

The Pen or the Paper?: Written Expression Supports for Secondary Students with Emotional Behavioral Disabilities

Sara Flanagan, Ph.D.
Assistant Professor
University of Kentucky
sara.flanagan@uky.edu

Emily C. Bouck, Ph. D.
Associate Professor
Michigan State University
ecb@msu.edu

Abstract

Written expression is a critical skill for students with disabilities; yet, little is known about how to best support secondary students with emotional behavioral disorders (EBD). This repeated acquisition study served as a follow-up study that demonstrated the effectiveness of a novel technology (the FLYPen™) for written expression. Three secondary students with EBD alternated between the FLYPen™ and the associated graphic organizers alone to write eight essays to explore which support was most effective. Prior to this study, all students struggled in written expression, and typically included one paragraph without topic sentences or supporting sentences. Students were equally supported in with each method. Students indicated the FLYPen™ “hooked” their interests in writing, but the paper-based graphic organizers provided the actual structure and support for improved writing.

The ability to write is a fundamental skill in today's society of constant communication through writing (Harris, Graham, & Friedlander, 2013; National Commission on Writing, 2003; National Writing Project, 2009). Unfortunately, recent assessment data suggests that students struggle to effectively produce written products. The National Writing Report suggested that the majority of eighth and twelfth graders were writing at or below a basic level (i.e., demonstrating slightly below to significantly below grade-level written expression). In other words, students with and without disabilities were not mastering essential written expression skills needed to effectively communicate their ideas at their respective grade levels (Graham, Harris, Hebert, & Morphy, 2014; IES, 2010, 2011; National Commission on Writing). All students may know what written expression elements (i.e., on-topic information, thesis statement) are needed to successfully complete a written expression task, but may not be able to accurately complete or consistently demonstrate in these without support. Challenges in written expression begin with ineffective planning and organization or "prewriting" (Graham & Harris, 2009; National Commission on Writing). A lack of or insufficient prewriting leads to inadequate written expression with the inclusion of irrelevant details, increased usage of repetitive ideas and phrases, poor structure, and little to no revision (Englert, Zhao, Dunsmore, Collings, & Wolbers, 2007; Graham & Harris, 2005, 2009; Harris & Graham, 2009).

While all students may struggle with written expression, students with high incidence disabilities struggle to a greater degree (Author, 2014, 2015; Graham & Harris, 2009; Taft & Mason, 2010; Troia, 2006). Compared to their peers without disabilities, students with high incidence disabilities write shorter, less organized, lower quality, and only partially completed passages (Graham & Harris; Taft & Mason; Troia). Students are less likely to be successful in courses with an emphasis on written expression, ranging from lab reports in science to the

traditional research papers in English. Additionally, students may not make the needed academic progress due to poorer grades or increased class failure (Ehren, Lenz, & Deshler, 2004; National Writing Project, 2009). A lower quality of written expression impacts postschool outcomes, including a lack of promotion in employment and not being as successful as possible in higher education (Taft & Mason).

Much of the existing literature on written expression and students with high incidence disabilities focuses primarily on learning disabilities (Graham & Perin, 2007), often excluding students with emotional behavioral disorder (EBD) (Hudson, Hinkson-Lee, & Collins, 2013; Taft & Mason, 2010; Wehby, Lane, & Falk, 2003). Some scholars suggest that academic challenges, including written expression, experienced by students with EBD may mimic their peers with learning disabilities. Thus, students with EBD may benefit from the same planning, organization, content generation, and revision strategies, such as the use of graphic organizers (Isaacson, 2007; Mason & Shriner, 2007; Taft & Mason; Wehby et al.). Graphic organizers allow all students to brainstorm and organize their ideas prior to composing paragraphs—or, prewriting (Graham & Harris, 2009; Flower & Hayes, 1980; Troia, 2006). When using graphic organizers for prewriting, written expression improves with a decrease in repetitiveness, and an increase of on-topic information and supportive detail sentences for each main idea (Flower & Hayes; Taft & Mason).

Supports for written expression for students with and without high incidence disabilities typically fall into two broad categories: paper-based and technology-based. While paper-based strategies support written expression, little attention has been paid to technology-based supports (MacArthur, 2009; Strum & Rankin-Erickson, 2002). Researchers have found some advantages to students using computer-based concept mapping software (e.g., spelling and grammar check)

as compared to paper-based concept mapping for prewriting. While both methods produce improved written expression, there is no difference in the overall quality or length of the written expression passage when using technology (Authors, 2014; MacArthur; Strum & Rankin-Erickson, 2002). Englert and colleagues (2007) utilized an Internet-based procedural facilitator to provide textual prompts to students as they wrote. Compared to students who received traditional instruction, students with the Internet-based supports and prompts demonstrated a higher quality of written expression.

