

July 2023

Core Vocabulary Intervention for Language-delayed Kindergarten Students Using Augmentative and Alternative Communication

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Recommended Citation

Riccelli, Angela M. and NIGAM, RAVI (2023) "Core Vocabulary Intervention for Language-delayed Kindergarten Students Using Augmentative and Alternative Communication," *Journal of Applied Disciplines*: Vol. 1: Iss. 1, Article 3.

Available at: <https://opus.govst.edu/jad/vol1/iss1/3>

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Running head: CORE VOCABULARY INTERVENTION

Abstract

The purpose of this study was to measure the impact of core vocabulary selection and the subsequent usage of a prescribed core vocabulary intervention over a period of one trimester (13-week period) and to report its impact on the overall communicative effectiveness of kindergarten students with language delay using augmentative and alternative communication (AAC). Study participants were provided with a pretest, speech and language therapy sessions in which intervention took place, and a posttest, which was administered by a speech–language pathologist. Intervention implementation commenced at the beginning of the school year and extended through the end of the trimester 13-week period. Data were examined at weekly intervals throughout the trimester. Analysis of the data determined the effect of selecting and using a core vocabulary intervention on overall communication in AAC users exhibiting language delay. The treatment group (n=15) received core vocabulary intervention in a naturalistic, aided-language environment, with modeling for the use of core vocabulary words. Acquisition of and significant improvement in core vocabulary usage was noticed, along with an increase in expressive language skills in line with individualized education plan (IEP) goals. The implications of core vocabulary intervention in the enhancement of language skills for Kindergarten-aged children who use AAC are discussed.

Keywords: core vocabulary intervention, language-delayed, kindergarten, augmentative and alternative communication, language intervention

Running head: CORE VOCABULARY INTERVENTION

Core Vocabulary Intervention for Language-delayed Kindergarten Students Using Augmentative and Alternative Communication

Augmentative and alternative communication (AAC) provides options for achieving functional communication skills for individuals with developmental disabilities and complex communication needs who are unable to use speech for expressive language (Ronski et al., 2010; Allen et al., 2017). Tilborg and Deckers (2016) emphasized the need for a structured, evidence-based approach to attain effectual communication and significantly improve quality of life for individuals who use AAC. Early symbolic communicators who use AAC rely on communication partners and AAC team members for selecting, modeling, and teaching vocabulary by using a core vocabulary approach (Laubscher & Light, 2020; Dada et al., 2017; Lund et al., 2017). In the context of AAC, core vocabulary is the relatively small set of approximately 200–400 basic words with the highest frequency of use both in conversation and in written text in any language or culture; these words are common and used frequently across different activities, contexts, topics, and demographic groups (Tilborg & Deckers, 2016; Trembeth et al., 2007). Across various studies, these core words consistently make up approximately 80% of the words in collected samples. In contrast, the vocabulary comprising the remaining 20% has been termed extended or fringe vocabulary and is specific to individuals. Core vocabulary members tend to be pronouns, verbs, auxiliary verbs, adjectives, adverbs, prepositions, determiners, conjunctions, interjections, and questions, because they represent words that generally do not change (Witkowski & Baker, 2012; Boenisch & Soto, 2015).

Core vocabulary lists have been generated for AAC users by examining the words most commonly used by specific groups of individuals, including typically developing individuals, such as toddlers (Banajee et al., 2003), preschool children (Beukelman et al., 1989; Marvin et al.,

Running head: CORE VOCABULARY INTERVENTION

1994; Fallon et al., 2001; Trembath et al., 2007), school-aged children (Robillard et al., 2014), and adults (Balandin & Iacono, 1999; Stuart et al., 1997), and for written communication by examining texts written by typically developing children (Clendon & Erickson, 2008). Core vocabulary lists have also been developed for individuals with physical disabilities (Yorkston et al., 1990; Dark & Balandin, 2007) and English-as-second-language speakers (Boenisch & Soto, 2015). Besides English, core vocabulary lists have also been developed for different cultures and demographic groups, such as Australian (Balandin & Iacono, 1999; Trembath et al., 2007), Asian-Indian (Nigam, 2006), French (Robillard et al., 2014), Korean (Shin & Hill, 2016), Mandarin (Chen et al., 2009), and Zulu (Mngomezulu et al., 2019).

