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Electronic Essay Writing with Postsecondary Students with Intellectual and Developmental Disabilities

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Abstract: This study examined the efficacy of an electronic essay-writing strategy to improve the expository writing skills of 20 young adults with intellectual and developmental disabilities enrolled in a program at an institute of higher education in the midwest. A pretest and posttest experimental design with random assignment to treatment or control group was used to investigate the mnemonic-driven electronic writing strategy. The writing strategy supported students' construction of essay responses using a computer. Students used the strategy and a computer word program to examine an electronically presented essay test question, plan through the construction of an electronic outline, and create and revise an electronic essay response. Pretest and posttest essay responses were evaluated through proximal and distal rubrics. Results revealed a significant positive effect for the treatment group when compared to the control group for overall essay quality including use of ideas and content, and word choice.

Writing is a complicated process and an integral form of communication. Graham and Perin (2007) asserted that "along with reading comprehension writing skill is a predictor of academic success and a basic requirement for participation in civic life and the global economy" (p. 3). The National Commission on Writing (2006) report *Writing and School Reform* asserted that difficulties in writing can serve as a barrier in the areas of communication, achievement in school, and success in the workplace. The National Assessment of Educational Progress (NAEP, 2011) computer-based writing assessment results for secondary students who were administered the NAEP revealed 74% of eighth graders and 73% of 12th graders fell in the below proficient range (National Center for Education Statistics, 2012). Students with and without disabilities experience difficulty in writing. These difficulties if not addressed can impede one's success in postsecondary education programs. As individuals with intellectual and developmental disabilities (IDD) exit high school they have the option of attending postsecondary educational programs at institutions of higher education (IHEs). Currently there are approximately 246 college programs for individuals with IDD (Think College, 2016).

The writing process is iterative in nature and includes metacognitive processes of planning, organizing, constructing text, and revising (Hayes, 1996, 2012; Hayes & Flower, 1980). Difficulties in the writing process can occur in planning, organizing, constructing text, and revising (Mason & Graham, 2009; Pennington & Delano, 2012). It is recommended that evidence-based practices be employed in writing practices (Cook et al., 2015; Odom et al., 2005; What Works Clearinghouse, 2013). Replications and extensions of instructional practices that reveal positive effects for learners' writing skills are one aspect

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of assessing effective practices (Graham, Harris, & Chambers, 2016). Graham et al. (2016) systematically evaluated 19 previously conducted reviews of writing instruction studies pertaining to K-12th grade learners with and without disabilities. Graham et al. (2016) results supported but were not limited to the following practices: (a) the incorporation of word processing with supports for 4 first- to fifth-grade students yielded a large effect size 1.46; (b) the use of writing goals for fourth- to eighth-grade students yielded a large effect size .80; (c) writing strategies that employed an explicit instruction framework was supported for 84 studies across second- to 12th grade students and yielded effect sizes that ranged from 56 to 1.59; (d) use of feedback from adults (i.e., seven studies) or peers (i.e., 10 studies) yielded effect sizes that ranged from .77 to .87; and (e) the use of self-assessment for 13 studies second- to 12th graders with an effect size of .51.

The majority of writing instruction investigations have been conducted in K-12th grade settings with students without disabilities and students with disabilities including students with learning disabilities, autism spectrum disorders, behavioral problems, intellectual disabilities, and students with attention deficit hyperactivity disorder (De La Paz, 1999; Delano, 2007; Englert, Raphael, Fear, & Anderson 1988; Graham & Harris 2003; Graham et al., 2016; Graham, McKeown, Kiuhara, & Harris, 2012; Joseph & Konrad, 2009; Lane et al., 2009; Pennington & Delano, 2012). For those students with disabilities who leave high school and enter postsecondary IHEs with difficulties in writing, it is imperative to provide evidence-based instruction in the area of writing. Graham and Perin (2007) noted that 75% of writing tasks are expository in nature for 12th graders and that the majority of college classroom writing tasks are expository. With the increase of individuals with IDD who are entering postsecondary programs at IHEs expository writing strategies should be available for students who need them. Several investigations have been conducted with college-age students with IDD and an essay writing strategy.

An essay writing strategy instruction developed by Hughes, Schumaker, and Deshler (2005), the Essay Test-Taking Strategy, is mnemonic-based, and incorporates explicit instruction. This six-step strategy uses the ANSWER mnemonic to guide students in analyzing essay questions, planning what to write, constructing an essay response, and revising/reviewing the essay response. The ANSWER mnemonic represents the following steps: (a) ***A***nalyze action words in the essay question, (b) ***N***otice the requirements of the essay question, (c) ***S***et up an outline, (d) ***W***ork in outline details, (e) ***E***ngineer an answer, and (f) ***R***eview the answer.

