

A Preliminary Investigation of a Virtually Delivered Multimedia Essay Writing Strategy with College Students with Developmental Disabilities

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Abstract

The authors of this study examined a virtually delivered multimedia expository writing strategy via a single-case multiple-baseline across-participants design with three college students enrolled in a postsecondary program for students with intellectual and developmental disabilities. Participants responded to expository essay prompts at the beginning of each virtual session. Two raters evaluated all baseline, intervention, and maintenance essay responses with a strategy rubric. Virtual one-to-one strategy instruction consisted of 45-minute Zoom sessions with live instruction and multimedia content (e.g., animated videos, visual cues). Two out of three participants successfully applied strategy steps to construct and revise essay-prompt responses. The results indicated that the strategy instruction was effective for the majority of the participants and also highlighted the need for future investigations and replication.

Keywords: technology, postsecondary, developmental disabilities, writing strategy

Plain Language Summary

- It is important for college programs for students with intellectual and developmental disabilities to support students.
- One way to support students in these programs is to offer instruction that has helped students in the past in improving their academic skills
 - Academic skills include writing essays.
- Essay writing instruction should be interesting and easy to access.
- **What we did in this study:**

- We taught three college students with developmental disabilities an essay writing strategy using ZOOM, teacher instruction, and cartoons.
 - A strategy is a way to teach students steps to help them do something.
- The essay writing strategy has steps that show students how to read essay questions, plan to write essays, and how to write essays. Each student met with the teacher using ZOOM.
- The teacher showed cartoons that taught the steps in the strategy. Then the teacher practiced the strategy steps with the students.
- **Findings:** Two of the students reported they liked writing and enjoyed the strategy lessons. These students learned the strategy steps and used the steps to plan and write essays.
 - One student did not use the strategy steps and did not plan and write essays on his own.
 - However, during instruction he was able to complete strategy steps with the help of his teacher.
- **Conclusion:** We found that the essay writing strategy was helpful for most but not all of the students.
- Our findings show the need for us to identify what type of additional supports we should include in future instruction so all students can learn and use the strategy.
- Overall, the findings were positive and useful.

The majority of states within the U.S. offer postsecondary education (PSE) programs for students with intellectual and developmental disabilities (IDD; Think College, 2022). Programs delineate specific entrance requirements (e.g., reading skill, level of independence); however, there is often a common criterion that students must have a documented developmental disability (e.g., intellectual disability [ID], autism spectrum disorder [ASD]; Grigal et al., 2022; Hendrickson et al., 2017; Think College, 2021). Students in these programs receive academic instruction and individualized supports that target domains such as daily living skills, career development, health needs, and use of technology (Grigal et al., 2009; Hendrickson et al., 2017). In addition, PSE programs for students with IDD vary regarding inclusivity and range from fully inclusive (e.g., enrollment in traditional college courses) or mixed (e.g., a blend of college courses and program specific courses) to separate (e.g., enrollment in program specific courses; Grigal et al., 2022; Lee et al., 2022). One PSE model, the Comprehensive Transition Program (CTP), meets federal requirements (i.e., 2008 Higher Education Opportunity Act) where applicants can apply for federal financial aid. In CTPs, students can attend traditional and program-specific courses and complete vocational internships (Lee et al., 2022).

Think College is the national coordinating center for PSE programs for students with IDD within the U.S. and has published program standards and recommendations (Grigal et al., 2011). These standards offer guidance for programs in empowering student self-determination via person-centered planning, student-directed decision making, and promoting student independence. To further support student learning and independence, Think College standards' authors recommend that programs use a Universal Design for Learning (UDL) approach (Grigal et al., 2011). UDL affords students a myriad of ways to

access, engage, and process information as well as supports students in using technology for personal, academic, and vocational activities (Grigal et al., 2011; Hitchcock & Stahl, 2003; Lee & Templeton, 2008). Furthermore, the standards recommend full student inclusion in college activities and coursework (Grigal et al., 2011). To prepare students to meet the demands of traditional college courses, PSE programs for students with IDD should afford students who have difficulties in prerequisite academic skills (e.g., writing, reading, technology use) access to evidence-based supplemental instruction. Given the impetus for students within these programs to enroll in traditional college courses, it is critically important to address existing student difficulties in foundational academic skills, such as written expression.

Technology and written expression readily intersect and are an intricate component of vocational (Gill, 2014; Moore & Morton, 2017), academic (Bouck et al., 2015; Rowland et al. 2022) and personal-social endeavors (Cannella-Malone et al., 2015; Pennington, 2016). A survey of business managers ($N = 50$) in the northeastern U.S. revealed that the majority of respondents (i.e., 84% to 86%) ranked written communication and computer expertise in the top 10 of highly valued employable skills, respectively (Baird & Parayitam, 2019). Baird and Parayitam (2019) asserted that a need exists for institutes of higher education (IHEs) to afford students opportunities to foster and practice employable skills, such as written expression. Across college programs and disciplines, expository essay writing (e.g., organizing and presenting ideas to explain or inform) is an often-used format for assignments (Gill, 2014; Li & Mak, 2022). Foxworth et al. (2019) and Li and Mak (2022) acknowledged the increasing demand for postsecondary students to effectively write (e.g., plan, produce text, revise) in a technological format (e.g., Microsoft Word, editing features) and noted that it was not uncommon for students with and without disabilities to have difficulty with this essential skill. PSE programs for students with IDD should not overlook the importance of fostering students' written expression skills (Woods-Groves et al., 2022). While a body of evidence is emerging regarding effective practices for college students with IDD, there is still a dearth of evidence-based instructional practices to address areas of academic need such as written expression (Woods-Groves et al., 2022). For this investigation, we examined the use of an expository essay writing strategy with students in a PSE program for students with IDD.

The Writing Process

Hayes (2012) asserted that motivation bolsters the writing process through an iterative path of activities (i.e., planning what to write, the production of text, and revision). Motivational variables are factors that may potentially mediate, influence, or affect one's writing process, such as interest and engagement (Hidi & Renninger, 2006; Renninger & Hidi, 2016) and self-efficacy (e.g., one's own perceived competence; Bandura, 1997; Bruning et al., 2013; Mitchell et al., 2023; Shunk & Usher, 2014). Camacho et al. (2021) conducted the first systematic review of literature to broadly include motivational factors and writing intervention studies. The authors examined 82 data-based studies (i.e., 59 quantitative, eight qualitative, and 15 mixed methods) conducted with approximately 28,000 students ranging from kindergarten to twelfth grade and published between 2000 and 2018. Writing instruction within studies varied (e.g., self-regulated strategy instruction, process approach, handwriting instruction, collaborative writing). The researchers

identified 24 motivational variables and found that self-efficacy was the most frequently targeted variable (42% of studies) while attitudes was the second (28% of studies; Camancho et al., 2021). Examples of other motivational variables included but were not limited to the following: (a) achievement goals, (b) self-concept, (c) liking or enjoyment, (d) interest, and (e) anxiety (Camacho et al., 2021). The researchers found that most study authors used teacher and student self-report surveys/questionnaires (88%) and reported that for most studies, dependent measures revealed “moderate positive effects” for motivational variables and writing outcomes (Camacho et al., 2021, p. 213).

