

Improving Adolescent Writing Quality and Motivation
with Sparkfolio, a Social Media Based Writing Tool

by

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ABSTRACT

Writing instruction poses both cognitive and affective challenges, particularly for adolescents. American teens not only fall short of national writing standards, but also tend to lack motivation for school writing, claiming it is too challenging and that they have nothing interesting to write about. Yet, teens enthusiastically immerse themselves in informal writing via text messaging, email, and social media, regularly sharing their thoughts and experiences with a real audience. While these activities are, in fact, writing, research indicates that teens instead view them as simply “communication” or “being social.” Accordingly, the aim of this work was to infuse formal classroom writing with naturally engaging elements of informal social media writing to positively impact writing quality and the motivation to write, resulting in the development and implementation of Sparkfolio, an online prewriting tool that: a) addresses affective challenges by allowing students to choose personally relevant topics using their own social media data; and b) provides cognitive support with a planner that helps develop and organize ideas in preparation for writing a first draft. This tool was evaluated in a study involving 46 eleventh-grade English students writing three personal narratives each, and including three experimental conditions: a) using self-authored social media post data while planning with Sparkfolio; b) using only data from posts authored by one’s friends while planning with Sparkfolio; and c) a control group that did not use Sparkfolio. The dependent variables were the change in writing motivation and the change in writing quality that occurred before and after the intervention. A scaled pre/posttest measured writing motivation, and the first and third narratives were used as writing quality pre/posttests. A usability scale, logged Sparkfolio data, and qualitative measures were

also analyzed. Results indicated that participants who used Sparkfolio had statistically significantly higher gains in writing quality than the control group, validating Sparkfolio as effective. Additionally, while nonsignificant, results suggested that planning with self-authored data provided more writing quality and motivational benefits than data authored by others. This work provides initial empirical evidence that leveraging students' own social media data (securely) holds potential in fostering meaningful personalized learning.

DEDICATION

For Bernie, Norah, Caleb, and Hannah, the Most Interesting Family in the World.

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
CHAPTER	
1 INTRODUCTION	1
Background and Rationale.....	1
Statement of the Problem.....	16
Overview of Present Study	16
Sparkfolio 1.0.....	32
Research Questions.....	33
2 METHOD	35
Overview of Experimental Design	35
Participants.....	36
Technology Implementation – Sparkfolio 1.0.....	37
Independent Variable: Planning Mode (Three Levels)	48
Teacher and Researcher Roles in Intervention.....	49
Assignment.....	50
Dependent Variables.....	50
Other Measures	57
Procedure.....	63
Implementing a Social Media Application in a School Setting	71
Analysis.....	73

CHAPTER	Page
3 RESULTS	81
General Observations.....	81
Sample Story Plans	83
Writing Quality	85
Writing Motivation	100
Multiple Regression Analyses	108
Qualitative Analyses	119
4 DISCUSSION	131
Research Question 1	131
Research Question 2	134
Summary of Overall Findings	138
Contributions.....	138
Future Work	140
Final Remarks	143
REFERENCES.....	185
APPENDIX	
A MODIFIED FACEBOOK INTENSITY SCALE (FBI)	199
B MODIFIED WWW/WHAT=2/HOW=2 STORY GRAMMAR QUESTIONS.	201
C HOLISTIC SIX TRAITS RUBRIC	203
D INDIVIDUAL SIX TRAITS RUBRICS	206
E WRITING DISPOSITIONS SCALE (WDS)	213
F MODIFIED SYSTEM USABILITY SCALE (SUS)	215