The Essay Test-Taking (i.e., ANSWER) Strategy has been previously investigated in four experimental group-design studies designed to assess the utility of the strategy to improve students with disabilities' expository essay-writing skills. Therrien, Hughes, Kapelski, and Mokhtari (2009) studied the use of this strategy with 40 seventh- and eighth-grade students with learning disabilities. The participants were randomly assigned to ANSWER intervention (n = 21) or non-intervention (n = 19) groups. The ANSWER intervention was conducted for eight 35-minute sessions. Students in both groups were administered pre- and posttests in which they were given an essay test question and asked to construct an essay response. The students' essay responses were evaluated by scores obtained through a proximal strategy-specific rubric and a distal holistic analytical rubric. The intervention group performed significantly higher than the non-intervention group in their use of the strategy steps (i.e., analyzing the essay question and constructing and outline) measured by the strategy rubric, and in the organization, ideas, and content of their essay responses (i.e., large effect size of d = 1.69) measured by the analytic rubric (Cohen, 1988).

A series of three sequential experimental group studies were conducted by Woods-Groves and colleagues in order to investigate the efficacy of employing the ANSWER mnemonic-driven strategy with postsecondary students enrolled in a two-year certificate program for young adults with IDD (Woods-Groves et al., 2014; Woods-Groves, Therrien, Hua, & Hendrickson, 2013; Woods-Groves, Therrien, Hua, Hendrickson, Shaw, & Hughes, 2012). A minimum of 16 young adults with IDD (e.g., students with autism, Asperger's Syndrome, non-verbal learning disorder, mild or moderate intellectual disabilities) partici-

pated in each study with a cumulative total of 51 students across all three investigations. The authors indicated that in each study the participants were randomly assigned to an ANSWER intervention group or a non-intervention group. The intervention groups in each study received large-group instruction in the ANSWER strategy and employed the strategy to create handwritten essays. Lessons delineated in the Essay Test-Taking Strategy manual (Hughes et al., 2005) were adapted to include lesson specific graphic organizers but maintained the explicit instruction format (i.e., modeling, guided practice with corrective feedback, and independent practice). The six ANSWER lessons were taught in a sequential mastery-based format (i.e., 80% mastery). Students were provided with folders with the ANSWER mnemonic attached to the front, graphic organizers, a histogram graph for self-graphing, and highlighters. The authors in each ANSWER study, analyzed rubric results through an Analysis of Covariance (ANCOVA) where mean posttest rubric scores were compared for the intervention and non-intervention groups with the pretest means employed as a covariate.

The ANSWER intervention consists of six lessons that can be taught through a series of instructional sessions. Woods-Groves et al. (2012) conducted the first ANSWER study that consisted of six 30-minute sessions, three times a week for 2 weeks for a cumulative total of 3 hours of instruction. The proximal strategy rubric results indicated students in the intervention group significantly outperformed the control group on overall rubric scores but only on aspects of strategy use (i.e., applying the first four steps of the strategy— analyze the essay prompt and construct an outline), $d = 2.63$, $p = .001$. The authors found no significant differences concerning aspects of the quality of the essay constructed (i.e., steps five and six of the strategy— creating the essay and revising the essay). As a result, the second ANSWER study conducted by Woods-Groves et al. (2013) incorporated individualized writing goals for the intervention group and a longer instructional time for the intervention (i.e., intervention time = 50 minute lessons, two days a week for 3 weeks, for a cumulative total of 5 hours). The proximal strategy rubric results revealed students in the intervention group significantly outperformed the non-intervention group in the following: (a) overall proximal strategy rubric results, $d = 1.90$, $p = .002$; (b) use of 1–4 strategy steps, $d = 1.85$, $p = .002$; and (c) steps 5–6 essay construction and revision, $d = 1.12$, $p = .019$. In 2014, Woods-Groves and colleagues conducted a third investigation of the ANSWER strategy to promote the construction of handwritten essay responses with young adults with IDD with the following adaptations: (a) the intervention time was further extended to ten 45 minute sessions, two days a week for 5 weeks, for a total cumulative time of 7.5 hours, (b) individualized student writing goals, (c) a proximal strategy specific rubric and distal holistic analytic rubric were employed as dependent variables, and (d) generalization and maintenance skills were assessed. Results indicated the ANSWER intervention group significantly outperformed the non-intervention group in the proximal strategy specific rubric overall results, $d = 8.63$, $p = .001$, strategy specific steps, $d = 15.85$, $p = .001$; and essay construction/revision, $d = 1.50$, $p = .002$. The distal analytic rubric indicated significant results in favor of the intervention group in the areas of overall score, $d = .95$, $p = .001$, and in the combined area of ideas/content and organization, $d = 1.44$, $p = .001$. According to Woods-Groves et al. (2014) students who received the ANSWER instruction were assessed 2 weeks following the end of the intervention for generalization and 13 weeks later for maintenance of skills. In the generalization phase students "performed at approximately 54.79% of their previous posttest score level" and in the maintenance phase students "performed at approximately 63.64% of their previous posttest score level" (Woods-Groves et al., 2014, p. 260).

The previous four experimental investigations of the ANSWER strategy with students with disabilities focused on the construction of handwritten essays. The aim of this current investigation was to examine the efficacy of the use of the ANSWER strategy to improve postsecondary students with IDD's skill in constructing electronic-based essays.

The following research questions were investigated:

1. Will postsecondary young adults with IDD employ the ANSWER writing strategy when constructing their electronic essay-test responses?
2. Will there be a significant difference in how postsecondary young adults with IDD use the strategy specific aspects (Steps 1 – 4) and the essay general component aspects (Steps 5 – 6) of the ANSWER writing strategy when constructing electronic essay-test responses?
3. Will there be a significant difference in the quality of electronic essay responses for postsecondary young adults with IDD in the intervention group and those in the non-intervention group in the analytic rubric areas of ideas/content, organization, voice, word choice, sentence fluency, and conventions, respectively?