To continue to explore the value of technology on written expression, the Authors (2010) investigated the use of a pentop computer (the FLYPen™) with the written expression software and two paper-based graphic organizers. The FLYPen™ provided auditory prompts based on where the students tapped on specific parts of the graphic organizers. For example, when the students tapped on “Topic Sentence,” the students were prompted to write a topic sentence for each paragraph. Three secondary students with high incidence disabilities increased their overall quality of written expression in both organization and content. The students were excited by the technology when introduced to it, but the excitement diminished as students continued to use it. Students stopped paying attention to the auditory prompts and focused only on the paper-based graphic organizers. This implied that the graphic organizers might actually provide enough support to improve written expression. Thus, the researchers examined if the FLYPen™ with the auditory supports with graphic organizers or if the graphic organizers alone supported written expression with the following research questions: (a) does the use of the FLYPen™ with graphic organizers or the graphic organizers alone best support written expression?, and (b) which method is more preferred by the students?

Method

Participants

The participants of this study included three secondary students with emotional behavioral disorders (EBD) and their special education teacher. All students were in a combined eleventh and twelfth grade special education English/Language Arts class and met the state criteria for being classified as being a student with an EBD (see IDEA, 2004, sec. 300.8.c.4.iA-300.8.c.4.iE). All students also exhibited primarily internalizing emotional behavior disorders (e.g., anxiety, withdrawn), rather than externalizing (e.g., aggression, noncompliance). The teacher reported that all students struggled across academic areas, including in written expression. She described all students as being reluctant, poor writers. Prior to the start of this study, none of the students produced a high quality five-paragraph essay. Students wrote in an illogical order with little supporting details. Students previously used graphic organizers in their English/Language Arts class for reading comprehension (e.g., KWL charts) but did not use graphic organizers specific for written expression. The teacher used outlines as a prewriting strategy, but did so infrequently and not at the time of this study.

Brittany. Brittany was an 18-year-old twelfth-grade student classified as having an EBD with a full-scale IQ of 95 (Wechsler Abbreviated Scale of Intelligence, 1999). At the time of the study, Brittany had not passed the state's graduation qualifying exam in mathematics or English/Language Arts after three attempts. This exam included a written expression component. She received study hall, English/Language Arts instruction, and mathematics instruction in a special education classroom. Before using the FLYPen™ and graphic organizers, Brittany wrote without organization, simply listed facts when writing five-paragraph essays, and frequently changed topics.

Matt. Matt was a 17-year-old, twelfth-grade student, with an EBD and a full-scale IQ of 92 (Wechsler Intellectual Scale for Children-III, 1991). Max experienced difficulties starting and completing assignments; worked at a slow pace; and, used avoidance behaviors to evade classes, assignments, or things he did not enjoy doing. During his participation in this study and in classes outside of it, Matt needed constant prompts and cues to stay on-task. At the time of the study, Matt had not passed the graduation-qualifying exam in English/Language Arts and mathematics three times. Matt received special education instruction for mathematics and English/Language Arts, and a supported study hall. He was also in a supported science class, where a special education teacher provided additional assistance during the general education class. Prior to this study, Matt struggled in written expression. He typically included two to four sentences in total for a five-paragraph essay, and did not include any topic sentences or additional information to support his ideas.

Peter. Peter was a 16-year-old, eleventh-grade student. In order to complete his graduation requirements, Peter enrolled in the class used for this study to receive credit for sophomore English. Peter was diagnosed with an EBD and a mild intellectual disability with an IQ measuring 69 (Woodcock Johnson-III, Test of Cognitive Abilities, 2001). He received a supported study hall, and special education mathematics and English/Language Arts classes. At the beginning of this study, Peter had not passed the state's standardized assessment for sophomore-level English/Language Arts. In order to graduate with a standard diploma, Peter was required to pass. He re-took this exam near the completion of this study and passed. Prior to start of this study, Peter's essays were repetitive and short, without paragraphs. He did not include topic sentences and included irrelevant details.

Setting

This study took place in a Midwestern rural, combined middle and high school serving students in grades 7 to 12. The students participated in this study across one academic semester during their 48-minute special education English/Language Arts class. Over the course of this study, class instructional activities – including the essays written – were centered on the novel *October Sky*. While the students in this study were typically the only ones in the classroom, other students periodically came in to take tests or work on their homework. During the class a paraprofessional was present, but also did not play a role in this study.

Materials

Materials in this study included a pentop computer from LeapFrog Technologies (2005a) – the FLYPen™ – and its written expression software, which included paper-based graphic organizers for students to use with the software. The FLYPen™ is a commercially marketed tool capable of providing a variety of academic supports through content-specific software (LeapFrog, 2007-2009). The FLYPen™ is a large, ballpoint pen with a USB hub at the end. A software cartridge inserts into this hub, much like how a flash drive would plug into a computer's USB port. To use the features of the FLYPen™ (i.e., auditory prompts), the user must write on dot-matrix paper designed specifically for the FLYPen™ (LeapFrog, 2005b).