Within the writing process, motivational factors such as individuals’ self-efficacy (e.g., perceived competence in completing writing tasks) can readily affect their persistence and engagement in the writing process as well as influence how they affectively view writing tasks (e.g., experiencing anxiety and stress, or enjoyment and interest; Bandura, 1997; Bruning et al., 2013; Mitchell et al., 2023; Nielsen, 2015; Schunk & Usher, 2014). As writing processes are examined, it is important to take into consideration and evaluate the possible influence of motivational variables (Alves-Wold et al., 2023; Camacho et al., 2021). The Intrinsic Motivation Inventory (IMI) is one of many tools designed to evaluate motivational variables as they relate to tasks. Ryan and Deci (2000) devised the IMI as a Likert-type survey where individuals complete items that pertain to a task or activity (e.g., writing) and that target motivational variables (e.g., interest, perceived competence, and pressure/tension).

Writing Instruction with Students with IDD

Rodgers and Loveall (2022) conducted a meta-analysis of experimental single-case and group writing intervention studies ($N = 52$) with students with IDD ($N = 424$) ranging from kindergarteners to college students. Results revealed that overall, interventions yielded positive strong effects (i.e., $ES = 1.44$) for participants regardless of disability. Meta-analytic results supported use of the following intervention components: (a) systematic instructional methods (i.e., strategy instruction, explicit instruction, and (b) systematic response prompting. Dependent measures included rubrics and writing curriculum-based measurement (CBM) metrics (i.e., words spelled correctly [WSC]; correct writing sequences [CWS]) to evaluate writing quality (Rodgers & Loveall, 2022).

Woods-Groves et al. (2023) systematically reviewed ($N = 43$) experimental single-case and group intervention studies conducted with participants in PSE programs for students with IDD ($N = 235$) and examined 33 of the studies via meta-analysis. Studies pertained to daily living (e.g., household chores, navigating), academic (e.g., writing, reading), or vocational (e.g., copying, scanning) interventions that integrated multimedia and technology (e.g., video modeling, virtual or robotic teaching agents, images, audio, software, apps), with systematic instruction, systematic prompting, and visual cues. Overall, interventions yielded positive strong effects (i.e., $ES = 1.84$) for participants regardless of disability (Woods-Groves et al., 2023). Dependent variables included task analysis, rubrics, number of correct responses, and interval recording.

ANSWER Strategy Instruction with College Students with IDD

The ANSWER strategy (i.e., Essay Test Taking Strategy; Hughes et al., 2005) is an expository writing strategy. Therrien et al. (2009) investigated the ANSWER strategy using a pre-/posttest design with random assignment to treatment and control groups with middle-school students (i.e., seventh, eighth graders) with learning disabilities ($N = 42$). Results indicated that students in the treatment group significantly outperformed those in the control group in the organization and quality of their essay responses measured via a Strategy Rubric (i.e., dependent measure where two raters evaluated essay responses for use of strategy steps and quality of essay responses).

Woods-Groves and colleagues adapted the ANSWER strategy and conducted five experimental group studies with random assignment to treatment and control groups with college students in PSE programs for students with IDD for a total of 95 participants across studies. The ANSWER strategy employs a mnemonic driven, teacher-directed explicit instruction (i.e., model, guided practice with feedback, and test), and teaching to mastery approach (Hughes et al., 2017). The ANSWER mnemonic is used throughout the strategy and directs students to read an essay question prompt and complete the following six strategy steps: (1) Analyze the action words in the essay prompt by underlining them, (2) Notice the requirements in the essay prompt by highlighting them, (3) Set up an outline with main ideas, (4) Work in the details under each main idea, (5) Engineer your essay response, and (6) Review your essay response by comparing it to your outline and completing the spellcheck (Hughes et al., 2005). Two studies (i.e., Woods-Groves et al., 2012, and Woods-Groves et al., 2013) had participants use handwriting to complete the strategy, while three studies (i.e., Woods-Groves et al., 2014; Woods-Groves et al., 2018; Woods-Groves et al., 2022) had students use computers or laptops and Microsoft Word to complete strategy steps.

For the dependent measure, each study had two raters evaluate strategy use and quality of essay responses via the ANSWER strategy rubric (Therrien et al., 2009). Across the five studies, intervention sessions were conducted in person, in a large group setting, used live teacher-led instruction, and ranged from 6-26 sessions, with 30-50 minutes per session; total intervention time ranged from 3-21.67 hours. Cohen's d (Cohen, 1988) effect size offers a metric (i.e., interpreted as standard deviation) to evaluate the degree of significance (i.e., $d = .20$, small, $d = .50$, medium, $d = .80$ or higher, large). ANSWER strategy rubric results yielded large effect sizes for the five studies that ranged from $d = 1.12 - 15.85$ where the treatment group significantly outperformed the control groups in using the strategy and/or quality of essay responses. Results showed positive strong effects across the five studies.

Purpose of Study

As students with IDD in PSE programs select coursework and choose supplemental instruction, it is important to design instruction that is appealing and interesting. A shortage exists concerning evidence-based writing practices for college students with IDD (Woods-Groves et al., 2022). Woods-Groves et al. (2023) and Rodgers and Loveall's (2022) meta-analytic findings revealed promising results for individuals with

IDD who received writing interventions that incorporated the following: (a) assistive technology (e.g., mobile devices, laptops, video modeling), (b) multimedia (e.g., visual cues, pictures, print, audio), (c) systematic instruction (e.g., explicit instruction), and (d) systematic prompting (e.g., constant time delay). We incorporated findings from these studies and adapted the ANSWER strategy to the ANSWER Plus (+) strategy by adding technology and multimedia components. Lesson instructions were delivered via Zoom through web-based modules. The instructor-scripted information that was previously delivered by a live in-person in previous studies was revised to be delivered via videos with animated characters that incorporated visual cues, pictures, music, and text presented online. In addition, we added a combination of additional practice exercises that incorporated animation, live teacher-led instruction, and constant time delay systematic prompting. In this study, we used a multiple-baseline across-participants design to investigate the effect of the ANSWER+ Strategy with three students enrolled in a CTP PSE program for students with IDD. We investigated the following research questions: (a) Will participants use the ANSWER+ Strategy steps to plan, construct, and revise essay responses measured via the ANSWER strategy rubric?; (b) Will the quality of participants' essay responses increase from baseline to intervention measured by WSC and CWS CBMs?; (c) Will participants' self-reported level of motivational variables of interest, perceived competence, and pressure/stress concerning the writing process differ from pre- to post- intervention IMIs?

