 42 to 54 (i.e., moderate intellectual disabilities). The researchers presented phrases with a picture symbols strip followed by multiple choice comprehension questions. Results indicated the intervention improved the comprehension skills of the participants. In addition, the study gave evidence that the use of visuals and discussion as interventions improved reading comprehension skills for students with moderate intellectual disabilities.

Jones, Long, and Finlay (2007) investigated the effects of adding picture symbols on the reading comprehension of adults with learning disabilities. The researchers implemented a within subject counterbalanced design study to determine whether the addition of picture symbols would enhance reading comprehension. The study examined the effects of a combined intervention of visuals and discussions on comprehension skills. To complete the study, the researchers had participants read the passage that contained text with pictures and text only passages. The participants read the passages and then answered comprehension questions. Results showed the participants scored better on comprehension questions after reading passages that were presented with pictures; especially those with lower reading comprehension abilities.

In adding pictures to text, Alberto and Fredrick (2000) presented an article on the use of a 5-step sequencing process to teach students to read pictures. The authors

described the use of pictures as having the potential to expand both receptive and expressive language skills. By sequencing pictures, students can learn to demonstrate comprehension, practice language skills, and to formulate sentences or complete complex task analysis to become more independent. Through the use of pictures, individuals with MSD are able to engage in instruction. The authors wrote that use of pictures encourages the cognitive thought processes, which could open the door to endless possibilities. With pictures, educators have the opportunity to provide students with MSD effective literacy instruction.

Alberto, Fredrick, Hughes, McIntosh, and Cihak (2001) defined literacy by the components of visual literacy. Visual literacy encompasses the ability to obtain meaning through images. Images may be graphics, such as signs or symbols. By incorporating the use of visual literacy (pictures), educators are providing an additional strategy for students with moderate to severe disabilities, increasing their access to the world around them. Alberto et al. conducted research using CTD to teach business logos and products available at those businesses to elementary and middle school students with MSD ranging in age from 9 to 14 years. The purpose of the study was to prove the effectiveness of using logos as a component of visual literacy. Results indicated students acquired the ability to identify the logos and available items for purchase, adding to the literature on CTD and visual literacy.

In response to the implication that use of pictures may prevent word recognition when words are presented without the use of pictures, Sheehy and Howe (2001) conducted research on "blocking effect" in relation to the use of picture with words. The blocking effect has been described as the reason for acquisition failure in teaching sight

word recognition. The researchers examined three conditions: a) use of words (text) alone, b) words with handles (i.e., inserting a shape or line drawing into the word to aid in word recognition), with fading of the handle, and c) feedback cueing where words were presented alone and then with the handle attached. The researchers employed a repeated measure design to study the three conditions. Conclusions from the study were the two conditions that incorporated the cue, handle/drawing, were more effective than word alone. Including cues can facilitate word identification and effectively teach students with severe disabilities, overcoming barriers in learning to read sight words.

Sheehy (2002) completed an additional study to compare the effects of a handle technique, picture cueing, and word alone to determine their effectiveness. The researchers sought to establish that there would be no difference in the effectiveness of integrated picture cueing, the handle technique, and word alone in teaching word recognition. Feedback cueing was implemented where words were presented on flashcards printed on one side with word alone and word with the handle cue on the other side. Conclusions drawn from this research indicated the use of strategies that incorporate more than word alone conditions can be more effective in teaching word recognition.

To assist in providing educators with information on the use of pictures with words, Parette, Boeckmann, and Hourcade (2008) outlined the use of Writing with Symbols software for children with and without disabilities. The use of this software enables educators to enhance literacy skills through the use of symbols by inserting a picture symbol with the word. This software provides the means of incorporating picture and text to engage students in reading. Students are presented with picture symbols from which to derive meaning and word identification. With the addition of symbols to print

the possibilities of their use in facilitating acquisition of words or word meanings presents special educators with a significant tool upon which to enhance reading instruction for students with moderate to severe disabilities.

The review of the literature directs educators to question the effectiveness and efficiency of using words with pictures for students with MSD. Does the addition of visuals enhance reading skills including word identification and comprehension? The purpose of the current research was to compare the acquisition of content vocabulary included in alternate assessment using words with pictures versus words alone.