Method

Participants

The 20 participants in this study were all young adults who were in their second year of a two-year postsecondary certificate program for individuals with IDD. The postsecondary program was at a research 1 institute of higher education located in the midwest. There were (7, or 35%) females and (13, or 65%) males who participated in this study and who ranged in age from 18 to 23 years, (M = 19.55, SD = 1.36). The participants lived in rural, (8, or 40%), urban, (6, or 30%), and suburban, (6, or 30%) demographic areas. Educational diagnostic information for the participants indicated that three (15%) individuals were diagnosed with autism, one (5%) individual with Asperger's Syndrome, two (10%) with Pervasive Developmental Disorder, six (30%) with intellectual disability, one (5%) individual was diagnosed with Down Syndrome, four (20%) with other health impairment, two (10%) with a severe learning disability and speech impairment, and one (5%) individual's diagnosis was not reported.

Woodcock Johnson Achievement III (WJIII; Woodcock, McGrew, & Mather, 2001) Total Scores for all participants ranged from 20-to-102, Mdn = 74, (standard scores with a M = 100, SD = 15), while Broad Reading scores ranged from 30-to-105, Mdn = 79, (standard scores with a M = 100, SD = 15) and Broad Written Language scores ranged from 30-to-105, Mdn = 78, (standard scores with a M = 100, SD = 15). The participants were stratified based upon their WJIII Broad Reading scores and were randomly assigned to the ANSWER strategy intervention group or the non-intervention group. A coin flip was used for random assignment to groups (i.e. heads = ANSWER strategy intervention and tails = non-intervention). An analysis of variance (ANOVA) was conducted that examined WJIII Broad Reading scores for participants in the intervention (n = 11, M = 75, SD = 15.41) and non-intervention (n = 9, M = 73.33, SD = 19.63) groups and revealed a non-significant difference between the two groups, $F(1, 19)$ = .045, p = .834, d = .09.

Materials

The lessons delineated in the Essay Test-Taking Strategy manual (Hughes et al. 2005) were adapted and included in the design and execution of the ANSWER strategy intervention. The lessons in the Essay Test-Taking Strategy manual pertained to student handwritten essay products. Adaptations were made to convert instructional materials to an electronic form so they could be used by the teacher and students via PC desktop computers. Teacher presentation materials for respective lessons were adapted to an electronic format in Microsoft Word. During the ANSWER intervention electronic documents were shown via an overhead projector connected to a PC computer. Student instructional materials were also adapted and created in an electronic format in Microsoft Word. For each lesson, instructional materials were given to respective students via USB memory sticks. Other adaptations included in the ANSWER intervention lessons pertained to the use of the following: (a) individual student folders with the ANSWER mnemonic on the front of the folder, (b) highlighters, (c) USB memory sticks for each student that contained guided practice and independent practice passages with a "TURN IN" folder for completed work, and (d) electronic and hard copy graphic organizers for each lesson. The ANSWER mnemonic and steps are depicted in Table 1.

The original essay prompts created by

TABLE 1

ANSWER Strategy Lessons (adapted from Hughes et al., 2005)

L/S	*Lesson Activities*
1/1	Students discussed their current essay response writing strategies, difficulties in writing, and the importance of constructing good essay answers. Students were introduced to the essay-test taking strategy with the mnemonic device ANSWER.
2/1	The instructor modeled the first two steps of ANSWER. Students underlined action words (e.g., describe, list, summarize, or analyze) and to highlighted the requirements (e.g., how to make a cake) for each essay prompt.
3/2	Students completed an independent practice worksheet about the first 2 ANSWER steps. The next two steps (i.e., Set up Outline and Work in Details) were introduced. Students read an essay prompt and completed the four ANSWER steps with guided practice, and an independent practice worksheet.
4/2	Students read an essay prompt and the first four steps of ANSWER were reviewed with guided practice. The instructor modeled step five of ANSWER (i.e., Engineer the Answer) that included writing an essay answer that contained the following: a) an introductory paragraph that included a topic sentence, b) a paragraph for each main idea and related details, and c) a conclusion paragraph.
5/2	The first five steps of ANSWER were reviewed. The instructor led the students in guided practice using the five steps. The instructor modeled the final step (i.e., Review the Answer). Students reviewed their answers and conducted a spell check.

Note: L = Number of the Lesson conducted, S = how many sessions spent on each lesson.