LIST OF TABLES

Table	Page
1. Descriptive Statistics for Post Frequency, by Social Media Site	145
2. Descriptive Statistics for “Everyday Activity” Responses	146
3. Descriptive Statistics for Overall Writing Quality Scores	147
4. A Priori Orthogonal Contrast Results for Overall Writing Quality Scores	148
5. Descriptive Statistics for Individual Six Writing Trait Scores	149
6. A Priori Orthogonal Contrast Results for Individual Six Writing Trait Scores	150
7. Descriptive Statistics for Overall Writing Motivation	151
8. A Priori Orthogonal Contrast Results for Overall Writing Motivation	152
9. Descriptive Statistics for WDS Constructs	153
10. A Priori Orthogonal Contrast Results for WDS Constructs	154
11. Gender by Condition	155
12. Descriptive Statistics for Total Social Data “Cards” Imported	156
13. Descriptive Statistics for Self-Authored Post Frequency	157
14. Descriptive Statistics for Total Logins	158
15. Descriptive Statistics for Total Cards Seen	159
16. Descriptive Statistics for Unique Cards Seen	160
17. Descriptive Statistics for Number of Redraws	161
18. Descriptive Statistics for Total Stories Created	162
19. Descriptive Statistics for Planner Total Details	163
20. Descriptive Statistics for Planner Total Word Count	164
21. Descriptive Statistics for Overall SUS Scores	165

LIST OF FIGURES

Figure	Page
1. Account Authorization Mockup	166
2. Idea Cards Mockup	167
3. Planning Mockup – Start	168
4. Planning Mockup – Placing Cards	169
5. Planning Mockup – AddingText	170
6. Planning Mockup – Complete	171
7. Terms of Service	172
8. Account Authorization	173
9. Home Screen	174
10. Idea Cards	175
11. Suits	176
12. Hovering	177
13. Naming a Story Plan	178
14. Planning	179
15. Placing Cards	180
16. Adding Text	181
17. Story Grammar Questions	182
18. Sample Story Plan – My Media	183
19. Sample Story Plan – Network Media	184

CHAPTER 1

INTRODUCTION

Background and Rationale

Writing Instruction

Since the creation of language, one practice has continually drawn human beings together: the story. From cave paintings to Facebook status updates, humans have always had a deep desire to share our lives with one another, to understand and to be understood. Phenomenologist Richard Kearney (2002) argues, “telling stories is as basic to human beings as eating. More so, in fact, for while food makes us live, stories are what make our lives worth living. They are what makes our condition human” (p. 3). Thus, in a digital age where viral videos can exceed 100 million views in under a week (Wasserman, 2012), crowdsourcing can fund a music album in under an hour (Devitt, 2012), and self-published authors can sell several hundred thousand books in under a month (Memmott, 2012), virtually anyone stands to impact the world with a well-crafted story, whether fact or fiction. Furthermore, as digital connectivity becomes increasingly pervasive and text-based electronic communication is the new norm in both the professional and personal spheres, writing effectively is arguably a more important skill than ever.

The Challenge of Teaching Writing

However, national test scores illuminate a lack of writing proficiency in American schools. In 2011, only 27% of eighth and eighth grade students scored as “proficient” or higher in writing (*The Nation’s Report Card: Writing*, 2011). Despite this deficiency, 98% of American teens believe that writing is important for future success, and 82% believe additional in-class writing time would benefit them (Lenhart, Arafeh, Smith, &

Macgill, 2008). While such findings would logically lead to an increased focus on writing instruction, American schools are actually doing the opposite. Due to a national emphasis on reading in recent years, writing has been a relatively low priority in the classroom (Cope, Kalantzis, McCarthy, Vojak, & Kline, 2011). This is particularly evidenced in the few federal research dollars being spent on writing instruction. At the time of this writing, only 13 of the 81 (16%) current awards by the Institute of Education Sciences (IES) in the “Reading and Writing” category involve writing. The “Educational Technology” category is similarly distributed, with only 5 of the 33 (15%) current awards regarding writing (“Search Funded Research Grants and Contracts,” 2014).

One reason for this bias favoring reading is that reading is “more readily assessed through discrete item comprehension tests” which can be graded quickly by an instructor or even automatically with a machine (Cope et al., 2011, p. 82). Writing assessment, however, “call[s] for more time and effort on the teacher’s part to read, correct, provide feedback, and grade fairly” (Sadler & Good, 2006, p. 2). As English teachers must constantly find a balance between administering quality assessments and maintaining manageable grading loads, writing is often not a curricular focal point (Cope et al., 2011; Sadler & Good, 2006).