Section 2: Research Questions

In order to determine whether the use of words with pictures enhances reading skills of students with MSD, the following research questions were addressed: 1) What are the differential effects of a words alone condition versus a words with picture symbols condition on the level and trend of sight word reading in high school students with moderate and severe disability; 2) What are the differential effects of a words alone condition and a words with pictures condition on stating the meaning of content vocabulary words for high school students with moderate and severe disability; and 3) Are students able to generalize to reading words alone for words learned with pictures when the pictures are removed?

Section 3: Methods

Participants

The study included 4 participants, 3 males and 1 female, enrolled in a high school resource classroom for students with MSD. The participants were Mary, Karl, Jerry, and Richard. Mary was a 15-year-old female with a mild intellectual disability. Mary's IQ measured by *Stanford-Binet Intelligence Scale* (2003) was 44. Mary scored 53 on *Kaufman Assessment Battery for Children,* Second Edition (KABC-II; 2004) and 78 on the *Vineland Adaptive Behavior Scales* (VABS; 2005). Mary identified all letters of the alphabet. She received 30% accuracy on her Swain sight word reading list of ten words. She independently wrote her name and 2-3 words from her sight word list. She exhibited good short-term memory skills. Mary followed directions and was compliant with requests made of her. She received speech language therapy for articulation errors. Mary participated in vocational training tasks within the school cafeteria of food preparation and cleaning tables, and in the hallways collecting recycling materials. Mary's Individualized Educational Program (IEP) goals included reading sight words and environmental sign identification. Mary used a picture schedule for daily classroom activities.

Karl was a 17-year-old male student with a moderate intellectual disability and seizure disorder. Karl's IQ score was 40 measured by the *Stanford-Binet Intelligence Scale* (2003). On the KABC–II, Karl's score was 47, and on the *Vineland Adaptive Behavior Scale,* 2nd Edition (VABS-II), he received a 64. Karl identified 21 of 26 letters of the alphabet. He identified 2-3 words from his current sight words list. Karl followed 2 to 3 step directives and was typically compliant with requests made of him. Karl

demonstrated autistic-like characteristics of echolalia and hand flapping. Karl's IEP goals included sight word identification, reading environmental/community sign, and answering reading comprehension question using words with pictures. Karl participated in school vocational tasks of cleaning tables in the cafeteria, food preparation, and collecting recycling in the school hallways. Karl used a picture schedule for daily activities.

Jerry was a 19-year-old with Down syndrome. Jerry's IQ was 47 as measured by the *Wechsler Adult Intelligence Scale IV* (WAIS-IV; 2008). Jerry's VABS II score was 64. Jerry read most words on the Dolch word list when printed on flash cards. He exhibited difficulty when reading the word when they were included in simple sentences. Jerry's IEP reading goals included sight word identification, reading sentences that included words from his current sight word list, and completing reading comprehension questions by selecting the answer from three answer choices. Jerry participated in community-based employment training at the local YMCA, food bank, and at the public library. He participated in school vocational training task of cafeteria food preparation and cleaning tables. He followed multiple step task directives and was compliant with requests made of him.

Richard was a 17-year-old male with Autism. His IQ measured by *Wechsler Intelligence Scale for Children*, 4th Edition (WISC-IV; 2003) was 54. Richard scored 74 on the KABC-II. He read on a first grade level. He read 5 of 10 words on his current Fry word list level three. Richard read simple passages that included words from his sight word list. Richard's IEP reading goals included sight word identification, reading sentences and short passage that included the sight words, and reading comprehension.

Richard participated in the school vocational task of collecting materials for recycling in the school hallways and community based employment training at the local library. Richard followed directions and was readily compliant of requests made of him.

Prerequisite skills

Prerequisite skills were assessed for all participants through direct observations and included the ability to attend to both visual and verbal stimuli, the ability to respond verbally to communicate their response, and the ability to wait 5s for a prompt. Students selected had experience using words with pictures and were familiar with the constant time delay procedure.

Setting and Instructional Arrangement

The setting was in an urban public high school with an enrollment of approximately 1800 students. The research was conducted in the students' resource classroom for students with MSD. The instructional arrangement was one-to-one with the student seated facing the teacher at a U-shaped table near the back of the classroom. There were a total of 10 students, three paraeducators, and one student teacher present during the study. Students not participating in the study were working on IEP goals with the paraeducators in the classroom. Precautions included providing an area free of distractions that encouraged attending to the task.