Therrien et al. (2009) and subsequently used by Woods-Groves and colleagues in three published experimental ANSWER studies (i.e., Woods-Groves et al., 2012, 2013, 2014) were employed in this investigation. The essay prompts incorporated in this study were counterbalanced and randomly assigned to participants for the pretest and posttest. Originally the essay prompts were constructed to mirror statewide writing assessment probes and pertained to the following topics: inventions and heroes/heroines. The inventions prompt stated "*Inventions are all around us. Think of an invention that has been especially helpful or harmful to people. Write an essay that gives at least 3 reasons why the invention was helpful or harmful.*" The hero/heroine prompt stated "*Your school newspaper is printing a series of articles about heroes and heroines. Write about someone who is a hero or heroine to you. That person may be someone you know, someone you have read about, a celebrity, or a historical figure. Explain at least 3 reasons why you believe this person is someone to admire.*" The following maintenance prompt was designed to mirror material presented within lessons and the Essay Test-Taking Strategy manual: "*You are going to have a week away from school. What is your favorite thing you will do next week? List three reasons why this is your favorite thing to do.*"

Design and Procedures

Design. An experimental design was employed via a 2-level factor, randomly assigned intervention (treatment) or non-intervention (control) groups with pretest and posttest and maintenance measures. As noted earlier, participants were stratified by their WJIII Broad Reading standard scores and a coin flip was used to assign individuals to intervention (i.e., heads) and non-intervention (i.e., tails) groups. Pretests and posttests consisted of two counterbalanced essay prompts. A separate essay prompt was employed for the maintenance measure.

Intervention. The Essay Test-Taking Strategy manual (Hughes et al., 2005) guidelines delineated the scope and sequence of the lessons incorporated into the ANSWER intervention. The manual instructional materials were adapted for electronic use and the participants' reading levels. The goal of the ANSWER intervention sessions was to provide students with instruction to support their construction of well-organized essay responses to

essay test prompt questions. The students were instructed in examining respective essay prompt questions, planning and constructing an outline, and in constructing and reviewing their essay response.

The scope and sequence of the ANSWER instruction consisted of five lessons that were executed in eight sessions. Detailed lesson steps are delineated in Table 1. In the first ANSWER lesson the rational for learning the strategy was discussed with students and a commitment was obtained from the students to learn the strategy. The ANSWER subsequent lessons pertained to teaching students to "Analyze" the essay prompt question and to "Notice the Requirements" in the electronic prompt by underlining and highlighting respective parts. Next, students were taught to "Set up an Outline" and "Work in the Details" by including main ideas and pertaining details in an electronic outline. Finally, students were instructed in constructing an electronic essay response by including outline components along with an introductory paragraph, a paragraph for each main idea and respective details, and a conclusion paragraph. The last step was for students to "Review" their essay response by checking the alignment with their outline and by using the spell checker function in Microsoft Word Office. The graphic organizer employed in instruction contains each ANSWER step and is depicted in Figure 1.

For each lesson the instructor followed an adapted script from the Essay Test-Taking manual. Each script included an advance organizer and an explicit instruction format that included the following components: (a) modeling, (b) thinking aloud methods coupled with guided practice, (c) immediate corrective feedback, (d) independent practice, (e) students' self-graphing their own performance. For each session students were given USB memory sticks with a guided practice passage for whole class and instructor practice, corrective feedback passage, and an independent passage. The USB memory sticks also each had a TURN IN folder for completed work.

Each student was given a folder for each session that had the ANSWER mnemonic on the front of the folder and a step-by-step guide for how to use the USB memory stick to access and save files attached to the back of the folder. On the inside of the student folder a bar graph was attached so students could graph their graded independent work. The students evaluated their own engagement, through a point booklet and earned participation points each lesson based upon following class expectations (e.g., arrive to class on time, show respect to peers and teachers). A hard copy graphic organizer was given to each student for each session's lesson components. The ANSWER strategy six steps were presented in a sequential format with each step being taught to 80% mastery (i.e., determined by independent work) before the next strategy step was introduced. Student goals were individualized with regard to essay construction with some students writing multiple paragraphs while some students constructed a single paragraph.

Throughout the sessions two raters collected treatment integrity data. Each of the sessions' lesson steps were delineated on respective lesson checklists. The raters checked steps as completed if the steps were observed by the raters during sessions.

Intervention group. As previously noted, students were randomly assigned to the intervention (treatment) group prior to the beginning of instruction. Each ANSWER session was 40 minutes in duration. There were eight sessions that were conducted once a week for 8 consecutive weeks. The total time for the duration of the intervention instruction was 6 hrs 40 min. The intervention instruction occurred during the students normally scheduled academic activities and was conducted in a large group setting within a computer lab. Each student was provided with a desktop PC and instructional materials. The instructor had a projector, and PC at the front of the class where instruction was conducted. The instructor had an undergraduate degree in language arts and was a certified general education teacher who was employed by the postsecondary program. The first author met weekly with the instructor to review each lesson and materials prior to instruction.

Non-intervention group. Students who were randomly assigned to the non-intervention (control) group participated in science instruction at the same time the ANSWER intervention was being conducted. Science instruction was conducted once a week for a period