The FLYPen™ software used was for written expression and targeted to secondary students. This software led students through completing two prewriting graphic organizers on the dot-matrix paper for writing five-paragraph essays. The FLYPen™ provided auditory prompts for each section of the prewriting pages, after a user double tapped the FLYPen™ on specific sections of the planning pages (i.e., the command to go onto the next section). On the first page, the Idea Map, students indicated their choice of essay. Students then wrote their topic, a thesis

statement, and then were guided in completing a concept map-like structure. Students were instructed to draw a line down the center of the page, put three circles on each side, and connect each pair of circles with a line. Students wrote a supporting reason in each circle on one side of the structure with the contrasting arguments on the opposite circles. The second page, the Planning Page, prompted students to fill out an outline-like graphic organizer. The graphic organizer provided specific spaces to write the topic sentence and details for each paragraph.

To complete the prewriting pages, the FLYPen™ offered two modes for the user to select from: Editor and Quick Path. In the Editor mode, the FLYPen™ provided step-by-step directions to complete each graphic organizer with additional prompts for directions on how to access hints, hear examples, or repeat a direction. For example, when drawing the Idea Map, the FLYPen™ gave an auditory prompt to draw three circles down the right side of the page, and double tap to indicate when finished. Then, it prompted the students to write one idea in each circle. The Quick Path mode provided students with only the main prompts (i.e., instructed the student to draw and complete the concept map, instead of going through each step given in the Editor mode). In each mode, students completed the same Idea Map and Planning Page.

Experimental Design

The research study utilized a repeated acquisition, single subject design. This design occurs when the research is (a) using “multiple equivalent learning tasks” and, (2) with “at least two different experimental conditions” (Kennedy, 2005, p. 163). With this design, participants alternated between each of the interventions without the use of a baseline, generalization, or maintenance (Kennedy). Researchers use this design when conditions can be randomized and to evaluate an academic skill difficult to reverse (e.g., written expression). For example, the students in this study could not “unlearn” how to plan and write essays between each condition.

This design was explicitly selected as the researchers had already explored the effectiveness of the FLYPen™ and this study served as a follow-up (see Authors, 2010).

Students alternated between two methods during each research session of two essays: writing one essay with the FLYPen™ with written expression software and graphic organizers and one with the graphic organizers alone. When using the graphic organizers alone, students did not have access to the FLYPen™. The order of what method was presented first was randomly selected for each session. During sessions one and two, students used the graphic organizers first. Students used the FLYPen™ first during sessions three and four. Research sessions occurred two days a week with essays written on two separate days. Data collection continued until data become stable for each participant (i.e., each student was individually performing similarly across essays).

Procedures

To establish students' written expression abilities prior to the start of this study, the teacher provided two to three essays completed by each student prior to data collection (i.e., when the students were not using the FLYPen™ or graphic organizers). Essay prompts were similar to those used in this study, related to the novel, and completed during in-class activities. The teacher described these samples as being "typical" of each student's written expression ability. These essays were used for comparison and not to establish a baseline.

Instruction. To learn to use the FLYPen™ and the written expression software, the students were provided instruction on how to turn it on/off, write, and follow the auditory prompts using games. All games were designed for the FLYPen™ and required students to respond to an auditory prompt. Students completed three activities: a music, basic mathematics,

and geography game. Students only moved on to the next phase of the training when they could complete each independently. No student struggled to complete the activities.

Next, students were taught how to use the written expression software and the graphic organizers. The first author demonstrated how the FLYPen™ provided auditory prompts, where to write on the graphic organizers, and defined the FLYPen™ terminology (e.g., “focus statement” for thesis statement). Because the research required the students to use the paper-based graphic organizers independently, students were instructed on how to complete these without the FLYPen™. As a group, each student partially completed one set of graphic organizers on a generic topic. Students then completed the remainder of the each independently. Students experienced no difficulties in understanding the components of each graphic organizer.

Intervention. During each session (N=4), students alternated between writing an essay using the FLYPen™ with the auditory prompts and graphic organizers, and one essay using the graphic organizers alone. A total of eight essays were written – four of each method. Each essay took one instructional period to complete. All essays were persuasive, per the teacher’s request. Sample essay prompts included, “Why should [book author] visit our high school?” and “Why should I live in [setting of the novel]?” Each student worked independently with minimal assistance from the teacher and/or a member of the research team (i.e., troubleshooting the FLYPen™). Two of the three students (i.e., Brittany and Peter) completed both the graphic organizers and essays during the instructional period. Matt worked at varying rates, characteristic of his work outside of this study. He typically finished one or both of the graphic organizers during the class period and then finished essays during a supported study hall. Matt completed the final two essays during class time.

During the initial sessions using the FLYPen™, students were instructed to use the “Editor” mode. For the third and fourth essays with the FLYPen™, students were told that if they understood the sequence of steps they could select between the “Editor” or the “Quick Path” mode. Student also had to successfully use the FLYPen™ on previous essays. Peter and Brittany choose to use “Quick Path” on their last two essays using the FLYPen™; Matt only used this mode on his last essay. During the sessions where students used the graphic organizers alone, students were only given these and did not have access to the FLYPen™ prompts.