General Procedures

This study was conducted to compare the use of a words with pictures condition to words alone condition on skill acquisition of students with moderate to severe disabilities. The study was implemented to determine the acquisition of content vocabulary related to alternate assessment using words alone in comparison to using

words with pictures. Sessions were conducted daily Monday through Friday during the school day. Sessions consisted of three trials per word per word set. Sessions were completed in one to one format by the classroom teacher.

Materials and Equipment

Materials included a set of word cards for text only words, a set of word with picture cards, a set of word only word cards for words included in the word with picture sets, data sheets, and a pen. The word alone cards were 3 in. x 5 in. (7.64 cm x 12.7 cm) laminated white cards printed in black lettering using Century Gothic 42 font. The words with picture cards were created using Writing with Symbols software and pictures identified in the alternate assessment in Kentucky (Kentucky Department of Education, 2013). Pictures identified from the alternate assessment were part of a resource guide for use in teaching alternate assessment in Kentucky. The cards were 3 in. x 5 in. white laminated cards. The words were printed in black lettering using Century Gothic 42 font. Pictures were either black line drawings or colored pictures. The symbol/pictures were placed above the printed text. All materials were secured in a binder with dividers for each student's materials.

Data Collection

Data were collected in baseline, intervention, maintenance, and generalization sessions. Baseline data were collected for five sessions using a 5s response interval. Instruction consisted of three 0s delay sessions and constant time delay sessions implemented using a 5s delay interval.

Baseline data collection sheets, included in Appendix A, contain situational information, performance data information including stimulus (target words) with

responses recorded as either correct, incorrect, or no response, and summary information with percentage of correct responses recorded. A correct response occurred when the student verbally stated the word printed on the card within 5s of the presentation of the stimulus. An incorrect response occurred when the students said an incorrect word or did not say any word within 5s.

The 0s delay data collection sheet contained identifying situational information of name, instructor name, date, target skills; performance data information. Responses were recorded as either correct (i.e., the student stated the word within 5s after the prompt), incorrect after the prompt (the student did not state the correct word 5s after the prompt), or no response (the student did not say any word within 5s after the prompt). Summary information was recorded for percentage of correct responses.

The 5s constant time delay data collection sheet contained similar situational information, participant name, instructor name, date, and target skill; performance data information with stimulus identification and responses recorded as either correct before the prompt, incorrect before the prompt, correct after the prompt, incorrect after the prompt, or no response after the prompt; and summary information with percentage of correct responses recorded. Stimulus words were preprinted on the data sheets but were presented in random order during each session. Responses were recorded as (+) for correct before and after the prompt and (-) for incorrect before and after the prompt and for no responses. A graph was included at the bottom of each data sheet. A sample intervention data sheet is shown in the Appendix A.

A data collection sheet which combined data for assessing interobserver and procedural reliability data was created. Data collection sheets included title, student

name, observer name, and information of how to record responses (+) for observed behaviors and (–) for behaviors not observed. The data sheet included the behaviors necessary for implementing the intervention. Sample reliability data sheets are included in Appendix A.

Screening

Screening was conducted in a one-to-one format with each student prior to implementing the study. Words were selected from grade level alternate assessment vocabulary. Grade level requirements included math for 10th grade, science 11th, social studies 12th, and writing for 10th and 11th grades. The classroom teacher conducted two screening sessions presenting all words printed on cards using text only. The procedure was explained to the students. The students were told they would be shown a word card and ask to say the word. During screening the teacher gained the student's attention and gave the task direction, "What word?" The student was given 5s to respond. Responses were recorded as (+) for correct, (-) for incorrect, and NR for no response. Reinforcement in the form of descriptive verbal praise was given for attending to the task.

Once a set of unknown words was identified, words were divided into two groups, words alone and words with pictures. Each group contained 5 words of equal difficulty. The level of difficulty was determined with word sets including the same content area, equal number letters, and number of syllables across the word sets. Prior to baseline the classroom teacher administered a pretest to each student in one-to-one format on the meaning of content vocabulary included in the study. Students were asked to verbally respond to questions on the words to determine their knowledge of the meaning of the words. The teacher explained the procedure, gained the student's attention, and presented

a question for each word (e.g., "what does the word divide mean?"). Students were given 5s to respond. Answers were recorded by the teacher writing the answers verbatim as to what the student answered. Table 1 shows the words selected for the study.