Another challenge in teaching writing is the *time* required for: a) teachers to provide quality in-class instruction; b) students to actually write and revise; and c) the constant reinforcement and encouragement necessary for attending to adolescents’ affective needs. Because writing involves incredibly complex cognitive processes (Flower & Hayes, 1980; Hayes, 1996; Zimmerman & Risemberg, 1997), the task is often daunting for adolescents (De La Paz & Graham, 2002), who are already especially self-

conscious about their academic skills, which they tend to believe are fixed rather than malleable (Anderman & Maehr, 1994; Dweck & Master, 2008; Pajares, 2003). Although not always acknowledged in writing interventions, the act of writing has a strong affective component (Blackburn & Stern, 2000; Brand, 1987; Daly & Wilson, 1983; Faigley, Cherry, Jolliffe, & Skinner, 1985; Kear, Coffman, McKenna, & Ambrosio, 2000; Knudson, 1993; Maimon, 2002; McLeod, 1987; Pajares, 2003; Piazza & Siebert, 2008). Furthermore, motivation and self-efficacy literature indicate that because self-beliefs profoundly impact one's actions (Bandura, 1977; Dweck & Leggett, 1988; Dweck & Master, 2008; Pajares, 2008; Pintrich, 2003), negative self-views are an especially difficult cycle to break. Hence, in the case of writing, students with low confidence in their writing abilities are likely to produce low-quality work. Then, recognizing that they have produced low-quality work is likely to reinforce their low confidence when attempting future writing, and the cycle essentially repeats itself.

Thus, adolescent writing intervention involves a complex interplay between its cognitive and affective challenges within the constraints of both student and teacher time. While it makes logical sense for writing interventions to address the cognitive, affective, and time issues simultaneously, very few do.

Existing Writing Interventions

Existing writing interventions typically tackle cognitive and affective challenges separately, and many of their practices require significant class time, which is a considerable challenge particularly in English classrooms, where the curricular demands of both reading and writing targets must be addressed. With this in mind, the following section will outline the advantages and disadvantages of: a) the explicit teaching of

writing strategies, a prominent method for attending to writing’s cognitive challenges; and b) the Writer’s Workshop, a widely adopted classroom model aimed at addressing writing’s affective challenges.

Explicitly Teaching Writing Strategies

A meta-analysis of writing instruction methods for adolescents indicates that—based on weighted effect size—the most promising technique for writing instruction is explicitly teaching students “strategies for planning, revising, and editing their compositions” (Graham & Perin, 2007a). Below, three particularly relevant approaches— a) Self-Regulated Strategy Development; b) prewriting; and c) story grammar—are discussed, as well as their primary obstacles for implementation: time and student motivation.

Self-Regulated Strategy Development. One model that “appears to have been a particularly potent approach” to teaching writing strategies (Graham & Perin, 2007a, p. 466) is the Self-Regulated Strategy Development (SRSD) method (Graham & Harris, 1993b; Harris & Graham, 1996), which has proven effective in improving both struggling students’ writing (Chalk, Hagan-Burke, & Burke, 2005; Graham & Harris, 1999; Graham & Perin, 2007b; Harris & Graham, 1999) and even regular-level students’ writing (De La Paz & Graham, 2002; De La Paz, 1999). While it has several levels of implementations, the SRSD approach essentially involves walking students through the entire writing process (brainstorming, prewriting, drafting, revising, and publishing) while modeling metacognition with explicit steps—often using mnemonics for easy recall (Graham & Harris, 1999; Harris & Graham, 1999). During this time, students consult existing exemplar work from all stages of the writing process (from early-stage prewriting to

finished drafts) and often work in small groups or as a class to construct “group” writing as additional metacognitive reinforcement (De La Paz & Graham, 2002; Harris & Graham, 1996).