Data Collection

The researchers used two rubrics to evaluate each essay, adapted from a previous research study on the FLYPen™ (Authors, 2010). Each rubric included items related to planning, organization, content, style and voice, and grammar (Graham & Harris, 2009; Isaacson, 2007; Troia, 2006). The first portion of the rubric included 17 Likert-scale ratings items (i.e., quality rubric), ranging from zero to three. A score of “zero” represented no evidence, “one” little evidence, “two” some evidence, and “three” mastery of that item. Sample rubric items included the following: includes planning details, planning details related to the topic, logical flow, consistent topic, introduction, topic sentence for body each paragraph, content relates to the topic sentences, conclusion, and grammatical errors. A total score of 51 was possible for each essay (17 items with a maximum score of 3 per item). A separate event recording rubric was used to record the number of times each written expression element was included (e.g., number of topic sentences and body paragraphs instead of rating the quality of each).

Data Analysis

Using the overall quality score, students’ essays were examined first using descriptive data (e.g., mean and range of scores for each method). As the purpose of this study was to

understand if there was a difference between using the FLYPen™ with the graphic organizers or the graphic organizers alone, a nonparametric statistic (e.g., the Mann-Whitney U) was used to understand if the two methods were statically different with regards to the quality rubric. A standard significance level was used (e.g., 0.05) for the test statistic, a z-score. For the event recording rubric, the mean was calculated for each of the items to quantitatively describe elements present in essays, such as the number of sentences and paragraphs.

Interobserver Agreement. Approximately one-third of each student's essays were randomly selected for interobserver agreement. The first rater, the first author, initially scored the quality portion of all essays and one-third of the event recording rubric for interobserver agreement. A second rater, the third author, was provided instruction and practice on how to use the rubrics to score each of the essays using the event recording rubric. This was done through using practice essays not related to this particular study where both raters scored portions of each essays; agreement was 100%. The first round of interobserver agreement was initially lower than desired due to slight differences in the number of words, sentences, and grammatical or capitalization errors. After additional training and discrepancies were addressed (for example, if how a student wrote a letter was a capitalization error or their handwriting), agreement increased to 100% for both rubrics. Interobserver agreement was derived by dividing the number of agreements by the total number of items, then multiplying by 100 (Kennedy, 2005).

Procedural Validity

To establish procedural validity, the teacher was observed on her instruction (e.g., telling students the prompt and method) during six of the eight essays. A task analysis was used to determine the steps: begin class, handout materials, tell students which method was going to be

used (i.e., FLYPen™ or just the graphic organizers), write the essay topic on the board, read the essay topic, and provide assistance if needed. Procedural validity was 100%.

Social Validity

The students were asked a series of questions at the end of data collection for social validity, including questions addressing overall perceptions of the FLYPen™ and the accompanying graphic organizers. Questions included the following: “Before you used the FLYPen™ and the papers what kinds of things did you do to help you write essays?,” and, “Which do you think helped your more? Why?” The teacher responded to questions prior to and at the conclusion of this study. For the teacher, the questions focused on the instructional value of the intervention, such as “Do you feel that your students benefited from either method? How so?,” and “Which method is more practical during instruction?”

Results

The results of this study suggested the FLYPen™ with the graphic organizers and the graphic organizers alone supported the students equally. Students reported a preference for the graphic organizers alone as they able to easily complete them and were able to predict the directions from the FLYPen™. Yet, the students and their teacher also saw value in how the FLYPen™ was motivational and provided individualized support.

Brittany

Brittany averaged an overall rating score of 46.5 out of a possible 51 for the essays using the graphic organizers alone (range of 45 to 48) and 46.3 when using the FLYPen™ with the graphic organizers (range 44 to 47). A visual analysis of Brittany’s data suggested little differences in her scores across each method (see Figure 1). Additionally, the Mann-Whitney U analysis indicated her scores between each method were not significantly different ($z = -0.60$; $p =$

0.55). Brittany opted to use the “Quick Path” (i.e., less auditory prompts) mode for essays during sessions three and four; however, these scores are similar to previous FLYPen™ essays.

<Insert Figure 1>

Bethany consistently wrote three separate body paragraphs and an introduction, all based off of her planning on the graphic organizers. Overall, Bethany included 11 planning details, out of a possible of 11, and no off-topic sentences when using both methods. She averaged 4.5 paragraphs with 4.5 topic sentences with the FLYPen™, with 243 words and 14.8 sentences. When using the graphic organizers alone, she included an average of 4.8 paragraphs with 5 topic sentences, 13.5 sentences, and 225 words.

Matt

When using the FLYPen™ with the graphic organizers, Matt’s average overall rating score was 38.5 out of a total possibly of 51, ranging from 38 to 39. With the graphic organizers alone, Matt’s average score was 38.3 (range 37 to 39). No significant differences occurred between Matt’s scores with each method ($z = -0.32$; $p = 0.71$; see Figure 1), a finding also supported through visual analysis. Matt also opted to use the “Quick Path” in his final essay, with no impact on his performance.