Table 1: Words selected for inclusion based on alternate assessment vocabulary

Subject Area	Words Alone Condition	Words with Picture Condition
Math	number	measure
	solid	divide
	point	multiply
	graph	angle
	circle	pyramid
Science	trait	metal
	force	atoms
	gene	mass
	object	gravity
	energy	weight
Writing	word	edit
	topic	spell
	author	write
	type	copy
	correct	sources
Social Studies	religion	economy
	constitution	immigration
	population	technology
	democracy	compromise
	freedom	monarchy

Baseline

Five baseline sessions were conducted with each student. The teacher directed the student to the task by explaining, "I'm going to show you a card and ask you to tell me the word." The attentional cue "Are you ready?" was given. Students were given 5s to respond. Responses were recorded as correct, incorrect, or no response. Descriptive verbal praise was given (e.g., "I like how you are looking at the card") for attending but

not for correct or incorrect responses for each trial. Sessions consisted of three trials per word for each set of words: words alone and words with pictures for a total of 30 trials per session. Words were presented in random order with words sets alternated each session and counterbalanced across students (e.g., Session One began with words with pictures and Sessions Two began with words alone).

Instructional Procedures

The teacher began instruction after completing the five baseline sessions. Three sessions of 0s time delay were implemented. The sessions began with the teacher giving the attentional cue "Are you ready?" Then, she presented the word card and delivered the prompt "What word?" immediately stating the word. Students were given descriptive verbal praise (e.g., "Good that is the word ____") for correct responses and corrective feedback was given for incorrect responses, "No, this is the word _____." Students were presented three trials of each word per set of words per session. Words were presented in random order. Word sets were alternated with words with picture cards presented first for one session and words alone presented first the next session.

After conducting three sessions of 0s delay, the CTD was implemented with a 5s delay interval. The 5s delay interval was chosen as the students were familiar with this procedure. The teacher explained that students were to wait for the prompt before giving a response. Correct responses occurred when the student stated the word printed on the card and incorrect responses occurred when students were unable to identify the word or gave no response within the 5s delay interval. The teacher began by giving the attentional cue "Are you ready?" The task direction was delivered "What word?" Then the teacher waited 5s before delivering the controlling prompt. If the student did not respond to the

controlling prompt, the teacher said "This is the word_____." Students were given descriptive verbal praise for correct responses and corrective feedback was given for incorrect responses "No, this is the word ___." Responses were recorded as correct before the prompt (+), incorrect before the prompt (-), correct after the prompt (+), incorrect after the prompt (-), or no response (NR).

Maintenance

Once criterion was reached (i.e., three consecutive sessions at 100% accuracy of responses), maintenance sessions were conducted. Maintenance sessions were implemented similar to baseline with the researcher presenting the task direction "What word?" and giving the student 5s to respond. Responses were recorded as (+) for correct, (-) for incorrect, and NR for no response.

Generalization

Generalization trials were conducted by the paraeducators in the classroom after students reached criterion. To further facilitate generalization, different cards were created using different color cards with different fonts used to print the words. Generalization consisted of presenting text only for all words in the study including the words learned using words with pictures.

Reliability

Procedural and dependent variable reliability data were collected by a paraeducator in the classroom 40% of all sessions. The paraeducator had 6 years of experience in this special education classroom, had certification in Kindergarten education, and had collected procedural and dependent variable reliability data during previous studies.

Procedural reliability data were collected during baseline, instruction, and maintenance sessions. During baseline, data was collected on teacher behaviors including a) gaining student's attention, b) showing the word card, c) delivering the task direction "what word?", and d) praising for attending. During instruction behaviors included a) gaining the student's attention, b) showing the word card, c) delivering the task direction, d) implementing the delay interval, e) waiting for student response, and f) delivery of reinforcement if correct or if incorrect response or no response, stating "this is word." Procedural reliability was calculated by totaling the number of observed behaviors divided by the number of planned behaviors and multiplied by 100. Data collection example sheets are included in the appendix.

Dependent variable (i.e., number of correct responses) reliability was calculated using the point-by-point agreement method by totaling the number of agreements divided by the number of agreements plus disagreements multiplied by 100 (Gast, 2010).