Various speech-generating devices (SGDs) use a core-fringe vocabulary arrangement, and clinicians include core vocabulary along with fringe vocabulary in the AAC systems they design or customize (Mngomezulu et al., 2019; Dada et al., 2017; Lund et al., 2016; Thistle & Wilkinson, 2015). Core vocabulary displayed on communication boards and SGDs in a consistent manner can lead to fluency and automaticity through repeated motor sequences (Banajee et al., 2003; Boenisch & Soto, 2015; Trembath et al., 2007). Beukelman and colleagues (1989) emphasized the importance of tailoring the selected vocabulary to meet each child's individual communication needs. They also noted that the children's use of fringe vocabulary illustrated the influence that context and environment had on the words they used.

Fried-Oken and More (1992) emphasized that the initial vocabulary for preliterate AAC users must be meaningful, motivating, functional, and individualized. The selected vocabulary must also be appropriate to the child's age, gender, background, personality, and environment, and the vocabulary must support a broad range of communicative functions (Light, 1989). Selecting a vocabulary for a child who uses AAC involves choosing a small set of words from hundreds of

Running head: CORE VOCABULARY INTERVENTION

thousands of possibilities (Yorkston et al., 1988). Thus, the process is often difficult and time consuming (Beukelman et al., 1991). Choosing an appropriate vocabulary for preschool-aged children who need AAC presents additional challenges, as these young children may be unable to participate actively in the selection process (Banajee et al., 2003; Fried-Oken & More, 1992).

Snodgrass et al. (2013) taught three core words to a participant with complex communication needs, focusing on pre-symbolic communication; Soto and Clarke (2017, 2018) used conversation-based intervention for children and adults with complex communication needs using core and fringe vocabularies, and their subjects demonstrated a greater ability to generate and generalize grammatically correct novel utterances and various linguistic targets following intervention. Despite interest and the core vocabulary resources available for early symbolic communicators who use AAC in a variety of activities that are common in academic school settings, a limited number of studies have examined the use of core vocabulary during AAC system design and during instruction on developing communication and language skills (Boenisch & Soto, 2015; Laubscher & Light, 2020).

The evidence base for the acquisition and usage of core vocabulary and its impact on expressive language skills is limited. Perhaps this is because the outcomes of the inclusion of core vocabulary are 1) correct use of grammar and 2) the ability to generate novel messages, which are higher-level linguistic skills that may take a significant amount of time and training to develop. As well, the heterogeneity of early communicators with complex communication needs further limits the ability to gather generalizable evidence (Lund 1989; Light 2017; Mngomezulu et al., 2019).

The purpose of this study was to measure the impact of core vocabulary selection and subsequent core vocabulary usage on overall communication. Specifically, the research questions

Running head: CORE VOCABULARY INTERVENTION

were: a) Does the selection of a prescribed core vocabulary impact the acquisition and overall communication of language-delayed kindergarten students using AAC in the classroom, and b) Does the learned usage of a selected core vocabulary impact the overall communication of language-delayed kindergarten students using AAC in the classroom?

Methods

Participants

This study was conducted during the first trimester/13-week period of the school year at a kindergarten center in a public school district that served approximately 484 students. At the kindergarten center, 10% of the students were identified as receiving special education services, while 6% of the students were considered low income, however, no correlated intersectionality can be established between students with lower socioeconomic status and those being a recipient of special education services. Among the students, 90% were White, 5% were Hispanic, 3% were of two or more races, 1% were Asian, 1% were African American, and 1% were Pacific Islander. The students attended kindergarten for half-day sessions of 2.5 hours, five days per week. The educator population of this study included general education and special education staff who were 98% White and 95% female (New Lenox, 2010). The average household income was \$88,788, and over 60% of the people living in the community were married. At the time of the study, 96% of the population was English-speaking, and 66% of the students in the district met or exceeded state standards on the Illinois Standards Achievement Test (ISAT) which is used to measure individual student achievement based on the Illinois Learning Standards.

This study focused on participants with, at minimum, a speech and language delay outlined on their IEP as part of their eligibility criteria. Participants included kindergarten students who attended a public kindergarten center in the previously mentioned school district.

Running head: CORE VOCABULARY INTERVENTION

The participants were enrolled in the Developmental Kindergarten and Inclusive Kindergarten programs. Developmental Kindergarten is a program for students who have an IEP that necessitates full-day instruction in a self-contained special education classroom for all academic needs. Inclusive Kindergarten is a program for students who have an IEP but are placed within a general education kindergarten classroom. In both programs, a special education teacher is present to meet IEP goals and objectives. Additionally, each program houses a classroom aide and related services (e.g., speech and language therapy or occupational therapy), which are provided according to each student's IEP.