Method

Participants

This study had three participants enrolled in a 2 to 4 year non-degree CTP PSE program for students with ID located at a southeastern, Research 1 university. Students lived on campus or in community housing. Program supports included development of the following: social skills, academic enrichment, independent living skills, health and wellness skills, employment development, self-care, and advocacy skills. There was a financial cost (e.g., tuition, fees) for attending the CTP PSE program. Students attended program-specific classes as well as traditional college classes. Admission requirements included the following: (a) a minimum age of 18 and maximum age of 26, (b) documentation of ID, (c) minimum third-grade reading level and basic mathematics skills, (d) verbal communication skills, (e) desire to attend college and attain employment, and (f) ability to participate in a college setting with minimal supervision. Study inclusion criteria included the following: (a) participants must be enrolled in the CTP, and (b) consented to participate in the study. Three students consented and received \$90.00 Visa gift cards for compensation at the end of the study. We used pseudonyms for the participants. Students who had consented or for whom parental consent and student assent was obtained gave permission for the CTP for students with IDD to provide student performance information. The first participant was Michelle, a 23-year-old Latina cis-gender female with she/her/hers pronouns with ID. Michelle had an IQ of 74 and scored in the 10th percentile on the Supports Intensity Scale-Adult version (SIS-A; American Association on Intellectual and Developmental Disabilities, 2004). Michelle's Dynamic Indicators of Basic Early Literacy Skills (DIBELS 8) 8th Edition (University of Oregon Center on Teaching and Learning, 2018) oral reading fluency level (ORF) was sixth grade,

and her MAZE reading comprehension results fell in the fifth-grade level. The second participant was Marshall, a 20-year-old white cis-gender male with he/him/his pronouns with ID and ASD. Marshall had an IQ of 56 and scored in the 5th percentile on the SIS-A. His DIBELS 8 ORF and MAZE reading comprehension results fell in the third-grade level. The third participant was Sammy, a 23-year-old white cis-gender male with he/him/his pronouns with ID and ASD. Sammy had an IQ of 55 and scored in the 5th percentile on the SIS-A. His DIBELS 8 ORF and MAZE fell in the fifth-grade level.

Setting

The study setting was virtual Zoom sessions that occurred during the participants' break between fall and spring semesters. Participants attended Zoom virtual sessions from their homes using their laptop computers (i.e., PC and Mac devices) which all had built-in webcams and microphones. The researcher scheduled and sent Zoom session invitations for each student via Microsoft Outlook. Participants regularly used Microsoft Outlook email, calendar, and Zoom for communication within their courses and for meetings in their program.

Materials and Procedures

Software and Technology

Software and technology were an integral component to this investigation. Each student used their own personal laptop equipped with webcam, microphone, and Microsoft Word. The researcher conducted all sessions (i.e., baseline and intervention) on the virtual meeting platform, Zoom. The first author used the following software for ANSWER+ intervention lessons: (a) Powtoons (2011-2021), Toonly (Voomly LLC, n.d.), Doodly (Voomly LLC, n.d.), and Moovly (2022) to create animated characters and scenes; (b) Descript (2017) and Talkia (Voomly LLC, n.d.) to create character voices and edit audio, and (c) Articulate (2022) to embed videos, images, audio, and practice exercises within lessons. The first author followed step-by-step instructions in Toonly and Powtoons software programs to design animated characters and to select background scenes or designs. For the next step, character scripts were entered into the Talkia software program, and the character voice was selected. The first author downloaded an audio file from Talkia and uploaded it to Toonly to sync the voice with the character. The Toonly video was uploaded into Moovly where further editing occurred (e.g., adding Doodly videos, cues, objects, animation). The first author used Descript to create transcripts and closed captions for Moovly videos. Moovly videos were uploaded to lesson modules created in Articulate.

ANSWER + Strategy

The ANSWER strategy (Hughes et al., 2005) lessons were adapted to a multimedia form for this study (ANSWER + Strategy). UDL principles (e.g., multiple means of representation; Hitchcock & Stahl, 2003) and Mayer (2008) principles of multimedia design were employed to create animated characters in videos where we eliminated unimportant content, highlighted critical elements, used animation and narration

simultaneously, combined images and text, and used a conversational style of instruction (e.g., “Hello we are college students like you.” Instructor scripts were adapted by including new model, lead, test opportunities along with additional expository essay prompt exercises. Essay Test-Taking Strategy exercises and practice prompts were revised to not exceed a third-grade reading level. Multimedia instructional examples and exercises within each lesson incorporated systematic prompting procedures (i.e., constant time delay with a 3-second delay). Each lesson and the videos included visual cues (e.g., underlining, highlighting, arrows, animated objects, and characters). We replaced in-person instruction with virtual instruction delivered via Zoom. Virtual instruction was a hybrid format (i.e., animated videos coupled with virtual live instruction).

Expository Essay Question Probes

Eighteen expository essay question probes were adapted from FCAT expository essay writing probes (Florida Department of Education, 2014). We used the Flesch-Kincaid Readability test (Kincaid et al., 1975) to adapt essay question probes to not exceed a third-grade reading level (e.g., average and median was 3.0 grade level). Each expository essay question probe contained a minimum of two sentences. Each sentence of the two sentences contained an “action” word (i.e., a verb that tells you to do something such as think, list, describe, include) and “requirements” (i.e., the things you need to write about and address in your response). Topics pertained to the following: (a) favorite (i.e., food, animal, day of the week, room in your house, place to visit, special place, pet, time of year, and person); (b) why you want to (i.e., do job or chore, eat healthy, do a hobby, meet a person from a book, and be an animal), and (c) what do you think (i.e., makes a good friend, and would help a new student). The following essay prompt is an example of one of the essay prompts used in the study: “Think about an animal you would like to be for one day. Explain why you would like to be this animal for one day. Include two reasons why you would like to be this animal.” The researcher administered the essay question prompts to each participant in a one-to-one format via Zoom during baseline and intervention at the beginning of each Zoom session before the day’s intervention lesson began.