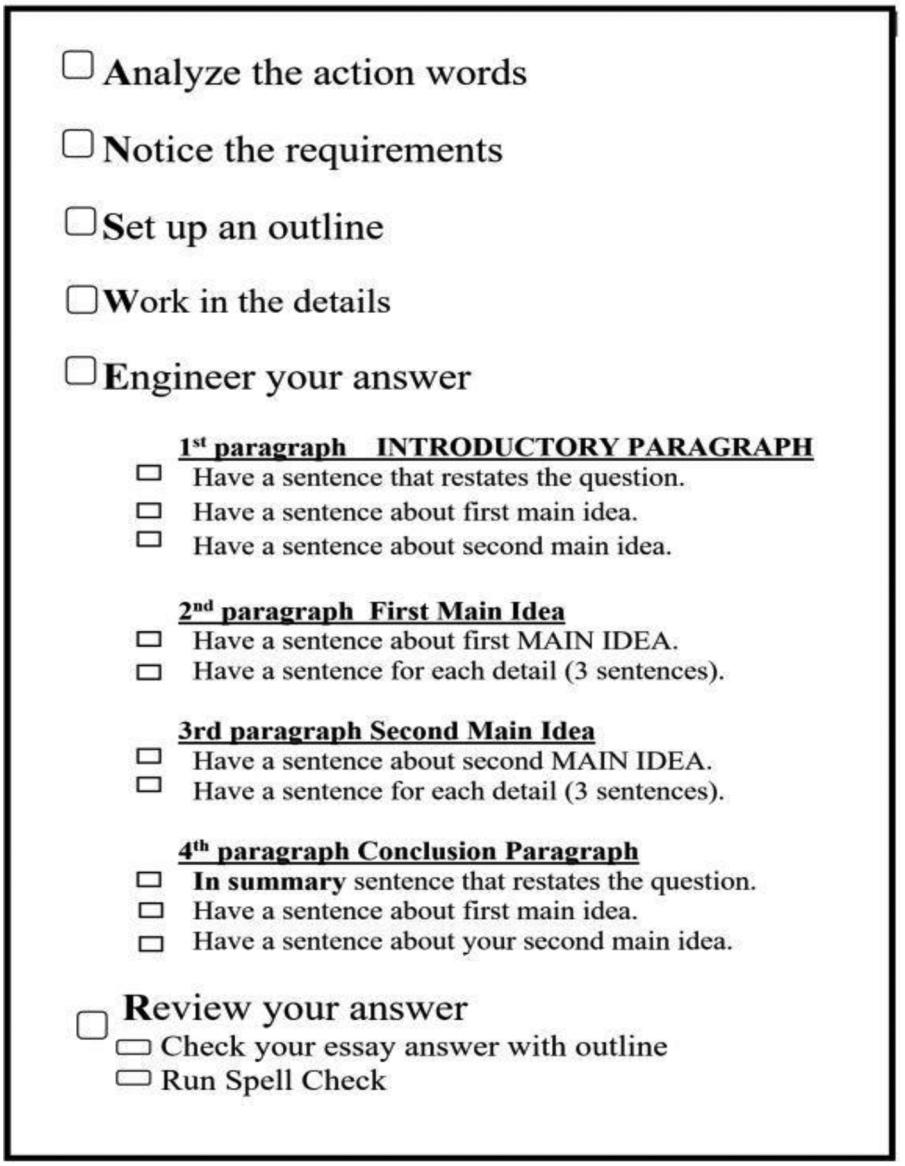

Figure 1. ANSWER MNEMONIC (adapted from Hughes et al. 2005).

of 40 min. for 8 consecutive weeks. All students in the intervention and non-intervention groups participated in their postsecondary delineated coursework. Common courses included instruction in finance, current issues, and vocational internships.

Dependent variables. The intervention and non-intervention groups' pretest and posttest responses to the essay prompts were assessed via the strategy scoring rubric. This rubric had been previously used as a dependent measure in the four published experimental ANSWER studies (Therrien et al., 2009; Woods-Groves et al., 2012, 2013, 2014) and is depicted in Figure 1. The strategy scoring rubric is a tool to assign scores that could range from 0 to 6 for a possible total score. The rubric is aligned to match to specific ANSWER strategy steps. Steps 1 through 4 pertain to (strategy specific steps) analyzing the essay prompt and to set-

Strategy Scoring Rubric

Strategy Specific Components

Step 1: Analyze the Action Words (1 each)
Were the key action word(s) underlined once?
_____ / 1

Step 2: Notice the Requirements (1 each)
Were the requirements underlined twice?
_____ / 1

Step 3: Set Up an Outline (.5 each)
___Was an outline constructed?
___Did the main points/ideas in the outline match the requirements in the question?
_____ / 1

Step 4: Work in Details (1 each)
Were relevant details listed under the main points in the outline?
_____ / 1

Essay General Components

Step 5: Engineer Your Answer (.2 each)
___Was there an Introductory Sentence or Paragraph?
___Did the Introductory Sentence or Paragraph contain a rephrase of the question?
___Was there a sentence for each requirement in the question?
___Did all sentences pertain to the topic?
___Was there a concluding sentence (summary)?
_____ / 1

Step 6: Review Your Answer (.5 each)
___Were all outlined items included?
___Was the question adequately answered?
_____ / 1

TOTAL SCORE $\frac{\text{Points Earned}}{\text{Total Points}} = \frac{\_\_\_\_\_}{6} =$ %

Figure 2. Strategy Scoring Rubric (adapted from Therrien et al. [2009], Woods-Groves et al. [2012], Woods-Groves et al. [2013], Woods-Groves et al. [2014]).

ting up an outline and can be scored a range of 0 to 4 points. Steps 5 through 6 are delineated in the rubric (general component steps) and pertain to the construction of the essay response and reviewing the essay response with possible scores ranging from 0 to 2 points. See Figure 2 for the strategy scoring rubric. Two graduate student raters employed the strategy specific rubric to evaluate the pretest and posttest essays and maintenance essays that were constructed by the students. The mean of the raters' responses were calculated for the strategy specific steps (1 through 4), the general component steps (5

through 6), and the overall total score (steps 1 through 6).