Despite continually using the graphic organizers with and without the FLYPen™, Matt continued to typically write one paragraph for all of his essays with the exception of his last essay. However, this one paragraph often included an introductory and concluding statement with a higher quality of sentences and details between compared to his essays before the start of this study. Largely due to his pace of work, Matt was inconsistent in completing the graphic organizers and essays with or without the FLYPen™. As the study progressed, he became more consistent. Despite challenges, Matt stayed on-topic in his essays and presented information in a

logical format. Matt included an average of 9.5 planning details out of 11 possible when using the FLYPen™ and 9.3 when using the graphic organizers alone. Matt averaged 6 sentences when using the FLYPen™ and 75.5 words, and 6.8 sentences and 82.5 words when using the graphic organizers. He typically included, on average, 0.8 similar phrases when using the FLYPen™ and 0.5 when using the graphic organizers.

Peter

Peter averaged an overall written expression rating score of 47.3 (range 47 to 48) with the FLYPen™ and the graphic organizers and 47.5 (range 47 to 48) with the graphic organizers alone. Peter's scores were identical across each condition for the last three sessions of data collection. A visual analysis indicated Peter benefited equally from both methods (see Figure 1), which was supported by the lack of significant differences between the rating scores for each intervention ($z = -0.68$; $p = 0.5$). Peter used the "Quick Path" on the final two FLYPen™ essays. Scores on these essays were consistent with the previous two essays when using the audio prompts from the FLYPen™.

Peter performed equally across each essay. He tended to use similar phrases across his essays such as "these are the reasons..." for his main points, in the introduction and concluding paragraphs. On average, Peter included 0.8 similar phrases when using the FLYPen™ and 1.3 similar phrases with the graphic organizers. Peter consistently included 11 planning details out of a possible of 11 and did not include any off-topic information when using either method. Peter included 5 paragraphs with 4.5 topic sentences when using the FLYPen™ alone and 4.8 paragraphs with 5 topic sentences with the graphic organizers only. He included an average of 18.3 sentences and 185.8 words with the FLYPen™, and 17.3 sentences and 186.3 words with the graphic organizers.

Social Validity

When asked why it was important to know how to write well, the students reported it was important for their goals (e.g., college, graduating from high school) or as a means of explaining oneself in writing. Initially, Brittany expressed frustrated with the FLYPen™ when it would get “off” on a step, usually due to her continuing to tap on the graphic organizers while listening to a direction. As she used the FLYPen™, Brittany enjoyed the technology more because she found it easier to write essays when the FLYPen™ explained the components of an essay. Matt and Peter were more positive about the FLYPen™, indicating it provided them instructions and support such as step-by-step directions and hints. All reported they would rather use the graphic organizer pages alone and acknowledged they stopped listening to the auditory prompts as they used the FLYPen™ after using it several times.

The teacher also emphasized the value of the technology with the individualization the FLYPen™ provided. Instead of having to work one-on-one with students, reteach, or continually adjust the pace of instruction while waiting for students to complete parts of graphic organizers, the FLYPen™ provided individualization and allowed students to work at their own pace. The teacher believed the FLYPen™ provided a starting-point for her students to be motivated to write because it was an interesting technology. However, the teacher felt the graphic organizer pages were what actually helped the students in planning and organizing writing tasks, as the graphic organizer pages accompanying the FLYPen™ broke down an essay into separate sections while allowing students to brainstorm and write topic sentences.

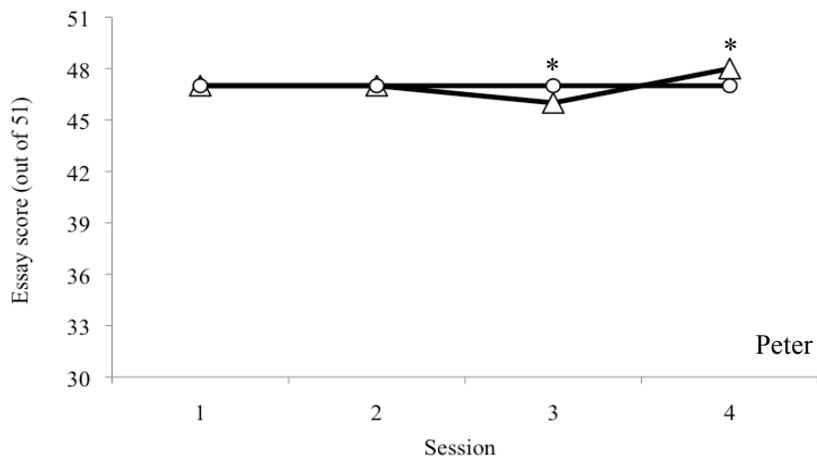
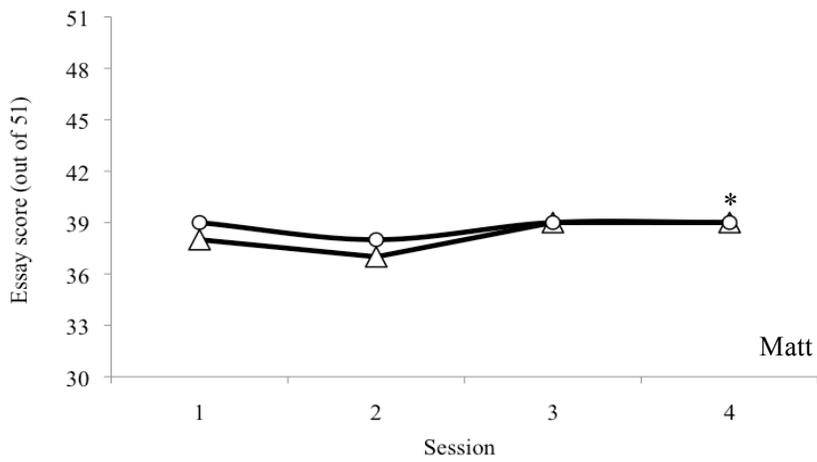
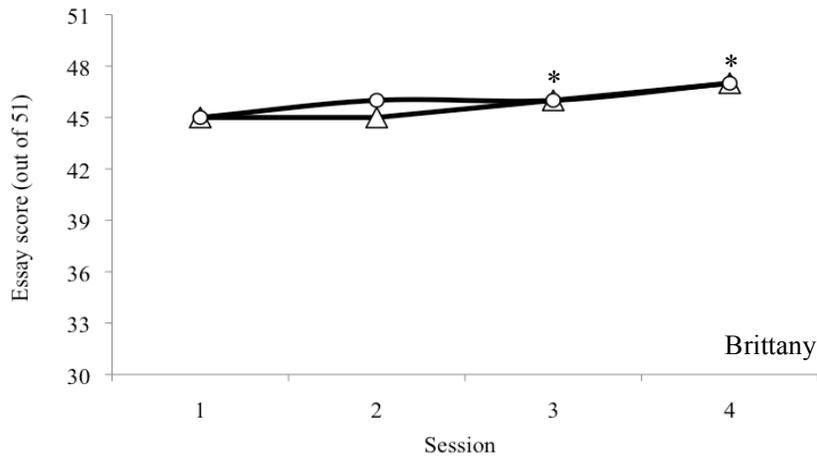
The value of the graphic organizers with and without the FLYPen™ was noted outside of the student products for this study. For example, Matt reported he used the strategies taught (i.e., planning, brainstorming) in his other classes when writing. When Peter re-took his standardized