Dependent Variables

Two raters independently evaluated each essay question response using the Strategy Rubric. Raters completed the Strategy Rubric (Therrien et al., 2009) for each essay response. The Strategy Rubric was created by Therrien and colleagues as a tool to evaluate student use of the ANSWER strategy steps and to assess the quality of expository essay responses. The Strategy Rubric included components that were aligned with writing scoring rubrics used within school districts (Therrien et al., 2009). The Strategy Rubric consists of the Strategy Use section and the Strategy Generalization section and yields a Total Score (i.e., sum of Strategy Use and Generalization sections). The Strategy Use section consists of evaluation of ANSWER steps 1 to 4 (i.e., Step 1: Analyze essay prompt action words by underlining them, Step 2: Notice requirements by highlighting them, Step 3: Set up Outline, Step 4: Work in the Details for the outline). Raw scores for Strategy Use can range from 0 to 4. The Strategy Generalization section consists of evaluation of ANSWER steps 5 to 6 (i.e., Step 5: Engineer essay response,

Step 6: Review essay response by checking the inclusion of all outline items and that there are no grammatical errors). Raw scores for Strategy Generalization can range from 0 to 2. The Total Score can range from 0 to 6. Directions for using the Strategy Rubric instruct a rater to examine a student's work which includes the essay prompt, students' outline, and student essay response. The rater is to use the rubric and rate whether the student completed the respective steps. Interrater reliability for the Strategy Rubric Total Score across five pre-/posttest group design essay strategy studies (i.e., Woods-Groves et al., 2012; Woods-Groves et al., 2013; Woods-Groves et al., 2014; Woods-Groves et al., 2018; Woods-Groves et al., 2022) conducted with college students with IDD fell on average within $r = .90$ or above. Regarding reliability, Cronbach's coefficient alpha yielded $\alpha = .87$ for ($N = 43$) Strategy Rubric ratings of the participants' essay responses.

Descriptive Measures

Writing CBM Metrics

Two raters evaluated each essay response using two types of Writing CBM metrics (i.e., WSC, CWS) as distal pre- and posttest measures. WSC metric entailed raters circling and reporting the total number of misspelled words (Hosp et al., 2016). For the CWS, metric raters examined each sentence to identify misspellings, errors in punctuation and or capitalization for one or more consecutive words (Hosp et al., 2014; Hosp et al., 2016). For criterion-related validity, Hosp et al. (2014) found a positive significant moderate relationship for writing CBM metrics (i.e., WSC, CWS) and the Woodcock Johnson Tests of Achievement (WJIII; Woodcock et al., 2001) for college students with IDD.

Intrinsic Motivation Inventory Student Self-Report

Participants completed a pre- and post-IMI as a distal measure. The researcher administered the IMI via Qualtrics through a Zoom session by sharing a screen and reading each item aloud to the participant. The participant then orally indicated the Likert-type 1-to-7 response (i.e., 1 = not at all true; 4 = somewhat true; and 7 = very true). The 17-item IMI assessed the following domains: (a) Interest (7 items), (b) Pressure/Tension (5 items), and Perceived Competence (5 items). Higher scores were desirable. Some items were reverse coded. Domain raw scores could range from the following: (a) 7-49 for Interest, (b) 7-35 for Pressure/Tension, and (c) 7-35 for Perceived Competence. Previous studies supported the psychometric properties of IMI scores for research use (Ryan et al., 1990; Ryan et al., 1991).

Researcher

The first author/researcher conducted all the Zoom sessions (i.e., baseline sessions, intervention sessions) with the participants. The researcher was qualified to implement the intervention based on her experience (i.e., a Ph.D. in special education, experience as a previously tenured special education teacher for students with IDD) and previous experience teaching the expository writing strategy to college students with IDD.

Interobserver Agreement and Treatment Fidelity

Rater Training

The first and second authors completed a one-hour interobserver (IOA) rater training session. Raters reviewed the structure and content of the ANSWER+ lessons and the ANSWER strategy scoring rubric scoring procedures. They independently scored two essay prompt responses using the rubric. Raters compared scores, resolved disagreements, and met the IOA training criterion (i.e., 100%).

Interobserver Agreement

We collected IOA for all baseline and intervention sessions. The first and second authors independently scored student essay prompt responses using the ANSWER strategy rubric, WSC, and CWS). The minimum criterion for IOA was 80% based on What Works Clearinghouse 4.1 ([WWC] 2020) recommendations. We collected IOA for all sessions (i.e., all baseline and all intervention sessions). We calculated IOA between the two raters by taking the number of agreements and divided by combined total agreements and disagreements (Fallon et al., 2015). After raters completed scoring, they met to discuss any disagreements. Rater agreement for the ANSWER strategy rubric IOA was 96.8% across all baseline and intervention for essay prompts with a range of 90.6-100%. For CBM WSC and CWS, IOA across baseline and intervention prompts was 96.5% for WSC, $R = 77-100%$, $Mdn = 98$, and 95.9% for CWS, $R = 90-100%$, $Mdn = 100%$.

Treatment Fidelity

Prior to completion of treatment fidelity rating, the first author met with the second author (i.e., 30 minutes) to review the structure of the ANSWER+ sessions, how to use treatment fidelity checklists, and to answer any questions. Once training was completed, the second author independently read the deidentified transcripts of all intervention sessions and completed the session treatment fidelity (TF) checklist aligned with each lesson. We collected TF 100% of sessions. TF across participants $M = 97%$, with $M = 92%$, for Michelle and $M = 100%$ for Marshall and Sammy.

Social Validity

Participants completed an adapted student self-report version of the Intervention Rating Profile-15 (IRP-15; Witt & Elliott, 1985) at pre- and post-intervention. The adapted IRP-15 had five, Likert-type items (i.e., 1 = strongly disagree, 4 = slightly agree, 6 = strongly agree) with a possible total raw score of 5-30. Higher ratings are desired. Examples of items included the following: (a) Pre-intervention item: "This intervention will help me be successful in class," and (b) Post-intervention item: "This intervention helped me feel better about myself" (Witt & Elliott, 1985). The researcher administered IRP-15 via Qualtrics through a Zoom session by screen sharing and reading each item aloud to the participant. The participant orally answered. Elliott and Treuting (1991) noted that IRP-15 results have adequate internal consistency (i.e., above $\alpha = .90$) and construct validity.