Prewriting Strategies. One subset of these strategies that has demonstrated effectiveness in improving student writing involves prewriting—the gathering, planning, and organization of ideas for a writing piece before beginning a first draft (Graham & Perin, 2007a, 2007b). While prewriting is a staple of professional writing, it is typical for K-12 students to spend little to no time on prewriting before beginning a first draft (Burtis, Bereiter, Scardamalia, & Tetroe, 1983; McCutchen, 1995), even when prompted by a teacher (Berninger, Whitaker, Feng, Swanson, & Abbott, 1996). Thus, instruction focused on prewriting is particularly beneficial for adolescents who are still developing as writers, including the use of graphic organizers and concept maps to externalize their thoughts—which allow them to minimize cognitive load while organizing ideas (Kellogg, 1987) and making connections (Novak & Cañas, 2008). Although the SRSD approach does place particular emphasis on prewriting (De La Paz & Graham, 2002), positive prewriting results are certainly not limited to the SRSD model (e.g. Kellogg, 1990; Schweiker-Marra & Marra, 2000).

Story Grammar. Of particular interest to this study is the genre-specific prewriting work associated with “story grammar.” Essentially, the term “story grammar” refers to the study and awareness of the set of elements common to successful stories and the interactions between them—in much the same way that attention to the proper use of language and parts of speech results in a functional and logical sentence (Stede, 2000). The concept of story grammar—the attention to story structure—is not new, as

exemplified by Aristotle's *Poetics* (335 BCE), the first major work outlining the beginning/middle/end structure common to stories. This basic framework has been reshaped and reworked for centuries, perhaps most notably by Gustav Freytag, whose *Die Technik des Dramas* (1900) outlined the five-part dramatic structure (exposition, rising action, climax, falling action, and dénouement) upon which much modern story structures are based. Despite this age-old attention to story structure, the term "story grammar" was not coined until the 1970s, as attention to "schemas" grew in popularity (Stede, 2000). Of particular note are the eight basic story grammar components proposed by Stein and Glenn (1979): a) main character(s); b) time; c) locale; d) an inciting event causing character(s) to act; e) the wants/goal(s) of the main character(s); f) actions of character(s) to achieve goal(s); g) consequences of actions; and h) reactions of character(s). These eight components have since become the foundational elements of story grammar, which has most prominently been employed in the context of reading comprehension and writing instruction for school-aged children (Gray, 1988; Stetter & Hughes, 2009). A recent meta-analysis supports the validity of this story grammar approach in improving both narrative comprehension and production for students in grades Pre-K through 12, with positive results regardless of the specific type or form of intervention (Murza, Montemurro, Schwartz, & Nye, 2009). Perhaps the most widely effective incarnation of story grammar in K-12 settings is the "WWW/What = 2/How = 2" mnemonic, first introduced by Danoff, Harris and Graham (1993) as a genre-specific strategy within Graham and Harris's empirically justified SRSD model (see above; Graham & Harris, 1993a; Graham & Perin, 2007a; Harris & Graham, 1996). The "WWW/What = 2/How =

2” mnemonic corresponds to the first words in a series of questions aimed at helping students address Stein and Glenn’s (1979) essential story components:

“Who is the main character; who else is in the story?
When does the story take place?
Where does the story take place?
What does the main character want to do?
What happens when the main character tries to do it?
How does the story end?
How does the main character feel?” (Danoff et al., 1993)

(It is important to note that this model does not include Stein and Glenn’s “inciting event” component.) Within the context of the SRSD approach, this WWW/What = 2/How = 2 model has since yielded increases in writing quality, number of story components, and word counts for students with emotional, behavioral, and learning disorders (Adkins & Gavins, 2012; Adkins, 2005; Graham & Harris, 1993a; Lane et al., 2008), students labeled as “struggling” writers (Harris, Graham, & Mason, 2006), and even students who write at or above grade-level (Danoff et al., 1993; Tracy, Reid, & Graham, 2009).