English/Language Arts assessment for the writing component, he passed. He attributed his success on the written expression portion to internalizing the strategies he learned in this study from using the FLYPen™ and graphic organizers.

Discussion

This study sought to understand if a technology-based tool – the FLYPen™ – with its written expression software and graphic organizers or the paper-based graphic organizers alone supported written expression. Both methods supported students equally in terms of the quality of the essays written and overall usability.

Prior to implementation of either intervention, students struggled to brainstorm, write topic sentences, often wrote only one paragraph, and lacked supporting details in their essays. They found written expression to be a difficult task. When introduced to the FLYPen™ and graphic organizers, Brittany and Peter *immediately* included multiple paragraphs, focused topic sentences, supporting details, and a higher overall quality of their essays. While Matt struggled to write multiple paragraphs, the overall quality of his essays also increased with the inclusion of focused, supportive sentences. The teacher and the students acknowledged that the FLYPen™ made writing more exciting and the students more willing to write. The technology provided a hook to interest previously reluctant writers to begin writing. Yet, the students and the teacher found the graphic organizers to be the most beneficial in actually supporting written expression as the prompts provided by the FLYPen™ were pre-programmed and did not change. Thus, in attempting to understand if the “pen” or the “paper” supported the students, the answer is possibly “both.” In other words, the success experienced was the result of an effective written expression package: a combination of a novel, motivating technology (i.e., the FLYPen™ with audio prompting) and the consistent written expression support from graphic organizers.



○ Essays with the FLYPen™ and graphic organizers
△ Essays with the graphic organizers alone
* Denotes that student did not use the “Editor Mode” during a FLYPen™ essay

Figure 1. Overall quality score for each student from the rating rubric
Value of Technology

Although the written expression products produced by the students were not better in terms of quality or quantity when using the technology compared to graphic organizers alone, they were also not worse. Hence, the audio prompts neither helped nor hurt as compared to just the paper-based supports. However, the social validity results suggest the technology provided motivation for the students writing and potentially provided a needed review for specific written expression elements such as the thesis statement. Given the challenge the teacher faced getting the students to write, the FLYPen™ provided a need “hook” to interest the students in order for them to actually learn about and make improvements in written expression. The motivation the FLYPen™ provided to write is consistent with previous research, suggesting literacy-based technologies may increase students’ motivation and interest in academic tasks (MacArthur, 2009; Okolo, 2008). Hence, with the added motivational element of the FLYPen™, students were more receptive to prewriting, the paper-based graphic organizers (see MacArthur, 2000, 1996).

In addition to the motivational value of the FLYPen™, it also provided auditory prompting. Arguably, the auditory prompts not only provided directions, but also helped the students stay on-task in completing each step of the graphic organizers. In the “Editor Mode,” if a student attempted to move ahead to the next section of a graphic organizer prior to double tapping (signal to move on) or wrote in the wrong section, the FLYPen™ beeped loudly to indicate an error and would not provide the next direction until a previous one was completed. While research has minimally explored potential benefits of technology-based auditory prompting for written expression for students with EBD, students with EBD were more likely to continue writing or write more when a teacher gives an auditory prompt followed by praise (Lee

& Laspe, 2003). Additionally, Hudson and colleagues (2013) also found that students with EBD were able improve their written expression when given prompts and were able to maintain the targeted written expression skills over six weeks.