Baseline

During the baseline phase, each participant met virtually via Zoom one-to-one with the researcher to complete the essay question probe. The researcher would email the participant an essay question probe. The student would open the probe then share their screen via Zoom. Next, the researcher would read the essay question aloud and answer any participant questions. The researcher would then tell the participant to answer the essay question by typing a response below the essay question and to indicate (e.g., say “finished,” or “I am done”) when they had finished answering the question. If the participant had a question that pertained to topics or grammar, the researcher would say “just do your best” or “do what you think is best.” The participant continued to screen share during this time. Once finished, the researcher asked the participant to email the document. The researcher provided the participant with any directions or support needed to complete these steps. During the first three baseline Zoom meetings, each participant completed one of the pre-intervention descriptive measures (i.e., IMI self-report, IRP-15) in addition to the essay question probe. On average there were seven baseline sessions with a range of 5 to 9 sessions, Monday through Friday. The duration of each session ranged from 15 to 20 minutes.

ANSWER+ Intervention

The researcher delivered the ANSWER+ intervention via Zoom in a virtual hybrid modality through multimedia content (e.g., animated videos) and live instruction during the participants’ winter break. Participants attended one-to-one Zoom virtual sessions from their homes using their laptop computers (i.e., PC and Mac devices) which all had built-in webcams and microphones. Each Zoom session lasted approximately 45 minutes, once a day during the week (e.g., Monday through Friday). The ANSWER+ intervention consisted of six lessons taught over a series of 8-9 sessions. See Table 1 for a description of ANSWER+ lessons. Each lesson began with the researcher sharing her screen with the participant. The researcher’s screen showed the lesson home page, which depicted the title of the lesson and the following: (a) the practice exercise(s) to download in Microsoft Word document form, (b) the animated videos to watch, (c) the practice exercise(s) for the researcher to present using a constant time delay with 3-second delay format, and (d) a list of lesson steps completed and or visual of the ANSWER mnemonic. Each participant would download emailed materials for the lesson. Next, the researcher would share their screen and play the first animated video of the lesson. The researcher would stop the video at certain points where parts of the practice exercise for the lesson were presented (e.g., underline the action words in the essay prompt). The researcher would then ask the participant to open the practice exercise document they downloaded, share their screen, and complete the presented steps. After the participant completed the steps, the researcher would share their screen and start the video again. This process would continue for each video in the lessons. Each lesson contained one to two videos, 2-5 minutes in length. Videos included one to two animated characters that presented lesson steps with examples. See Figure 1 for an animated video lesson and a guided practice example.

Figure 1

Animated Video Example Constant Time Delay Prompting and All ANSWER Steps.

Describe how you would **make a cake**. Be sure to **include five steps** in your description.

remember what the teacher wants me to include

We all have a favorite day of the week. Think about your favorite day of the week. Include three reasons for why this day of the week is your favorite one.

Saturday

A. See family 1.
Sister
My niece

B. Do what I want 3.
Watch tv
Clean my house

C. Play with my dog 2.
Walk my dog
Play fetch

My favorite day of the week is Saturday. There are three reasons why this is my favorite day of the week. First, I get to see my family on Saturdays. I like to spend time with my sister. I enjoy spending time with my niece. Second, I can do what I want on Saturdays. I can watch television. I also like to clean my house. Third, on Saturdays I can play with my dog Gracie. I get to walk Gracie. I play fetch with Gracie. In summary, this is why my favorite day of the week is Saturday.

Note. Animation and background created with Toonly, Powtoons©, and Moovly.

Each lesson encompassed a strategy instruction format that included the following: (a) the mnemonic ANSWER+, (b) an explicit instruction format with model, lead, test steps, (c) teaching to mastery where the target strategy step would be taught to at least 80% mastery and practiced with all previously taught strategy steps for each lesson, and (d) use of systematic prompting via constant time delay (CTD) with a 3-second delay for all practice exercises. For the CTD prompting for practice exercises, the researcher would screen share and read the practice exercise item (e.g., essay prompt “Describe how to make a cake”), and ask the participant “What is the action word in this sentence?” Next, the researcher would say the action word (e.g., “Describe”) and show the action word being underlined with a 0-second delay. After the participant demonstrated 100% mastery of identifying the action word, the researcher would use a 3-second delay after the direction “What is the action word in this sentence?” See Figure 1 for an example of CTD prompting. At the end of the lesson, the participant emailed their work to the researcher.

Research Design

The researchers used a multiple-baseline across students single-case design. Researchers chose this design because there was just one intervention that they suspected would result in learning; therefore, an effect could not be shown upon withdrawal of the intervention. The independent variable was the Answer+ intervention. The dependent variable was the total score on the ANSWER strategy rubric. All students began in baseline, and the researchers randomly assigned the order (i.e., drew names out of a container) in which they began intervention. The order was Michelle, Marshall, Sammy, and the decisions related to phase change from baseline to Answer+ intervention were based on students’ ANSWER strategy rubric total scores. Michelle moved from baseline to Answer+ intervention when her ANSWER strategy rubric baseline data were stable. The researchers defined stability as data points varying no more than 1 rubric point from the mean of baseline. Marshall moved from baseline to Answer+ intervention when his baseline data were stable, and Michelle achieved two consecutive ANSWER strategy rubric total scores above baseline. Sammy moved from baseline to Answer+ intervention when his baseline scores were stable, and Marshall achieved two consecutive ANSWER strategy rubric scores above baseline. Mastery was an ANSWER strategy rubric total score of 6.

Results

Results include graphed ANSWER strategy rubric total scores and three pre- and posttest distal measures (i.e., WSC, CWS, and IMI self-report). For the dependent variable (i.e., ANSWER strategy rubric total scores), Figure 3 depicts graphs constructed with a y-axis that show the ANSWER strategy rubric total scores with a range of 0-6. Six was the highest possible rubric total score across students. We used visual analysis, noting the level, range, immediacy of effect, and a simple measure of magnitude of change. Level was defined as the mean of a data path. Range was defined as the distance between the least and greatest data point in a path. Immediacy of effect was defined as the difference between the last baseline data point and the first data point in intervention. The researchers defined magnitude of change as the percentage of nonoverlapping (PND) data points according to Scruggs and Mastropieri (2013).