Social Validity

Social validity data were collected at the conclusion of the study through surveys and informal interviews with special education teachers concerning instruction that included the use of words with pictures. A survey was administered to determine the social validity of the study. The survey included the following statements about using pictures to teach sight word vocabulary: (a) This skill was important to learn, (b) This skill is useful, (c) This skill was helpful in learning reading skills, (d) This was a an effective way to learn to read, and (e) This skill will be useful in the future. The survey was measured using a five-point Likert scale shown in Appendix A. Students were presented a similar survey in which yes/no responses could be given and included: a) Do

you think using pictures to read words was important to learn? b) Do you thing using pictures to read was helpful? c) Is using pictures a good way to learn to read? d) Do you think using pictures will help you in the future? and e) Did you like learning to read using pictures?

Experimental Design

An adapted alternating treatment design (AATD) replicated across participants was used to evaluate two instructional formats: words with pictures and words alone. AATD offers a comparison of instructional strategies to determine acquisition of target behaviors comparing their efficiency with internal validity demonstrated through a control set (Gast, 2010, Chapter 12). Using the AATD allowed for the determination as to the effectiveness and efficiency between the two interventions since differences in each condition could be compared. The study was a comparison across 4 participants with two sets of words (i.e., one set with words with pictures and one set with words alone). Words were determined by the researcher to be of equal difficulty. The alternating presentation of the word cards sets was counterbalanced across the two instructional interventions, sessions, and participants.

Section 4: Results

Figure 1 shows the student responding data for all participants in the words alone condition and words with picture condition. Percent correct responses for baseline and intervention sessions for all participants with maintenance and generalization data for 3 of the 4 participants is illustrated.

During the five baseline sessions, 3 of the 4 participants had 0% accurate responses. Richard's baseline data showed 20% accuracy in responses in the first two sessions. It was determined he knew one of the words that had been included in the words with picture set. A different word was selected, and three additional baseline sessions were conducted, resulting in 0% accuracy of responses.

After intervention was initiated, visual analysis revealed 3 of the 4 participants had immediate and abrupt changes in percentages of accurate responses in both conditions: words with pictures and words alone. Jerry reached criteria in the words alone condition in 10 sessions and in 11 sessions in the words with pictures condition. Richard reached criteria in 15 sessions in both word sets while Mary reached criteria in 14 sessions in the words alone condition and 24 sessions for the words with pictures condition. Karl did not reach criteria before the end of the study; however, he achieved an average of 50% accuracy in the words with pictures condition and 39% accuracy in the words alone condition. Maintenance sessions were conducted similar to intervention once participants reached criteria. Jerry and Richard both maintained at 100% accuracy while Mary's average accuracy for maintenance was 96%.