The second dependent measure was used by the raters to provide a more stringent evaluation of the students' constructed essays. This measure was a holistic analytic scoring rubric developed by the Oregon Department of Education and denoted as an "Official Scoring Guide" (Oregon Department of Education, 2004–2005). This measure had been used in two previous experimental investigations of the ANSWER strategy (i.e., Therrien et al., 2009; Woods-Groves et. al., 2014) and provided an evaluative criteria similar to often used state writing assessments (Isaacson, 1996). Six domains were evaluated with this rubric which included: ideas and content, organization, voice, word choice, sentence fluency, and conventions. Each domain could receive a score that ranged from 0 to 6 with 6 indicating the highest quality.

Data collection. Following the random assignment of students to the intervention and non-intervention groups, all students were administered a pretest with counterbalanced prompts (prompt 1 and prompt 2). A posttest was administered one week following the conclusion of ANSWER instruction. The posttest was given to all students. A maintenance prompt was administered to all students 2 weeks following the end of ANSWER strategy instruction. Two graduate students enrolled in the doctoral program in special education used the strategy rubric and the analytic rubric to evaluate de-identified pre- and posttest essays, and maintenance essays. The raters did not have knowledge of the ANSWER strategy instruction or if the essays were from students in the intervention group or non-intervention group. The first author trained the student raters in how to use the respective rubrics to evaluate the students' completed essays. The raters practiced using the rubrics to evaluate essays and met to discuss their ratings with each other while they were evaluating the essay responses.

Data Analysis

The software G power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) was used to conduct a power analysis. Previous experimental studies for the ANSWER strategy reported Cohen's *d* effect sizes that ranged from $d = .95$ to $d = 15.85$ (Therrien et al., 2009; Woods-Groves et al., 2012, 2013, 2014). The power analysis was conducted with a large effect size of .80, an alpha of .05, and .80 for power. The results indicated that a total sample size of 15 would be adequate ($N = 14.6429 - = 15$). Additional analyses were conducted via IBM SPSS 23 (2016). A series of analysis of variance (ANOVAs) were used to compare pretest strategy and analytic scoring rubric results from intervention and non-intervention groups. An analysis of covariance (ANCOVAs) with pretests as the covariates strategies were used to examine the strategy and analytic scoring rubrics posttest results for the intervention and non-intervention groups. The strength of statistically significant findings (effect sizes) were calculated and then evaluated via Cohen (1988) classification standards (i.e., .2 = small, .5 = medium, and .8 = large).

Results

Treatment Integrity and Inter-Rater Reliability

For each of the eight ANSWER sessions treatment integrity was collected via two raters completing respective lesson related checklists. Each checklist contained the content and steps to be included in each session. For seven of the eight lessons two raters agreed 100% with regard to content and steps completed in each session. For one session treatment integrity was collected by one rater due to scheduling conflicts. Treatment integrity for this session indicated 100% compliance.

Interrater agreement for the two raters' results from the strategy scoring rubric and the analytic scoring rubric was calculated via bivariate correlations. Correlations were examined for the two raters' scores via the respective rubrics (i.e. strategy scoring rubric and the analytic rubric) for the pretests, posttests, and maintenance. Correlations for the strategy scoring rubric results across essay prompts between raters ranged from $r = .89$ to 1.00, $mdn = .99$. For the analytic rubric results for pretest and posttest correlations between the two raters ranged from $r = .91$ to .98, $mdn = .95$. For the analytic rubric raters' results for the maintenance essay responses correlations ranged from .73 to .87, $mdn = .79$.

Posttest Measures

Strategy-specific rubric. The differences between the treatment and control groups' posttest essays were examined using a series of ANCOVAs. The results for the overall strategy rubric between the treatment and control groups were statistically significant with a large effect size for the treatment group ($p = .008$, $d = 1.33$). The strategy-rubric components were broken down into two parts to further examine what might account for the significant difference. The strategy-use components steps 1–4) for the treatment group were significantly higher, with a large effect size ($p = .012$, $d = 1.31$). For the general components (steps 5–6), the treatment group significantly outperformed the control group, with a large effect size ($p = .021$, $d = .90$). Table 2 details the means, standard deviations, p values, effect sizes, ANOVA, and ANCOVA results for the strategy-scoring rubric for the pre- and posttests.

Analytical-scoring rubric. The participants' posttest essays responses were evaluated using a 6-point scale that ranged from 1 for the lowest point to 6 for the highest. The rubric includes six analytic areas: ideas/content, organization, voice, word choice, sentence fluency, and conventions. The ANCOVA posttest results, with pretests as the covariate, for the intervention and non-intervention group responses were significant in favor of the intervention group for "ideas/content" and "word choice" with large effect sizes of $p = .039$, $d = .71$ and $p = .011$, $d = .86$, respectively. However, non-significant results were revealed for the rest of the analytic rubric areas. Table 2 details the mean values, standard deviations, p values, effect sizes, ANOVA, and ANCOVA results for the analytic rubric for the pre- and posttests.