Challenges of Explicitly Teaching Strategies: Time and Student Motivation.

However, a considerable drawback to all of the above approaches emphasizing the explicit teaching of writing strategies is that they require significant in-class time commitment from both teachers and students, including extensive whole-class walk-throughs of writing activities and in-depth discussion of examples. In addition to the already present time constraints in English classrooms, these extensive activities can also become tedious for students—especially those who neither see themselves as capable writers nor are motivated to improve (Anderman & Maehr, 1994; Bandura, 1977; Dweck & Leggett, 1988; Dweck & Master, 2008; Pajares, 2003, 2008; Pintrich, 2003).

Accordingly, many instructors opt for approaches with elements that appeal to adolescents' affective needs.

The Writer's Workshop

One of the most widely adopted writing instruction models is the Writer's Workshop, an approach designed to address adolescent writers' affective challenges. While in the "classic" writing instruction model the teacher dictates writing content and is the sole audience, the Writer's Workshop's intent is to engage students by letting them choose writing topics they care about—their lives, interests, family, friends, etc.—thus intrinsically motivating them to craft stories thoughtfully and carefully (Atwell, 1998, 2002; Calkins, 1994; Taylor, 2000). These stories are then shared with peers who offer positive feedback, reinforcing the authors' efforts (Harrison, 2002; Nelson, 2000). While fairly time-intensive, this is intended to be a cyclical process. By writing about content that interests them, students are more inclined to increase their efforts and produce quality work. Their efforts are then validated by peers, boosting motivation and confidence for future writing and the cycle repeats, ultimately improving skills and confidence in all writing genres (Harrison, 2002; Nelson, 2000). Teens themselves support this methodology, as "they are motivated to write when they can select topics that are relevant to their lives and interests, and report greater enjoyment of school writing when they have the opportunity to write creatively" (Lenhart et al., 2008, p. iii).

However, many teachers have found the Writer's Workshop difficult to put into practice (Brooks, 2012; Dodsworth, 1994; Furr, 2003; Tompkins, 2002) due to the challenges of: a) students choosing their own writing topics; b) its lack of support for struggling writers; and c) its time-intensive nature.

Student Topic Choice. While the idea of choosing their own writing topics appeals to adolescents (Atwell, 1998, 2002; Lenhart et al., 2008; Nelson, 2000; Taylor, 2000), the practice of actually choosing one is often daunting for them. Given boundless options to write about whatever they choose, they often do not know where to start (Sadauskas, Byrne, & Atkinson, 2013), and have trouble narrowing down their initial general ideas to workable, specific ones (Atwell, 2002), a problem common to writers of all skill levels (Lamott, 1994; Nelson, 2004). While it is typical for teachers to conference with such students one-on-one and provide structured questions for fleshing out an idea (Atwell, 2002; Sadauskas et al., 2013), a teacher cannot conference with each and every student. Furthermore, if the aim is for the student to select a topic that is personally meaningful, the teacher cannot make that choice—it must be the student. One approach to addressing this problem involves “mining memories” (Atwell, 2002), a practice in which students are encouraged to keep a log of topics that interest them as a bank of potential ideas for future writing (Sadauskas et al., 2013), typically cultivated over time through frequent brainstorming sessions and freewriting. Yet, this method requires a significant time commitment from both teachers and students and is typically paper-based, making months’ worth of work easy to misplace. Hence, while approaches such as mind maps, one-on-one conferencing and idea logs are available, for many students, the stumbling block of finding the spark for a relevant topic remains.