The control group of 15 students received language intervention through services directly provided by the speech–language pathologist. The remaining 15 students, who comprised the treatment group, received language intervention through services directly provided by the speech–language pathologist, as well as a core vocabulary intervention during therapy sessions. The students who received a core vocabulary intervention were randomized, since the majority of special education students had been arbitrarily assigned to special education programs based on the outcome of their IEP placement.

The study explored the selection and subsequent usage of a prescribed core vocabulary intervention over a period of one trimester and reported its impact on the overall communicative effectiveness of language-delayed students using AAC. Study participants were provided with a pretest, speech and language therapy sessions in which intervention took place, and a posttest, which was administered by a speech–language pathologist. Intervention implementation commenced at the beginning of the school year, and it extended through the end of the trimester. Data were examined at weekly intervals throughout the trimester. Analysis of the data determined the effect of selecting and using a core vocabulary intervention on overall

Running head: CORE VOCABULARY INTERVENTION

communication in language-delayed AAC users.

The core language intervention occurred within the confines of a small-group speech–language therapy session that lasted approximately 30 minutes. The control group contained students who did not receive a core vocabulary intervention as part of their therapy session over one trimester. The treatment group utilized core language interventions, such as core boards or programmed devices with core vocabulary, as part of their speech–language therapy session over one trimester.

Research Design

The study examined data from quantitative measures, requiring a quasi-experimental research design. A quasi-experimental design was deemed the best research method based on the selection process. Subjects were identified through the individualized education plan (IEP) process as opposed to random assignment. The independent variable was core vocabulary intervention and the dependent variable was acquisition and usage of core vocabulary. A quasi-experimental method was used to predict the causal impact of an intervention on its population (Creswell, 2012). This researcher sought to determine a causal relationship between the intervention and increased communicative competence.

Instrumentation

The assessment instrument used in this study was the core word list that comprised 96.3% of the total words used by toddlers in the study conducted by Banajee et al. (2003). Additionally, an iPad was utilized to videotape all pretest and posttest therapy sessions. A speech therapy session was conducted in the speech room of the kindergarten center. The language samples were collected after the participants became accustomed to talking under the condition of being videotaped with an iPad. The researcher started with basic comments, explained the

Running head: CORE VOCABULARY INTERVENTION

procedure, and introduced an open-ended game to the participants in the one-to-one structured setting. The pretest and posttest taping sessions each lasted 10 minutes and utilized the same open-ended game. To obtain quantitative data in this quasi-experimental design method, each student's verbal behaviors were assessed by analyzing pretest and posttest data.

Data Collection

The data collection process began with acquiring approval from the Institutional Review Board (IRB) of the university and then gaining approval from the school administrator in the school district where the research study was conducted.

Before the commencement of the study, the parents of the participants were contacted in order to be provided with a written explanation of the proposed research project and secure permission for student involvement. The researcher sent 30 informed consent documents to the parents of students who could be involved in the study, and all 30 sets of parents agreed to have their child participate, making the total sample size for this study 30. Subsequently, 15 students comprised the control group who received standard treatment and the remaining 15 students comprised the experimental group who received the core vocabulary intervention.

Procedure

Language sampling procedures were typical of previous studies that collected conversational samples in closed environments (Stuart et al., 1997). All participants were recorded with an iPad during pretest and posttest therapy sessions. While each participant played an open-ended game and engaged in spontaneous conversation with the researcher, the researcher tallied existing core words already present in the participant's vocabulary. The tally marks were recorded on the list of toddlers' vocabulary and arranged by frequency, following the research of Banajee et al. (2003). The pretest data served as a baseline indicator. The posttest

Running head: CORE VOCABULARY INTERVENTION

data served as a measure of the rate of increased communicative effectiveness after the intervention was implemented. The quantitative data were analyzed statistically to identify trends and to explain any perceived changes in communicative effectiveness in students who received the core vocabulary intervention. Once all data were reported, the final analysis was used to determine whether the students made statistically significant gains.

Once the pretest data were ascertained, a speech–language pathologist directly delivered the intervention for 30 minutes per week over the course of one trimester/13-week period in a small-group setting. Of the 30 students in this study, 15 were placed in a control group and did not receive a core vocabulary intervention. The other 15 students represented the treatment group, or the group that received interventions utilizing a core vocabulary in a naturalistic aided-language environment with modeling for the use of core vocabulary words within class activities. These students were compared to the students in the control group, who had not utilized a core vocabulary intervention as part of their speech and language therapy sessions. The relationship was explored through the analysis of student achievement results as measured by pretest and posttest data.