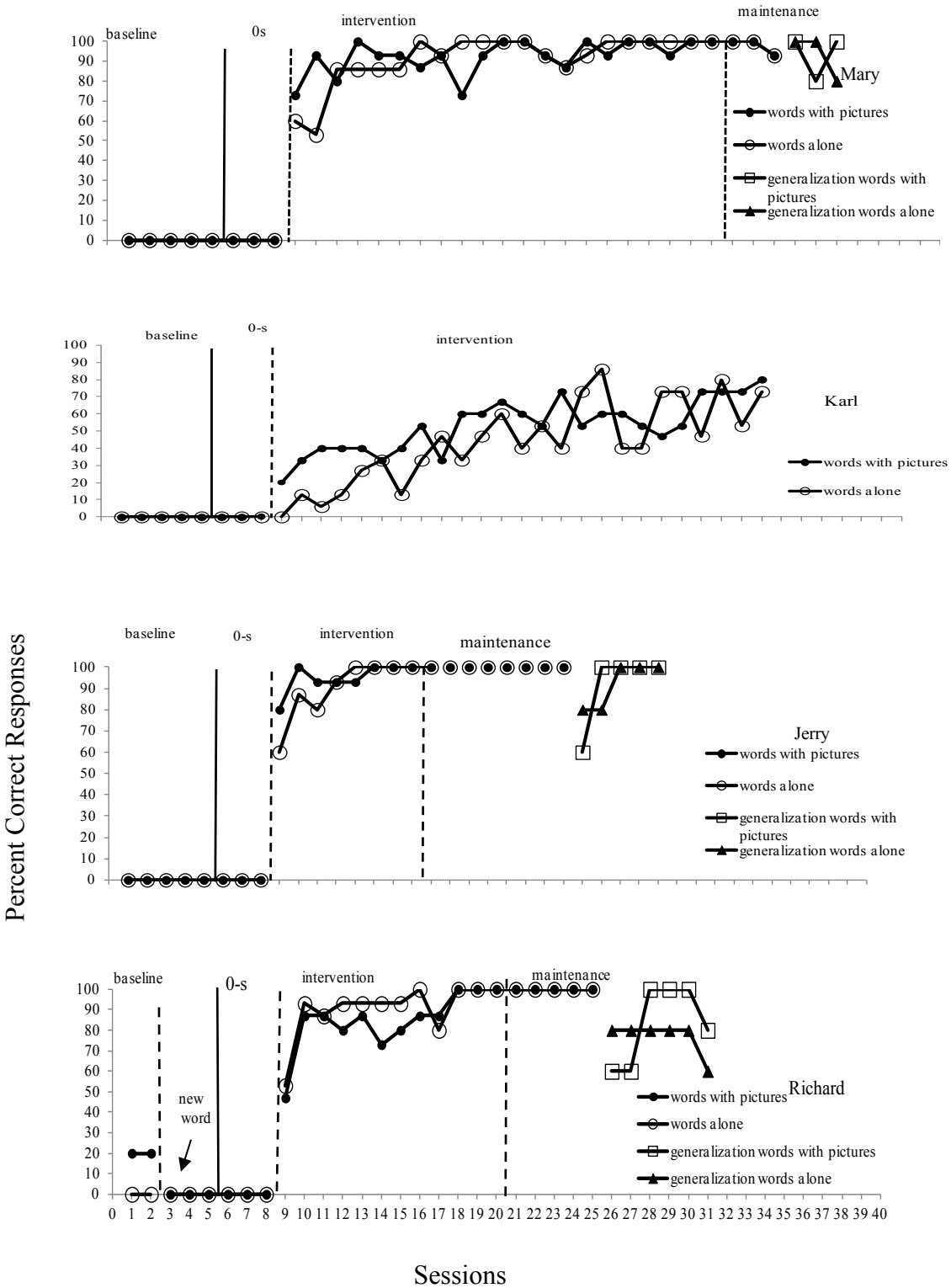

Figure 1: graph of results: comparison of the percentage of correct responses in acquisition of target words in words with picture and word alone conditions

Post intervention sessions were conducted to determine if the participants were able to generalize to read the words alone after instruction using the words with pictures word sets. These sessions consisted of presenting the students with the words that had been included in the word with picture sets as text only. Results indicated 100% accuracy of responses for Richard, 73% accuracy for Jerry and Mary at 96%.

In determining the students' ability to acquire the meaning of words included in the sets of words with pictures, a post test was administered. This consisted of presenting the questions addressed in the pretest (e.g., What does the word divide mean?). Results indicated no significant change in student's ability to state the meaning of the words included in the study.

Generalization sessions were conducted for the 3 participants reaching criteria. Sessions were conducted by the paraeducators in the classroom consisting of presenting all words in text only printed on different colored flashcards incorporating different fonts and font sizes. Results showed Mary at an average of 93% accuracy and Jerry at 92% accuracy for both words sets with Richard at 77% accuracy for words with pictures and 80% for text only.

Efficiency Results

Table 2 presents the efficiency data which show the number of sessions required for each participant to reach criteria, trials to criteria, number of errors, and percentage of errors that occurred in each condition. Two of the 3 participants who reached criteria had fewer errors in the words with picture condition. Comparison of percentages show Mary at 6% for words with pictures and 12% for words alone condition; Jerry with 4% words with pictures and 8% for words alone. The fourth student, Karl, who did not reach

criteria, had fewer errors in the words with picture condition. Percentage for words with pictures was 45% and the words alone at 54%.

Table 2: Efficiency Data

Student and Condition	Sessions to Criteria	Trials to Criteria	Number of Errors	Percentage of Errors
Mary				
Words alone	14	210	26	12%
Words with pictures	24	360	23	6%
Jerry				
Words alone	10	150	12	8%
Words with pictures	11	121	6	4%
Richard				
Words alone	15	225	17	7%
Words with pictures	15	225	28	12%
Karl	Number of sessions	Trials completed	Number of errors	Percentage of errors
Words alone	26	390	210	54%
Words with pictures	26	390	177	45%

Reliability

Results from reliability data collected indicated mean procedural reliability was 99% with a range of 96% to 100%. Teacher behaviors included: a) gaining the student's attention, 100%, b) showing the word card, 100%, c) delivering the task direction, 100%, d) implementing the delay interval, 100%, e) waiting for the student response, 100% and f) delivery of reinforcement if correct or if incorrect response or no response, stating,

"this is word," 96%. Dependent variable reliability was calculated with a mean of 93.5% across all participants with a range of 86% to 100% with 100% for Richard, 94% for Jerry and Karl, and 86% for Mary. Mary's lower percentage may have been a result of difficulties in the observer's ability to understand Mary due to her articulation errors.