Lack of Support for Struggling Writers. Furthermore, the Writer’s Workshop approach often lacks structure and direct instruction (with the exception of occasional “mini-lessons”), emphasizes “free” in-class work time, and urges students to work at their own pace with few deadlines (Atwell, 2002). While this fosters a positive, creative

environment for confident, experienced writers (Vanderslice, 2002), it is difficult to put into practice with struggling writers (Helsel & Greenberg, 2007), who often “resist the independence of the writing workshop and shut down” (Brooks, 2012, p. 93) and tend to find more success when provided with structured steps and activities (Chalk et al., 2005; Graham & Harris, 1999; Graham & Perin, 2007a, 2007b; Harris & Graham, 1999). As mentioned above, choosing a meaningful writing topic is difficult for writers of all skill levels, and so this choice often does not motivate struggling writers. Colored by their anxiety, they tend to believe they have nothing interesting to say about themselves and fear embarrassment in sharing with their peers (Furr, 2003; McPherron, 2010; Tompkins, 2002). Again, the challenges are both cognitive and affective. Because struggling writers believe they lack the natural abilities required to write effectively (Anderman & Maehr, 1994; Dweck & Master, 2008; Pajares, 2003), they require: a) time, structure and guidance in a Writer’s Workshop setting (Upton, Morse, & Lenhart, 2002) to meet their cognitive needs; and b) encouragement in developing personally relevant ideas to satisfy affective needs.

Hence, while teens are drawn to personally relevant writing topics and sharing them with a real audience (Lenhart et al., 2008)—a focal point of the Writer’s Workshop—difficulties in implementing the approach lie in helping students choose their own topics, supporting struggling writers, and the significant time commitments associated with both of these challenges.

Writing and Technology

As both the explicit strategy instruction and Writer’s Workshop approaches pose the challenge of time constraints, a logical remedy is the development and

implementation of computer-mediated solutions supporting students both in and out of the classroom—even without a teacher present. More specifically, a well-executed integration of computational tools in school writing settings could: a) decrease the need for a teacher to provide the majority of instruction and support; b) expedite tasks and processes associated with writing; and c) extend this expedited/instructional support to any setting, on any device. Unsurprisingly, much research has explored such possibilities, a vast majority of which support revising through either (human) peer feedback or (computer) natural language processing to support revising (Haswell, Donnelly, Hester, Neill, & Schendel, 2012; Vojak, Kline, Cope, McCarthy, & Kalantzis, 2011). However, most existing writing interventions do not leverage the potentially impactful realm of social media (Vojak et al., 2011), an informal yet engaging writing space that is particularly popular with adolescents.

Social Media

Teens and Social Media

American adolescents spend 8+ hours per day using digital media (Rideout, Lauricella, & Wartella, 2011), a significant portion of which involves text-based communication via social media, SMS, instant messaging, and email (Lenhart et al., 2008; Lenhart, Purcell, & Zickuhr, 2010; Lenhart, 2012), and as teen cell phone ownership continues to increase (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013), many are able to engage in these activities anytime and anywhere. As discussed above, while these activities are, in essence, writing, teens do not view them as such (Lenhart et al., 2008). Interestingly, it has been found that students who struggle academically are more prone to be heavy users of social media. Students who are “heavy” media users are

twice as likely as “light” media users to earn grades of “mostly C’s or lower” (Rideout, Foehr, & Roberts, 2010), and African American and Hispanic students—who tend to earn low grades—use social media and mobile devices more often than their Caucasian counterparts (Rideout et al., 2010, 2011). Thus, as social media (essentially electronic writing) appeals in particular to students who tend to struggle academically, incorporating elements of social media into writing instruction seems to be a potentially potent avenue to improving national writing proficiency.

Social Media: The Virtual, Informal Writer’s Workshop

Furthermore, without realizing it, many of the same teens who claim to have nothing interesting to write about themselves and are afraid to share with peers in a school setting willingly engage in activities remarkably similar to the Writer’s Workshop on a daily basis. Social media, smartphones, and digital media have made it incredibly easy to archive one’s life events (Byrne, Doherty, Jones, & Smeaton, 2008; Byrne, Kelliher, & Jones, 2011), and using these technologies, adolescents regularly document their lives and thoughts via status updates, photos, and videos (Lenhart et al., 2008, 2010)—essentially “authoring” stories every day—stories that matter to them, stories they share because they want to. They then voluntarily share these stories with a “real” peer audience who deliver instant feedback via comments, “likes,” etc. (Atkins, 2011; Kitsis, 2008; Pascopella & Richardson, 2009). Teens welcome this feedback, as social acceptance is deeply important to them, and unsurprisingly, research demonstrates that this social media interaction positively impacts the self-esteem and overall well-being of adolescents and young adults (Davis, 2013; Ellison, Steinfield, & Lampe, 2007; Gentile,