As Table 1 shows, over the course of one 13-week trimester, students were introduced to core words from a list that contained 96.3% of the total words used by toddlers in a study conducted by Banajee et al. (2003). Two core words from the established list were introduced and taught to the students each week in order to ensure that there was equal time to learn each new core vocabulary word. After the trimester ended, data were compared by analyzing pretest and posttest information from both the treatment group and the control group.

Running head: CORE VOCABULARY INTERVENTION

Data Analysis

In this study, 15 kindergarten special education students represented the group that received a core vocabulary intervention during their speech therapy session. These students were compared to the students in the control group who received speech and language therapy services but did not use a core vocabulary as part of their speech and language therapy intervention. The relationship was explored through the analysis of student achievement results as measured by the pretest and posttest assessments. Data pertaining to all research questions were analyzed using the Statistical Package for the Social Sciences (SPSS) statistical IBM software. All data were collected and organized into an Excel spreadsheet and entered according to the recommendations of the SPSS.

For the purpose of answering the research questions in this study, it was appropriate to use an independent samples *t*-test, paired sample *t*-test and Cohen's *d* statistical measuring tools. The overall purpose of gathering data was to determine any differences between the students who received a core vocabulary intervention and those students who did not receive a core vocabulary intervention during speech therapy. The *t*-tests compared the pretest and posttest data of the control group and treatment group to determine if there was a significant difference between the two groups in terms of the independent variable of selecting and using a core vocabulary. These particular tests aided in identifying whether or not there were significant differences between the sets of data. The Cohen's *d* statistical test was used to assess any statistical differences between what was observed and what was expected between the pretest and posttest data sets.

An independent samples *t*-test was conducted to compare the rate of improvement between the treatment and control groups. A Levene's test for independent variables was

Running head: CORE VOCABULARY INTERVENTION

conducted and did not produce a statistically significant result. Therefore, equal variances were assumed. The t -test resulted in a value of -3.4 with 28 degrees of freedom. Since $p = .002$, the difference in means was statistically significant at the $p < .05$ level. Therefore, the students who learned to use a core vocabulary increased their communicative effectiveness significantly compared with students who did not use a core vocabulary.

All quantitative data were analyzed, and tables were created for interpretation. Particular statistical tests were chosen and run in order to appropriately answer the research questions. All data were analyzed at the statistical level of $p > .05$. Both descriptive and inferential statistics were employed to examine the research questions and null hypotheses of this study.

Results

Selection and Acquisition of a Prescribed Core Vocabulary

Table 2 represents the number of prescribed vocabulary words that existed in the treatment group's repertoire prior to intervening and after intervening, as well as their subsequent rate of improvement. These findings indicate that students increased their core vocabulary repertoire when a prescribed vocabulary was selected for them.

Table 3 presents the means and standard deviations of the group that received the vocabulary intervention and the control group with regard to selecting a core vocabulary. In fact, students who had a core vocabulary selected for them learned an average of 12 more words than the control group upon completion of this research project.

Effect of Learned Usage of Core Vocabulary

Table 4 indicates a significant statistical difference between the rate of improvement of the treatment group and that of the control group. The findings suggest that the language-delayed

Running head: CORE VOCABULARY INTERVENTION

kindergarten students using AAC in the classroom showed an increase in the use of core vocabulary words in the classroom when their vocabulary was selected for them.

Table 5 represents the difference between the rate of each student's improvement on the expressive language area of their IEP from the beginning of the first trimester until the end of the trimester. In fact, the rate of increase in expressive language skills in the treatment group was found to be between 10% and 40% from baseline to completion of the research project. The analysis strongly indicates that selecting and using a prescribed core vocabulary increases the communicative effectiveness and language-learning skills of language-delayed kindergarten students using AAC in the classroom.