Maintenance. A maintenance essay prompt was administered 2 weeks after the ANSWER strategy intervention was completed. The ANSWER strategy was not reviewed. An electronic Word document that contained the essay prompt was loaded on the PC desktop for each student in a large group format. The graduate students' mean strategy scoring rubric scores for the intervention group and non-intervention group were examined via ANCOVAs with the pretests as the covariate. The overall rubric total revealed that the intervention group significantly outperformed the non-intervention group, $p = .001$, $d = .2.26$. For strategy use and general components the intervention group, significantly outperformed the non-intervention group $p = .001$, $d = .2.32$. and, $p = .004$, $d = 1.40$, respectively. The intervention group significantly outperformed the non-intervention group in the analytic rubric rating for word choice, $p = .036$, $d = .68$. A comparison of intervention and non-intervention groups revealed non-significant results for the analytic rubric ratings for ideas/content, organization, voice, sentence fluency, and conventions. Table 3 depicts ANCOVAs, Mean, SD, effect sizes, and p-values for maintenance comparisons.

Discussion

This study investigated the efficacy of the ANSWER strategy to improve electronic essay writing skills of college students with IDD. Students who were taught the ANSWER strategy once a week for 8 weeks (i.e., a total of 6 hrs 40 min.) used the strategy steps as they constructed their essay test responses. Students in the treatment group improved their essay writing skills in the areas of overall essay quality, the use of ideas and content, and word choice when compared students in the control/non-intervention group. In the 2 weeks following the end of ANSWER instruction, students in the treatment group maintained their skills in overall essay quality that included strategy use, quality construction of the essay responses, and word choice when compared to the control group. The results from the proximal (i.e., Strategy Rubric) and distal (i.e., Analytic Rubric) were similar to those found in Woods-Groves et al. (2014) where significant effects were found for the treatment group for both metrics for college students with IDD where students who were taught the answer strategy constructed better quality essay responses than students who were not taught the strategy.

The four previous experimental ANSWER studies instructed students in constructing hand written essay outlines and essay responses. In Therrien et al. (2009) middle schoolers with LD who were taught the ANSWER strategy sig-

TABLE 2

ANSWER Strategy Pre- and Posttests Results for Strategy Rubric and Analytic Rubric Mean Ratings

	Overall Strategy Rubric Total	*Strategy Use 1–4 Steps*	*General Components 5–6 Steps*	*Ideas Content*	*Organization*	*Voice*	*Word Choice*	*Sentence Fluency*	*Conventions*
Pretest									
C (9)	1.87* (.83)	.00* (.00)	1.87* (.83)	3.34* (1.33)	2.67* (1.33)	3.34* (1.23)	3.34* (1.00)	2.89* (1.27)	3.12* (1.06)
T (11)	2.01* (.92)	.00* (.00)	2.01* (.92)	3.37* (1.29)	3.14* (1.19)	3.74* (1.04)	3.24* (1.13)	3.28* (1.43)	3.14* (1.10)
d	.15	NA	.15	.02	.37	.35	.09	.28	.01
ANOVA	$F(1, 19) = .128$ $p = .725^{ns}$	$F(1, 19) = .000$ $p =$ NA	$F(1, 19) = .128$ $p = .725^{ns}$	$F(1, 19) = .003$ $p = .959^{ns}$	$F(1, 19) = .701$ $p = .413^{ns}$	$F(1, 19) = .610$ $p = .445^{ns}$	$F(1, 19) = .048$ $p = .828^{ns}$	$F(1, 19) = .397$ $p = .537^{ns}$	$F(1, 19) = .003$ $p = .959^{ns}$
Posttest									
C (9)	1.74* (1.37)	.00* (.00)	1.74* (1.37)	3.00* (1.53)	2.73* (1.40)	2.89*(1.58)	2.62* (1.27)	2.73* (1.35)	2.73* (1.35)
T (11)	4.78* (2.92)	1.87* (2.01)	2.91* (1.20)	4.05* (1.39)	3.96* (1.36)	3.96* (1.32)	3.60* (.99)	3.41*(1.34)	3.32* (1.19)
d	1.33	1.31	.90	.71	.89	.73	.86	.50	.46
ANCOVA	$F(1, 18) = 9.19$ $p = .008^{**}$	$F(1, 18) = 7.728$ $p = .012^{**}$	$F(1, 18) = 6.506$ $p = .021^{**}$	$F(1, 18) = 4.992$ $p = .039^{**}$	$F(1, 18) = 3.085$ $p = .097^{ns}$	$F(1, 18) = 1.965$ $p = .179^{ns}$	$F(1, 18) = 8.064$ $p = .011^{**}$	$F(1, 18) = .932$ $p = .348^{ns}$	$F(1, 18) = 2.764$ $p = .115^{ns}$

Note: * Denotes mean values, C group (9) = Control, number of non-intervention participants, T group (11) = treatment, number of intervention group participants. Standard deviations are provided in parentheses. ns = non-significant. ** = significant. *d* = Effect size, Cohen's *d*.