Social Validity

Student responses to survey questions found all 4 participants felt that using pictures to read was an important skill to learn, a good way to learn, and they enjoyed learning to read using pictures. One of the 4 participants did not think using pictures was helpful or would be beneficial in the future. Likert scale survey results showed strong agreement on all five survey questions. Informal interviews with teachers of MSD indicated that pairing pictures with words was important to use. The teachers felt it gave the student an additional way to learn to read. They felt that using words with pictures in reading text increased reading skills and gave the student confidence when reading as it provides clues or concrete images making reading easier for the students.

Section 5: Discussion

The purpose of the study was to determine whether the use of words with pictures would enhance reading skills of students with MSD. A comparison of the acquisition of content vocabulary was completed to answer the questions as to the effects of a words alone condition versus a words with picture symbols condition on the level and trend of sight word reading, the effects of words alone condition versus words with pictures on stating the meaning of content vocabulary, and if students would be able to generalize reading the words alone after instruction was completed.

In the comparison, data indicated no substantial difference between the two instructional approaches, words with pictures and words alone and their effects on the level and trend of acquisition. Two of the 4 participants acquired the targeted words in both conditions at approximately the same rate (Jerry in 10 sessions for words with pictures and 11 sessions for words alone; Richard in 15 sessions for both conditions). One student, Mary, acquired the target words in words alone condition in 10 fewer sessions than the words with pictures condition. Karl's data indicated a slight but variable difference in acquisition with greater percentage of correct responses in the words with pictures condition. The use of three sessions at 0s delay was familiar to the students and has proven effective in the past; however, in this study it may have had an impact on acquisition resulting in slight to no differences in the two instructional conditions.

In evaluating the effects of the words alone condition versus words with pictures on stating the meaning of content vocabulary, participants' responses to the post test questions indicated no significant change in their ability to state the meaning of the words included in either condition set. Students were given pre and post tests for both words

sets. Data indicated the students who learned the word with pictures did not acquire the meaning of the word through instruction with words with pictures. Comparison of the pre and post test indicated responses were similar in both test with over half of the responses being “I don’t know” or “I have no idea.” Other responses were similar such as when asked “What is a point?” the student responded “point at something” in pre and post testing.

The third research question asked whether participants would be able to generalize to reading words alone after instruction with words with pictures when the pictures was removed. Results indicated participants were able to read most of the words included in the word with pictures sets when the picture was removed: Jerry at 73% accuracy of responses, Mary at 96%, and Richard at 100%. When presented the words in generalization sessions conducted by the paraeducators Mary averaged 93%, Jerry 92%, and Richard at 77%.

In summary, results of this study demonstrate there were little differences in the acquisition for students with MSD in learning to read using words with pictures versus words alone. For students such as Karl, who required longer period of instruction, the use of words with pictures may increase acquisition rates as he achieved an average of 50% accuracy in the words with pictures condition and 39% in the text alone condition. The study was concluded before his reaching criteria due to the end of the school year. Overall data indicated both instructional approaches (words alone condition and words with pictures condition) were effective in teaching the reading of alternate assessment vocabulary for students with MSD.

Limitations and Conclusions

Limitations in the study included the abstract concepts used in some of the pictures that were needed for vocabulary from the alternate assessment, such as two shaking hands for the word compromise. Secondly, the study did not provide inclusion of information or definitions, which may have increased the participants' ability to learn and state the meaning of the words. Embedding the meaning of each word during instruction may have increased the students acquiring the meaning of the words. Finally, including a different means of measuring comprehension might have been more appropriate for this group of participants instead of simply asking for the meaning of the word (e.g., having the students answer multiple choice questions). In addition, the study did not include control sets, which would have added to the interval validity of the study.