Other emerging research on students with autism also suggests the value of auditory prompting for written expression. Pennington and colleagues (2012; 2010) provided verbal simultaneous prompting then physical prompting, as needed, when using a written expression software. Results demonstrated significant improvements in the number of complete sentences and words written. While the prompts provided focused more so on beginning and completing the task, improvements in overall written expression were demonstrated. Research has found that prompting, through technology or a person, is effective in increasing students' focus towards any given task and performing the requested actions (Morse & Schuster, 2004).

Value of Graphic Organizers

As a stand-alone support, paper-based graphic organizers were effective in supporting written expression. Research suggests that graphic organizers positively impacts planning, supports organization, and increases written expression ability across grade levels and for all students (Graham & Harris, 2009; Graham & Perin, 2007). In this study, the combination of the "Idea Map" (i.e., a concept map) and the "Drafting Page" (i.e., an outline of topic sentences and supportive details) provided students with a brainstorming and organization structure. These graphic organizers enabled students to focus their ideas, and have a foundation for each paragraph using the topic sentences and supportive details. The teacher in this study emphasized how important it was for students to have such a structure and to know where to begin each paragraph. This structure allowed students to better translate their ideas (i.e., planning) into an actual organized essay with separate paragraphs and detailed sentences.

For the students in this study, the graphic organizers used with the FLYPen™ were one of the first types of graphic organizers ever used, and one of the first times they had been required to systematically plan and organize before writing. Prior to the start of the study, Matt and Peter indicated how they just “thought about” what they wanted to write and began writing. Both acknowledged their previous method was ineffective in producing quality essays. While Brittany created concept maps in the past, she reported they did not provide her as much support in writing as she needed and were insufficient. After using graphic organizers, all students reported that prewriting was a valuable component of improved written expression.

Implications for Practice

The primary implication for practice of this study was the success of a low-to-no cost support (i.e., paper-based graphic organizers) in improving students’ written expression. Although the technology benefited the students and perhaps resulted in them being more willing to write, teachers may experience the same student success through paper-based supports. Teachers can use find motivating, lower-cost, and accessible technology as a stand-alone support (e.g., typing, word prediction) and with paper-based graphic organizers to encourage secondary students to write. If a teacher does not have access to technology, such as the FLYPen™, other technology-based supports are available to potential motivate students to engage in writing, such as creating an outline with a word processing program. Teachers can also consider using concept mapping via commercially available software (e.g., Inspiration, <http://www.inspiration.com/>) or free ones (e.g., Cmap, <http://cmap.ihmc.us/>).

Limitations and Future Directions

One limitation involved removing a student from this study due to unrelated factors; his results may have provided additional support for the results of this study. Another limitation is

the lack of baseline data. However, this was an intentional decision per the single subject design used (i.e., repeated acquisition). This study serving as a follow-up study to one exploring the effectiveness of the FLYPen™. An unintentional limitation was the lack of formal assessment of motivation, which the social validity interviews revealed to be an unanticipated result. Last, interobserver agreement was initially low. However, this was resolved with additional training and practice.

Future research includes replicating this study by including longer measures with a generalization phase to understand if written expression abilities were sustained when not using the FLYPen™ or graphic organizers across settings and types of writing. Research should compare written expression motivation and abilities with two groups of students – one with and one without a novel technology – to better examine the association between motivation and technology. Additional research is simply needed in the areas of secondary students with EBD, as research is limited in how to best support students' written expression in special or general education settings.

References

Authors. (2010)

Authors. (2015).

Englert, C. S., Raphael, T. E., Anderson, L. M., Anthony, H. M., Fear, K. L., & Gregg, S. L.

(1988). A case for writing intervention: Strategies for writing informational text.

Learning Disabilities Focus, 3, 98-113.

Englert, C. S., Zhao, Y., Dunsmore, K., Collings, N. Y., & Wolbers, K. (2007). Scaffolding the

writing of students with disabilities through procedural facilitations: Using an Internet-

based technology to improve performance. *Learning Disability Quarterly*, 30, 9-29.

Gallagher, K. (2006). *Teaching adolescent writers*. Portland, ME: Stenhouse Publishers.

Graham, S., & Harris, K. R. (2009). Evidence-based writing practices: Drawing recommendation

from multiple sources. *British Journal of Educational Psychology Monograph Series*,

II(6), 95-111.

Flower, L. S., & Hayes, J. R. (1980). The dynamics of composing: Making plans and juggling

constraints. In Gregg, L. W. and Steinberg, E. R. (Eds.), *Cognitive Processes in Writing*

(pp. 31-50). Hillsdale, NJ: Erlbaum.

Graham, S., Capizzi, A., Harris, K. R., Hebert, M., & Morphy, P. (2014). Teaching writing to

middle school students: A national survey. *Reading and Writing*, 27(6), 1015-1042

Graham, S., & Harris, K. R. (2005). Improving the writing performance of young struggling

writers: Theoretical and programmatic research from the Center on Accelerating Student

Learning. *The Journal of Special Education*, 39, 19-35.