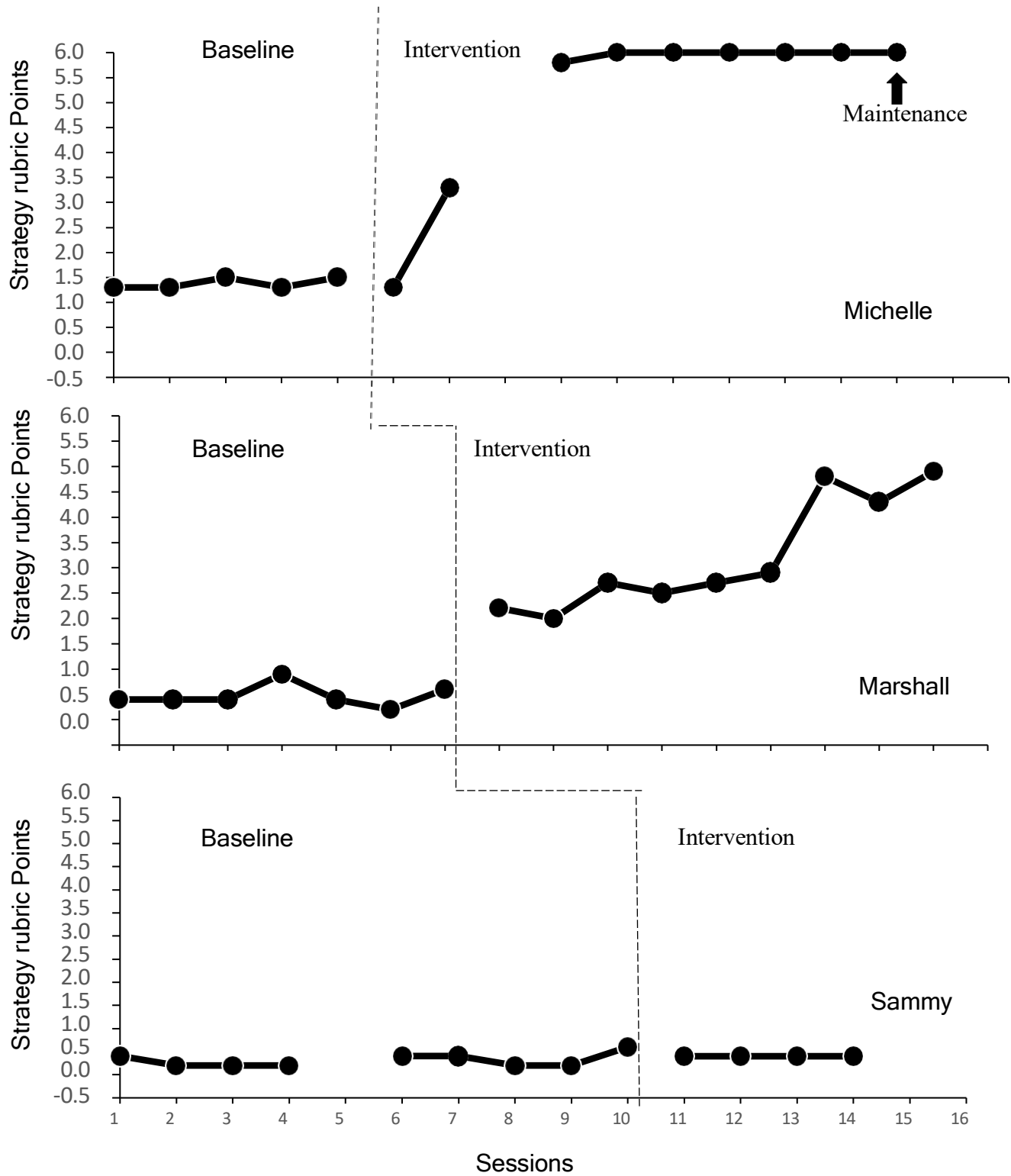
Figure 2

Strategy rubric (Therrien et al., 2009).

Strategy Specific Rubric	Rater Initials _____	Prompt Code Number _____
Step 1: Analyze the Action Words (1 each)		
Were any of the key action word(s) underlined once?		
___ /1		
Step 2: Notice the Requirements (1 each)		
Were any of the requirements highlighted?		
___ /1		
Step 3: Set up an Outline (.5 each) Place scores in the blanks provided.		
___ 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		
Step 5: Engineer Your Answer (.2 each) Place scores in the blanks provided.		
___ Was there an introductory sentence or paragraph?		
___ Did the introductory sentence or paragraph contain a rephrase of the question?		
___ Was there a sentence or paragraph for each requirement in the question?		
___ Did all sentences or paragraphs pertain to the topic?		
___ Was there a concluding sentence or paragraph (summary)?		
___ /1		
Step 6: Your Answer (.5 each) Place scores in the blanks provided.		
___ Were all outlined items included?		
___ Was the question adequately answered?		
___ /1		
Total Score	$\frac{\text{Points Earned}}{\text{Total Possible}} =$	$\frac{\quad}{6}$

Figure 3

Strategy rubric Total Score Results for Michelle, Marshall, and Sammy



ANSWER Strategy Rubric Total Scores*Michelle*

In baseline, Michelle's essay prompt responses did not include pre-planning (e.g., outline); however, most of her essay responses included an introductory sentence and two to three sentences. She did not include a summary sentence in her responses. Visual analysis of Michelle's ANSWER strategy rubric total scores showed a baseline level of 1.4 and a range of 1.3-1.5. At initiation of Answer + intervention, we noted a delayed effect; the second intervention data point increased to 3.3. Intervention level 5.2 had a range of 1.3-6.0, one overlapping data point, and PND = 88.8%. Michelle met the criterion (i.e., total score of 6 on ANSWER strategy rubric) at the 4th intervention point and continued meeting the criterion. Maintenance data was collected for Michelle for one session following the completion of the ANSWER Strategy+ instruction. There was only one day between the completion of ANSWER Strategy+ instruction and the collection of maintenance data. Michelle's maintenance data probe indicated she maintained her post ANSWER Strategy+ skill level.

Marshall

In baseline, Marshall's essay prompt responses did not include pre-planning (e.g., outline). The majority of his essay responses included one sentence, a sentence fragment, or a run-on sentence. He consistently did not include an introductory sentence, additional sentences related to the topic, nor a summary sentence. Visual analysis Marshall's ANSWER strategy rubric total scores in baseline had a level of 0.5 and range of 0.2-0.9. There was an immediate effect upon initiation of Answer+ intervention with a change from 0.6 to 2.2. The intervention level was 3.2 with a range 2.0-4.9. PND was 100%. Marshall did not meet the mastery criterion (i.e., 6 total score on ANSWER strategy rubric). He did approach mastery at the 9th intervention point (i.e., 4.9 score on ANSWER strategy rubric) where he successfully completed ANSWER+ steps 1-4; however, for step 5, his introductory sentence did not rephrase the essay question, and he did not include a summary sentence.