Interpretation of the results could be used to imply that use of words with pictures in teaching reading skills to students with MSD provides little if no benefit. This study showed both instructional conditions to be effective with no substantial difference in the acquisition for 3 of the 4 students. However, most of the students felt the use of pictures with the words were beneficial for them. The students enjoyed learning to read the words using pictures. The pictures provided cues to what the words were. Students who reached criterion were able to generalize reading the words once the pictures were removed and maintained those words. Based on data collected, students could have attended to the words in words with picture condition when the picture was removed due to the alternating presentation of the word card sets, which potentially alerted them to focus on the words. Other factors potentially impacting results were the students learning history that included words with pictures and familiarity with time delay procedures. The use of

pictures provided another strategy that the students felt comfortable using. Incorporating the strategy that uses words with pictures is easily implemented. Based on the results of this study, future research could include additional comparisons of words with pictures versus words alone, comparison of acquisition rates related to the type of vocabulary such as core content versus vocational, comparison of incidental information with and without pictures, and studies which embed information during instruction to enhance meaning of words and increase reading comprehension for students with MSD. Another possibility for future research would be to compare similar conditions under a less-stringent strategy. It is possible that the words were acquired in both conditions as a result of using CTD, and evidence based practice for individuals with MSD.

Appendix A: Data Collection Sheets

Procedural and Interobserver Reliability Data Collection Baseline

Name: _____ (+) correct (-) incorrect

Date:			Instructor		
Trial	Gain Attention	Show Flash card	"what word"	Student response	Praise for attending
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total correct response					
Percentage					

Procedural and Interobserver Reliability Data Collection Zero Seconds

Name: _____ (+) correct (-) incorrect

Date:				Instructor		
Trial	Gain Attention	Show Flash card	"what word"	Immediately state the word	Student response	Praise for correct response, if no response or incorrect response states "this is word" praise for attending
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
Correct responses						
Percentage						

Procedural and Interobserver Reliability Data Collection
Constant Time Delay 5seconds (words with pictures)

Name: (+) correct (-) incorrect

Date:				Instructor			
trial	Gain Attention	Show Flash card	"what word"	5 second delay	Student response		Praise for correct response, if no response or incorrect response states "this is word" praise for attending
					before	after	
1. metal							
2. weight							
3. mass							
4. gravity							
5. atoms							
6. metal							
7. weight							
8. mass							
9. gravity							
10. atoms							
11. metal							
12. weight							
13. mass							
14. gravity							
15. atoms							
Correct responses							
Percentage							

Baseline Data Collect Sheet

Name: _____ Instructor:_____

Target Skill: _____ Setting: _____

Stimulus	Sessions 1 date	Session 2 date	Session 3 date	Sessions 4 date	Session 5 date
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
#correct					
% correct					

Percentage correct

100						
90						
80						
70						
60						
50						
40						
30						
20						
10						
score						
date						

Zero second Data Collect Sheet

Name: _____ Instructor:_____

Target Skill: identify words without pictures Setting: _____

Stimulus	Sessions 1 date	Session 2 date	Session 3 date
1. trait			
2. force			
3. gene			
4. object			
5. energy			
6. trait			
7. force			
8. gene			
9. object			
10. energy			
11. trait			
12. force			
13. gene			
14. object			
15. energy			
#correct			
% correct			

Percentage correct

100						
90						
80						
70						
60						
50						
40						
30						
20						
10						
0						
score						
date						

Constant Time Delay Data Collection

Name: _____

Targeted Skill: Identify sight words text only

Date:	**Delay:**		**Date:**	**Delay:**		**Date:**	**Delay:**	
Instructor			**Instructor**			**Instructor**		
Stimulus	**before**	**after**	**Stimulus**	**before**	**after**	**Stimulus**	**before**	**after**
1. correct			1. correct			1. correct		
2. word			2. word			2. word		
3. topic			3. topic			3. topic		
4. author			4. author			4. author		
5. type			5. type			5. type		
6. correct			6. correct			6. correct		
7. word			7. word			7. word		
8. topic			8. topic			8. topic		
9. author			9. author			9. author		
10. type			10. type			10. type		
11. correct			11. correct			11. correct		
12. word			12. word			12. word		
13. topic			13. topic			13. topic		
14. author			14. author			14. author		
15. type			15. type			15. type		
score			**score**			**score**		

Graph of progress

Percentage of correct

100						
90						
80						
70						
60						
50						
40						
30						
20						
10						
score						
date						

Likert Scale Survey

Question (mark x in the appropriate box)	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1. This skill was important to learn					
2.This skill is useful					
3. This skill was helpful in learning to read					
4. This was an effective way to learn to read					
5. This skill will be useful in the future					

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