Graham, S., & Perin, D. (2007). A meta-analysis of writing instruction for adolescent students.

Journal of Educational Psychology, 99, 445-476.

- Harris, K. R., & Graham, S. (2009). Self-regulated strategy development in writing: Premises, evolution, and the future. *British Journal of Educational Psychology Monograph Series, II(6)*, 113-135.
- Harris, K. R., Graham, S., Friedlander, B., & Laud, L. (2013). Bring powerful writing strategies into your classroom! Why and how. *The Reading Teacher, 66*, 528-542.
- Hudson, T. M., Hinkson-Lee, K., & Collins, B. (2013). Teaching paragraph composition to students with emotional/behavioral disorders using the simultaneous prompting procedure. *Journal of Behavioral Education, 22*, 139-156.
- IES. (2010). *Digest of educational statistics 2009*. Retrieved from <http://nces.ed.gov/pubs2010/2010013.pdf>.
- IES. (2011). *The Nation's Report Card: Writing 2011, National Assessment of Educational Progress at Grades 8 and 12*. Washington D.C.; U.S. Department of Education.
- Individuals with Disabilities Education Improvement Act of 2004*, P.L. 108-446, 108.
- Isaacson, S. (2007). Written language. In P. J. Schloss, M. A. Schloss, & C. N. Schloss (Eds.), *Instructional methods for secondary students with learning and behavior problems* (4th ed.) (pp. 213-232). New York, NY: Pearson Education, Inc.
- Kennedy, C. H. (2005). *Single-case designs for educational research*. Boston: Allyn and Bacon.
- LeapFrog. (2007-2009). *FLY fusion pentop computer software*. Retrieved from <http://www.FLYworld.com/>.
- LeapFrog. (2005a). FLY Pentop Computer. [Educational software]. Emeryville, CA: LeapFrog Enterprises, Inc.
- LeapFrog. (2005b). FLY through writing: Master the steps to writing essays, stories, and poems. [Educational software]. Emeryville, CA: LeapFrog Enterprises, Inc.

- Lee, D. L., & Laspe, A. K. (2003). Using high-probability request sequences to increase journal writing. *Journal of Behavioral Education, 12*, 261-273.
- MacArthur, C. A. (1999). New tools for writing: assistive technology for students with disabilities. *Topics in Language Disorders, 20*(4), 85-100.
- MacArthur, C. A. (2009). Reflections on research on writing and technology for struggling writers. *Learning Disabilities Research and Practice, 24*, 93-103.
- MacArthur, C. A. (1996). Using technology to enhance the writing processes of students with learning disabilities. *Journal of Learning Disabilities, 29*, 344-354.
- Mason, L. H., & Shriner, J. G. (2008). Self-regulated strategy development instruction of writing an opinion essay: Effects for six students with emotional/behavior disorders. *Reading and Writing Quarterly, 21*, 71-93.
- Morse, T. E., & Schuster, J. W. (2004). Simultaneous prompting: A review of the literature. *Education and Training in Developmental Disabilities, 39*, 153-168.
- National Commission on Writing. (2003). *The neglected "R": The need for a writing revolution*. Retrieved from http://www.collegeboard.com/prod_downloads/writingcom/neglectedr.pdf. New York, NY: College Board.
- National Writing Project. (2009). *Writing*. Berkley, CA: University of California, National Writing Project.
- Okolo, C. M. (2008). Technology and individuals with mild disabilities. In J. D. Lindsey (Ed.), *Technology and Exceptional Individuals* (4th ed.) (pp. 325-375). Austin, TX: Pro-Ed.
- Pennington, R. C., Ault, M. J., Schuster, J. W., & Sanders, A. (2010). Using simulations prompting and computer-assisted instruction to teach story writing to students with autism. *Assistive Technology Outcomes and Benefits, 7*, 24-38.

- Pennington, R. C., Stenhoff, D. M., Gibson, J., & Ballou. (2012). Using simultaneous prompting to teach computer-based story writing to a student with autism. *Education and Treatment of Children, 35*, 389-340.
- Strum, J. M., & Rankin-Erickson, J. L. (2002). Effects of hand-drawn and computer-generated concept mapping on the exposition writing of students with learning disabilities. *Learning Disabilities Research and Practice, 17*, 124-139.
- Taft, R. J., & Mason, L. H. (2010). Examining effects of writing interventions: Highlighting results of students with primary disabilities other than learning disabilities. *Remedial and Special Education*. Retrieved from <http://rse.sagepub.com/content/early/2010/02/24/0741932510362242>.
- Troia, G. A. (2006). Writing instruction for students with learning disabilities. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of Writing Research* (pp. 324-336). New York, NY: The Guilford Press.
- Wehby, J. H., Lane, K. L., & Falk, K. B. (2003). Academic instruction for students with emotional and behavioral disorders. *Journal of Emotional and Behavioral Disorders, 11*, 194-197.