Discussion

The results indicated that students expanded their core vocabulary when a prescribed core vocabulary was selected for them. Students who received the core vocabulary intervention more than doubled their repertoire of core words post treatment. The results were not only statistically significant, but also clinically significant in that their gain of core words went from +2 to +26, collectively. The results also indicated that while the selection of a core vocabulary is crucial to the communicative competence of students with language-delay who use AAC, communication cannot progress until the student has the potential to actually use those words to communicate. The students in the treatment group were administered two pre-selected core vocabulary words via their core board or AAC device each week. As each set of selected words was introduced, the words were then incorporated into all aspects of the classroom curriculum and speech therapy sessions for the remainder of the week. At the point of the pretest, all students in the treatment group were using 2–15 core vocabulary words when attempting to communicate within the classroom. By the posttest, all students in the treatment group were using 12–26 core vocabulary

Running head: CORE VOCABULARY INTERVENTION

words when trying to communicate. Data showed an increased rate of improvement in the treatment group with gain scores ranging from 6–18 words post intervention. These results were not only statistically significant but also clinically significant in that their gain in core word usage increased from +6 to +18, collectively. Further, these findings suggest that kindergarten students with language-delay using AAC in the classroom show an increase in the usage of prescribed core vocabulary words when pursuing communication in the academic setting.

Core vocabulary can assist students who use AAC to meet a broad range of communication needs; this is in contrast to use of the AAC system, which is loaded with nouns, for the pragmatic function of requesting. Laubscher and Light (2021) pointed out that core words may not fulfill the prerequisites of expressive vocabulary for early symbolic communicators. Core vocabulary, along with individual-specific fringe vocabulary, is more effective and may enhance communication board use, initiate opportunities for novel sentence patterns, and serve a variety of pragmatic functions (Dodd & Gorey, 2013; Tilborg & Deckers, 2016). Functional vocabulary selection should be based on vocabulary need or demand for expeditious communication to participate in activities, support language and communication development, and consider both present and future communication needs based on the participation model (Beukelman & Light, 2020). Vocabulary selection should involve multiple informants, such as parents, siblings, communicative partners, clinicians, and educators. The vocabulary selection process should consider the language development of typical children, although differences may exist for children who use AAC (Gerber & Kraat, 1992).

Limitations and Future Directions

A number of factors contribute to the limitations of the generalizability of the results. First, there were time restrictions that hindered the rate of return of the informed consent

Running head: CORE VOCABULARY INTERVENTION

documents needed to allow minors to participate in the study within the timeframe of the school year. Therefore, the original length of the study was narrowed from one school year to approximately thirteen weeks, or one trimester. Further research is needed to study the implications over a longer period.

Second, few subjects were used. Due to the fact that only 30 subjects were used and only 15 actually received the treatment, the results cannot be accurately generalized to a larger population. Additionally, the participants in the study all shared the same profile. That is, (a) they were all kindergarten students, (b) they all had a speech and language delay, as evidenced by their IEP, and (c) they all used some form of AAC (low and/or high tech). Further research needs to be conducted with larger populations of AAC users and with different profiles.

Third, although pretest and posttest measures were used, testing threats were not minimized in this study, as a percentage rate of improvement was analyzed. This researcher used pretest and posttest checklists that did not offer standardized scoring or norm-referencing. The checklists were based solely on the research conducted by Banajee et al. (2003). Future research should include assessments that are norm-referenced, research-based, and standardized to ensure the utmost validity throughout the study.

Finally, future studies should also explore the combined use of core vocabulary and fringe vocabulary and how it affects language learning in children who use AAC and helps develop emergent and preliteracy skills using milieu language teaching (Kaiser & Hester, 1994), matrix training (Nigam et al., 2006), communicative partners strategies, such as modeling, recasting, and prompting (Binger et al., 2011), aided language stimulation (O'Neill et al., 2018), and the just-in-time approach (Schlosser et al., 2016).

Conclusion

Running head: CORE VOCABULARY INTERVENTION

When developing a prescribed core vocabulary intervention for language-delayed children using AAC, it is important to realize that important strides have been made in the selection process and learned usage of core words. No longer can low-tech and high-tech AAC devices or boards be overloaded with nouns and fringe vocabulary. Instead, as this research study clearly indicated, there needs to be appropriate vocabulary at-the-ready to meet a student's changing communication needs as they grow and develop language skills. Children need vocabulary that is flexible and useful across diverse topics and settings.

As the current research shows, the selection and use of a core vocabulary intervention with students who are language-delayed using AAC, was crucially important to increasing overall communicative effectiveness. These preliminary findings support the tenet that core vocabulary can be used as the foundation to support the building of language skills using an AAC system.