TABLE 3

ANSWER Strategy Maintenance 2 Weeks Following Instruction

Main.	*Overall Strategy Rubric Total*	*Strategy Use 1–4 Steps*	*General Components 5–6 Steps*	*Ideas Content*	*Organization*	*Voice*	*Word Choice*	*Sentence Fluency*	*Conventions*
C (9)	1.23* (1.08)	.00* (.00)	1.23* (1.08)	2.78* (1.18)	2.95* (1.08)	3.34* (1.07)	3.06* (.89)	2.78* (1.07)	3.06* (1.02)
T (11)	5.80* (2.64)	2.89* (1.76)	2.92* (1.32)	3.82* (1.35)	3.96* (1.51)	3.78* (1.13)	3.73* (1.06)	3.37* (1.29)	3.37* (.98)
d	2.26	2.32	1.40	.82	.76	.39	.68	.49	.30
ANCOVA	$F(1, 18) = 29.101$ $p = .0001^{**}$	$F(1, 18) = 24.012$ $p = .0001^{**}$	$F(1, 18) = 10.885$ $p = .004^{**}$	$F(1, 18) = 5.871$ $p = .072^{ns}$	$F(1, 18) = 1.950$ $p = .181^{ns}$	$F(1, 18) = .293$ $p = .595^{ns}$	$F(1, 18) = 5.162$ $p = .036^{**}$	$F(1, 18) = .737$ $p = .403^{ns}$	$F(1, 18) = .555$ $p = .466^{ns}$

Note: * Denotes mean values, CI group (9) = number of non-intervention participants, I group (11) = number of intervention group participants, Standard deviations are provided in parentheses. ^{ns} = non-significant. *d* = Effect size, Cohen's *d*.

nificantly improved their essay responses. Woods-Groves et al. (2012) revealed that college students with IDD learned and applied the ANSWER strategy. Woods-Groves and colleagues conducted two additional studies that supported the use of the ANSWER strategy to improve the quality and organization of college students with IDD's essay responses (Woods-Groves et al., 2013, 2014). This experimental study examined the use of the ANSWER strategy in an electronic format where students applied the steps of the strategy when presented with an essay question in a word document via a desktop computer. The students analyzed the action words and noticed the requirements by underlining and highlighting the essay prompt question, constructed an electronic outline, constructed an essay response, and revised their response all through their word document and desktop computer.

Limitations and Future Research

There were several limitations to this study. The first limitation pertained to the fact that while students in the treatment group significantly outperformed students in the control group on the distal analytic rubric in the area of idea/content and word choice the 2-week maintenance results revealed that students' essays were not scored as significant in the area of idea/content. This could indicate an extension in instructional time may be needed to ensure students have overlearned the strategy and that students have a chance to apply the strategy over a longer period of time. The 2-week maintenance time was a relatively short period of time between the end of intervention and the maintenance phase. This occurred due to the length of the academic year. A second limitation is related to scheduling and the length of the academic year and pertains to the lack of a generalization phase. Unfortunately, we were not able to ascertain if students in this study would have generalized their essay writing skills. Future studies should include a longer maintenance phase period and a generalization phase. The third limitation pertains to the need to examine the ANSWER strategy's use in different contexts where expository writing tasks are assigned such as in-person college classes in different

subject areas, in one-to-one tutorial services, and through online college coursework assignments.

Implications for Practice

MacArthur, Graham, and Fitzgerald (2016) noted that "writing is critical to the advancement of knowledge in academic, technical, and business fields. . . ." (p. 1). Students with and without disabilities who experience difficulties in written expression throughout their secondary settings oftentimes will enter college or the workforce ill prepared to complete core aspects of their educational program or job. It is essential that teachers use evidence-based strategies in writing instruction. As noted earlier, 75% of writing tasks are expository for 12th graders, with that proportion increasing in college (Graham & Perin, 2007). With the majority of secondary students in eighth and 12th grades who were assessed via the NAEP falling in the non-proficient range in the area of writing there is a need to employ effective writing practices in the classroom. The writing process is iterative in nature and involves metacognition, motivation, and can be context dependent (Hayes, 1996; 2012; Hayes & Flower, 1980). Individuals write for many purposes and within many contexts. Components of the ANSWER strategy are undergirded by previous empirical work reviewed by Graham et al. (2016) in the area of writing (i.e. use of explicit instruction, self-assessment through goal setting and graphing, use of feedback during guided practice, using word processing in writing). Within secondary and college classrooms students are called upon to construct text in an electronic format and are oftentimes assessed via computer-based platforms where they construct quality of essay responses.

When differentiating instruction it is beneficial for educators to identify and use strategies that can be effective for all learners. The efficacy of the ANSWER strategy has been supported through five experimental group studies that included middle schoolers with LD or college students with IDD. These studies support the use of the ANSWER strategy as an instructional method that has been effective in improving the quality of essay test responses.

This current investigation extended previous work pertaining to the ANSWER strategy and handwritten essay responses to embedding the strategy in an electronic-based format. It is important to support 21st century learners with and without disabilities who struggle in written expression with instruction that includes pre-planning, essay construction, and revision of text within a word processing or equivalent electronic format. For college students with IDD who struggle in writing and who are entering IHEs it is imperative to provide effective instruction in a timely manner. We encourage future exploration of the efficacy of ANSWER strategy in improving essay writing for secondary and college-age students with disabilities who experience difficulties in writing.

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