Twenge, Freeman, & Campbell, 2012; Steinfield, Ellison, & Lampe, 2008; Valkenburg, Peter, & Schouten, 2006).

Social Media's Motivational Potential

In a recent investigation of the reasons people use social media, it was found that the top three most influential factors were: 1) enjoyment; 2) number of peers; and 3) usefulness. (Lin & Lu, 2011). Furthermore, a meta-analysis of recent medical research indicates that incorporating social media in health behavior change interventions yields a significant positive effect on health-related outcomes (Laranjo et al., 2014). These findings provide further evidence of social media's powerful motivational potential; not only is it widely regarded as “enjoyable” and “useful”—it has even successfully facilitated positive behavior changes that improve health.

Accordingly, since adolescents are already immersed in practices found to improve writing outside of the classroom through social media (which, in turn, boosts self-esteem and shows promise in promoting behavior change), it stands to reason that incorporating aspects of social media into the classroom will illuminate students' natural abilities as storytellers, positively affect their writing self-confidence, and ultimately motivate them to improve their writing.

Toward Social Media Based Writing: A Proposed Framework

Considering the cognitive and affective challenges of adolescent writing instruction as well as the prominent methods for addressing these challenges separately, it is proposed here that an ideal writing intervention framework would emphasize the personally relevant elements that excite adolescents (Lenhart et al., 2008) alongside the structured strategy development activities they require as developing writers. The

essential components of such an approach would be *personally relevant and structured prewriting activities* and *time-effective practices*. More specifically, an ideal writing intervention ought to first focus on *prewriting activities* (Graham & Perin, 2007a, 2007b) with: a) an emphasis on writing about *personally relevant content* (Atwell, 1998, 2002; Calkins, 1994; Harrison, 2002; Lenhart et al., 2008; Nelson, 2000; Taylor, 2000); b) *affective support* illustrating to struggling writers that they do have valid ideas (Anderman & Maehr, 1994; Dweck & Master, 2008; Furr, 2003; Pajares, 2003; Tompkins, 2002); and c) *explicit teaching of structured planning* (Brooks, 2012; De La Paz & Graham, 2002; Graham & Perin, 2007a; Upton et al., 2002; Vanderslice, 2002). Additionally, the practices should be grounded in a *time-effective framework* that helps students and teachers optimize their time spent on these activities—both in and out of class (Brooks, 2012; Cope et al., 2011; Dodsworth, 1994). With these recommendations in mind, it appears that infusing adolescent writing instruction with social media elements would easily fulfill these criteria.

Personally Relevant, Encouraging, and Structured Prewriting

Although prewriting exercises positively impact writing quality (Graham & Perin, 2007a), most of the existing computational interventions focus on subsequent portions of the writing process via natural language processing aimed at drafting and revising (Haswell et al., 2012; Vojak et al., 2011). However, few (if any) systems approach writing from the content perspective (Vojak et al., 2011)—i.e. supporting personally relevant idea generation. Rather than helping students generate engaging ideas, such frameworks assume a topic is already chosen and address how to organize it. This is largely because it is easier to have computers analyze language patterns than to mimic