Running head: CORE VOCABULARY INTERVENTION

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Running head: CORE VOCABULARY INTERVENTION

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Running head: CORE VOCABULARY INTERVENTION

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Running head: CORE VOCABULARY INTERVENTION

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Running head: CORE VOCABULARY INTERVENTION

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Running head: CORE VOCABULARY INTERVENTION

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Running head: CORE VOCABULARY INTERVENTION

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Running head: CORE VOCABULARY INTERVENTION

Table 1

Procedure for Introducing the 26 Core Vocabulary Words in a Prescribed Order

Date	Implementation	Action Plan
8/19–8/21	Administer pretest to all participants	Use speech therapy session
8/24–8/28	Introduce target words I and NO	Provide speech therapy
8/31–9/4	Introduce target words YES and THE	Provide speech therapy
9/7–9/11	Introduce target words WANT and IS	Provide speech therapy
9/14–9/18	Introduce target words IT and THAT	Provide speech therapy
9/21–9/25	Introduce target words A and GO	Provide speech therapy
9/28–10/2	Introduce target words MY and MINE	Provide speech therapy
10/5–10/9	Introduce target words YOU and WHAT	Provide speech therapy
10/12–10/16	Introduce target words ON and IN	Provide speech therapy
10/19–10/23	Introduce target words HERE and MORE	Provide speech therapy
10/26–10/30	Introduce target words OUT and OFF	Provide speech therapy
11/2–11/6	Introduce target words SOME, HELP, and FINISHED	Provide speech therapy
11/9–11/13	Introduce target words ALL DONE, YEAH, and ALL	Provide speech therapy
11/16–11/27	Administer posttest to all participants	During speech therapy
12/5–12/6	Analyze results of vocabulary intervention	Create graphs to depict results of pretest and posttest information from control group and experimental group

Running head: CORE VOCABULARY INTERVENTION

Table 2

Selected Core Vocabulary Words in Repertoire Pre/Post Intervention and Rate of Increase

Student Number	Eligibility on IEP	Pretest	Posttest	Rate of Increase
One	Down Syndrome	2	20	18
Two	Autism	10	26	16
Three	Jacobsen Syndrome	9	25	16
Four	Apraxia	4	15	11
Five	Spina Bifida	15	26	11
Six	Developmental Delay	9	15	6
Seven	Autism	15	26	11
Eight	Autism	14	26	12
Nine	Apraxia	2	12	10
Ten	Developmental Delay	8	15	7
Eleven	Articulation Delay	10	26	16
Twelve	Articulation Delay	9	26	17
Thirteen	Language Delay	7	18	11
Fourteen	Language Delay	9	17	8
Fifteen	Down Syndrome	8	24	16

Running head: CORE VOCABULARY INTERVENTION

Table 3

Mean Scores for Core Vocabulary Selection

Number of Vocabulary Words	Treatment/Control Group	<i>N</i>	Mean	Std. Deviation	Std. Error Mean
Number of vocabulary words pretest	Treatment Group	15	8.73	4.026	1.040
	Control Group	15	15.60	6.468	1.670
Number of vocabulary words posttest	Treatment Group	15	21.13	5.276	1.362
	Control Group	15	18.87	4.912	1.268

Running head: CORE VOCABULARY INTERVENTION

Table 4

Inferential Statistics for Usage of Core Vocabulary

Use of Vocabulary	Levene's Test for Equality of Variances			t-Test for Equality of Means		
	Variances	<i>F</i>	Sig.	<i>t</i>	<i>Df</i>	Sig. (2-tailed)
Usage of vocabulary pre-treatment	Equal variances assumed	4.543	.042	-3.491	28	.002
	Equal variances not assumed			-3.491	23.434	.002
Usage of vocabulary post-treatment	Equal variances assumed	.850	.365	1.218	28	.233
	Equal variances not assumed			1.218	27.858	.233

Running head: CORE VOCABULARY INTERVENTION

Table 5

IEP Goal Increase for Treatment Group from Baseline to Trimester 1 in Expressive Language

Student Number	Eligibility on IEP	Baseline in Expressive Language Area	Trimester 1 Goal Update	Percent of Increase in Language Skills
One	Down Syndrome	10%	50%	40%
Two	Autism	50%	60%	10%
Three	Jacobsen Syndrome	40%	60%	20%
Four	Apraxia	20%	30%	10%
Five	Spina Bifida	50%	60%	10%
Six	Developmental Delay	30%	60%	30%
Seven	Autism	30%	50%	20%
Eight	Autism	50%	60%	10%
Nine	Apraxia	20%	30%	10%
Ten	Developmental Delay	40%	60%	20%
Eleven	Articulation Delay	60%	70%	10%
Twelve	Articulation Delay	50%	60%	10%
Thirteen	Language Delay	30%	50%	20%
Fourteen	Language Delay	30%	60%	30%
Fifteen	Down Syndrome	10%	50%	40%