Sammy

In baseline, Sammy's essay prompt responses did not include pre-planning (e.g., outline). The majority of his essay responses consisted of a sentence that pertained to the topic; however, he did not rephrase the essay question, include a topic sentence, include additional sentences nor include a summary sentence. Visual analysis of the ANSWER strategy rubric total scores in baseline showed a level and a range 0.2-0.6. There was a decrease from baseline at the first data point for the Answer+ intervention. The intervention level was 0.4 with a range 0.4-0.4. There were four overlapping data points for a PND of 0%. Sammy's baseline performance continued during intervention. He did not complete all of the ANSWER+ intervention sessions and did not attend subsequent intervention sessions after the 4th data point. During the last ANSWER Plus + intervention session that Sammy attended, he successfully completed guided practice instruction with the researcher and applied steps 1-5 of the strategy steps.

Descriptive Results for Writing CBM and IMI Self-Report

Participants' CBM writing WSC and CWS mean scores and standard deviations and IMI mean pre- and posttest raw scores are depicted in Table 2.

Michelle

Michelle's WSC scores were $M = 54.00$ in baseline and $M = 70.22$ during intervention. Her CWS scores were $M = 54.00$ in baseline and $M = 69.56$ during intervention. Her IMI total scores increased from pretest to posttest for Interest (i.e., pretest $M = 6.86$ to posttest $M = 7.00$) and Perceived Competence (i.e., pretest $M = 5.60$ to posttest $M = 7.00$). Her Pressure total raw score stayed the same from pre- to posttest, $M = 1.00$. Participants' CBM writing WSC and CWS mean scores and standard deviations and IMI pre- and posttest mean raw scores are depicted in Table 2.

Marshall

Marshall's WSC scores were $M = 16.14$ in baseline and $M = 16.33$ during intervention. His CWS scores in baseline were $M = 13.71$ and $M = 12.44$ in intervention. His IMI average scores did not differ from from pre- to posttest for Interest and Perceived Competence (mean raw score = 7.00), however, his Pressure pretest raw score slightly increased from pre- to posttest (i.e., mean raw score 1.00 increased in posttest to 1.60).

Sammy

Sammy only completed pretest descriptive measures. Sammy's WSC scores were $M = 19.44$ during baseline and $M = 11.75$ during intervention. His CWS score in baseline was $M = 14.33$, and $M = 10.50$ during intervention. His IMI pretest mean raw scores were 4.00 for Interest and 2.20, for Perceived Competence, and mean raw score = 5.80 for Pressure. He did not complete the posttest.

Social Validity Results

Michelle's and Marshall's pre- and posttest IRP-15 results reflected a positive view of the intervention at pre-intervention and post-intervention with all item responses indicating "strongly agree" ($M = 6$, total raw score of 30). Sammy's pretest indicated that he answered yes and no to similarly reworded questions. His pretest IRP-15 yielded a mean of 3.8 and total raw score = 19.

Discussion

Recent meta-analytic studies support the use of systematic instruction, response prompting, use of visual cues, and integration of multimedia and technology (e.g., video modeling, images, audio, virtual teaching agents) with students with IDD (Rodgers & Loveall, 2022; Woods-Groves et al., 2023). The ANSWER strategy has been effective in improving planning and the quality of expository essay responses for college students with IDD. Previous ANSWER studies used in person, teacher-led, large group instruction with only three of the five studies requiring students to plan and construct essays using

computers and Microsoft Word. To infuse technology use and create interesting lessons, we adapted the ANSWER strategy to the ANSWER+ strategy. This preliminary study investigated the impact of the ANSWER+ strategy on the expository essay writing skills of three college students with IDD. Our first research question pertained to if participants would use the ANSWER + strategy steps to plan and construct essays measured by the ANSWER strategy rubric. Michelle and Marshall used the strategy to plan and construct expository essay responses. However, Sammy did not use the strategy steps independently, even though during guided practice instruction with feedback, he successfully completed steps 1-5; he did not generalize these skills. Sammy also did not complete all the sessions. Difficulty in generalizing skills could indicate the need for additional opportunities to engage in guided practice with feedback and the need to practice skills to mastery (i.e., move from acquisition to proficiency). While we did not specifically target grammar mechanics and motivation in ANSWER+ intervention, previous work (Hosp et al. 2014; Rodgers & Loveall, 2022; Woods-Groves et al., 2022) supported the use of writing CBM metrics to evaluate written expression. For our second research question, we asked if WSC and CWS would increase from baseline to intervention. Overall, all three participants were spelling words correctly in baseline (i.e., 100% for Michelle and Marshall, 99.3% for Sammy) and intervention (i.e., 99.4% for Michelle, 100% for Marshall and Sammy). From pre- to post-, Michelle and Marshall increased total words written and WSC (i.e., 16 and 19, respectively) while Sammy decreased (i.e., -7.69). Average pre- to posttest CWS increased for Michelle (15 points) but decreased for Marshall (-2.27 points) and Sammy (-3.43). As participants applied the strategy, they constructed more focused responses based on their outlines, while in baseline they did not pre-plan or construct outlines. Intervention responses may reflect a decrease in words written but an increase in organization and focus.

Hayes (2012) posited that motivation is intertwined with the writing process. Success or difficulty in the writing process can readily affect motivational variables such as one's level of interest, enjoyment, persistence, emotional state (e.g., pressure, stress, agitation), and perceived competence (Bandura, 1997; Bruning et al., 2013; Mitchell et al., 2023). Our third research question pertained to if participants' IMI scores would differ from pre- to post-intervention. For Michelle and Marshall they appeared to have entered and exited the intervention with a high degree of self-reported intrinsic motivation regarding writing activities and with a belief that instruction in writing could be beneficial. Sammy's pretest IMI responses conflicted with each other where he responded, "very true" and "not true at all" to similar questions. Additional supports such as visual cues (e.g., pictorial scale with frowning face to smiling face) may have been needed to provide support in completing the IMI Likert-type scale. Regarding social validity, Michelle and Marshall felt positive about the strategy and viewed it as useful, while Sammy did not. Michelle and Marshall both indicated that they strongly agreed that the strategy would help with their classwork and positive view of themselves, and that the strategy was easy to use and they would recommend the strategy to other peers. Sammy indicated that he strongly agreed that it would be easy to use, and that it would help him have a positive view of himself. However, Sammy indicated that he did not agree that the intervention would positively affect his classwork and strongly disagreed that he would recommend the strategy to other peers. For two of the three participants (Michelle and Marshall) the ANSWER+ Strategy intervention had a positive impact on their expository essay writing skills. Both students reported having an affinity for writing activities, enjoyed the writing process, and felt that they were competent writers.

Limitations

A limitation of this study pertained to Sammy not using the strategy steps independently and not completing all intervention sessions. Regarding why Sammy, the third participant, did not complete all the intervention sessions, when reviewing Sammy's social validity responses, it became evident that they reflected a lower self-reported degree of perceived personal value or benefit in learning the intervention. He might have benefited from increased opportunities to engage in guided practice and in discussions about how the strategy might be useful. In addition, Sammy successfully applied strategy steps during an ANSWER+ intervention session via guided practice; however, he did not apply the steps when completing essay prompt/probes. One aspect to note was that Sammy was randomly assigned to be the third participant and subsequently stayed in baseline for the longest duration when compared to Michelle and Marshall. Sammy may have habituated to the baseline condition of responding to essay probe/prompts due to the repetition, and while he demonstrated strategy steps through guided practice during lessons, he did not generalize this behavior when completing essay probe/prompts. Future investigations could further highlight the benefit of the strategy and extend the number of essay lessons and opportunities for participants to practice in a guided practice format, to afford participants additional opportunities to experience success in the writing process. Sammy not successfully completing the IMI was a limitation. We did not obtain a valid measure of Sammy's self-reported interest, perceived competence, and stress/pressure regarding the writing process at the beginning and end of the study. The timing of the study was also a limitation. Due to scheduling constraints, we conducted the study during the participants' winter break when they were home from campus. This was a busy time for the participants. The participants often had appointments, trips, and activities that would conflict with scheduled sessions. The researcher was flexible with scheduling session times. If we conducted the study during the academic semester or during a delineated summer session, the participants could be afforded a more predictable schedule. An additional limitation was the lack of maintenance and generalization data for the participants. Due to time and scheduling restrictions, maintenance data was only collected for one participant one day after the ANSWER Strategy + instruction was completed and generalization data was not collected for any participants.

Implications for PSE Programs for Students with IDD

Writing is an impactful form of communication, albeit a challenging one at times. The writing process does not exist in a vacuum without context or influences but instead interacts readily with motivational variables (e.g., interest, perceived competence, affect; Bandura, 1997; Bruning et al., 2013; Mitchell et al., 2023; Ryan & Deci, 2000; Schunk & User, 2014). Think College standards (Grigal et al., 2011) recommend that PSE programs for students with IDD should support student use of self-determination skills (e.g., making choices based on personal interests and enjoyment), use of technology, and inclusive instructional practices. Students within these programs through person-centered planning can select academic courses/supplemental instruction based on their interests. For students within these programs who may struggle in the writing process (e.g., planning, constructing text, and revising) it is essential to provide instruction that is not only effective but also appealing. Given the rapid expansion of PSE programs for students with IDD, there exists a need for evidence-based writing instruction that has been shown to be

effective. Within PSE programs for students with IDD, writing strategy instruction such as the ANSWER+ strategy could be provided during peer tutoring sessions or as part of readiness instruction delivered at the beginning of a student's PSE program. This study is a preliminary step in exploring the efficacy of the ANSWER+ strategy. Findings highlight the need for replication and will inform future investigations of this virtual multimedia expository essay writing strategy.

Author Note

We have no known conflict of interest to disclose.

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Table 1*ANSWER+ Lesson Content*

L#	Lessons
1	Present overview of all ANSWER steps and obtain participant's commitment to learn the ANSWER strategy. Ask participants to read an essay prompt. Teach students to Analyze the Action Words by underlining the action words then Notice the Requirements by highlighting them.
2	Review the first two steps of the ANSWER strategy (i.e., Analyze action words and Notice the Requirements). Next, teach participants to Set up an Outline and Work in the Details. Include at least two details per main idea. Number main ideas in the order that you want to write about them (e.g., 1 = first main idea).
3	Review the first four steps of the ANSWER strategy (i.e., Analyze action words, Notice the Requirements, Set up Outline, Work in Details). Next, teach participants to Engineer the essay including a topic sentence(s) that restates the essay question, a sentence for each main idea and details, and a summary or conclusion sentence.
4	Review the first five steps of the ANSWER strategy (i.e., Analyze action words, Notice the Requirements, Set up Outline, Work in Details, Engineer essay). Next, teach participants to Review their essay response by completing spell check and making sure all main ideas and details are included in the essay response.

- 5 Review the five ANSWER strategy steps (i.e., Analyze action words, Notice the Requirements, Set up Outline, Work in Details, Engineer essay, Review essay).
- 6 Review and practice all six steps of the ANSWER strategy.

Note. L# = Lesson number

Table 2*Descriptive Results for CBM Writing and IMI Results.*

Student	CBM Writing				IMI					
	WSC		CWS		Interest		Per Com		Pressure	
	Base <i>M</i> (<i>SD</i>)	Inter <i>M</i> (<i>SD</i>)	Base <i>M</i> (<i>SD</i>)	Inter <i>M</i> (<i>SD</i>)	Pre <i>M</i> Raw Score	Post <i>M</i> Raw Score	Pre <i>M</i> Raw Score	Post <i>M</i> Raw Score	Pre <i>M</i> Raw Score	Post <i>M</i> Raw Score
Michelle	54.00 (9.64)	70.22 (26.34)	54.00 (8.33)	69.56 (25.51)	6.86	7.00	5.60	7.00	1.00	1.00
Marshall	16.14 (10.89)	16.33 (14.03)	13.71 (10.09)	12.44 (11.75)	7.00	7.00	7.00	7.00	1.00	1.60
Sammy	19.44 (5.36)	11.75 (1.50)	14.33 (5.31)	10.50 (2.08)	4.00	--	2.20	--	5.80	--

Note. WSC = Words Spelled Correctly, CWS = Correct Writing Sequence, IMI = Intrinsic Motivation Inventory, Per Com=Perceived Competence, Pressure = Pressure/Tension, Pre = pre-intervention, Post = post-intervention, Base = Baseline condition, Inter = Intervention phase, *M* = Mean.