creative human thought. As mentioned above, although teachers can provide strategies and organizational aids (e.g. mind maps, graphic organizers) and consult with students one-on-one, many students still struggle in choosing writing topics that interest and excite them. Yet, lifelogs and social media data have proven effective in seeding narratives (Appan, Sundaram, & Birchfield, 2004; Byrne et al., 2008, 2011; Byrne & Jones, 2008; Kelliher & Davenport, 2007), and as teens regularly create digital content about themselves via social media, leveraging these digital extensions of themselves as a browsable dataset for brainstorming in a prewriting tool would inject that missing human element into a computational framework. Rather than attempting to retrieve ideas from thin air, such a system would allow students to use their social media data as reminders of events they have experienced and thoughts they have had which could then be repurposed as writing topics. Furthermore, seeing a vast collection of potential ideas they themselves have generated would illustrate in particular to struggling writers that they do, in fact, have valid ideas they have already felt worth sharing with peers, providing encouragement and decreasing the need for one-on-one teacher-student conferencing during topic selection. Finally, once a personally relevant topic is chosen, such a system could then assist students in fleshing out initial ideas into organized compositions, providing the structure developing writers need in preparing initial ideas for writing a draft.

A Time-Effective Framework

Furthermore, housing such a system online would allow students to work on ideation and prewriting outside of class—from any Internet-enabled device—thus freeing more in-class time for activities better suited for teacher-guided instruction (e.g.

structured strategy instruction; Graham & Perin, 2007a). Additionally, explicitly using social media data during the prewriting process affords potential for expediting the topic selection process by providing more tangible options for students, making them easily accessible, and streamlining the planning process with scaffolded steps.

Statement of the Problem

Based on the prior work outlined above, it appears that a computational tool leveraging personally relevant social media data for idea generation and structured planning could provide positive cognitive and affective support for adolescent writers, resulting not only in higher writing quality but also more positive attitudes about writing. However, an extensive literature search indicated that few (if any) studies have employed such an approach in a school writing setting, and furthermore, such a tool was not in existence.

Overview of Present Study

Purpose

Accordingly, a first aim of this study was to design and develop a social media based prewriting tool based on the framework above, which ultimately resulted in the creation of an online prewriting tool called Sparkfolio, a first-of-its-kind application which helps adolescents: a) choose meaningful writing topics based on their personal social data; and b) develop and organize those ideas in structured prewriting activities in preparation for writing a first draft. A second goal was to subsequently evaluate Sparkfolio in a real classroom setting to evaluate its cognitive and affective effects—particularly its effects on adolescent writing quality and motivation to write—thus

providing the first known empirical findings associated with a prewriting tool that leverages social media data.

Series of Design Studies

The design effort began with a series of studies aimed at first validating a social media based prewriting approach, and then iteratively designing an application based on empirical research in cooperation with high school students and teachers. This series of studies included: a) a needs assessment via teacher interviews and student focus groups; b) a student social media usage survey; and c) the design of a prototype, through which feedback was elicited from students in participatory design focus groups. What follows is an overview of these studies, including their foci, procedures, results, and their design implications.

Needs Assessment - Teacher Interviews and Student Focus Groups

Purpose and Rationale

Little to no prior work had explored the implications of utilizing social media data to spark ideas during prewriting in a school setting. Accordingly, an initial effort to both a) validate this approach as a sound method, and 2) envision what such an approach might entail involved one-on-one interviews with middle- and high-school teachers and focus groups with high school students (Sadauskas et al., 2013).

Research Questions

While one research question for this study focused on online peer feedback on writing, a second research question—which directly relates to this work—asked: “*In what ways might students’ social media data be used for generating personally relevant writing ideas and planning a first draft?*” (Sadauskas et al., 2013)

Method

Six English teachers (four female, two male) participated in the one-on-one interviews. They ranged in age from 31-54 years old, teaching experience from 4-28 years, and current teaching assignment from grades 6-12. These interviews (each roughly an hour in length) were conducted first, before any student focus groups. Foci for these discussions included: “1) the needs, expectations and challenges in teaching writing; 2) best practices for engaging students in writing and eliciting quality work; 3) how each teacher utilizes technology in writing instruction; and 4) opportunities for integrating social media into a writing curriculum” (Sadauskas et al., 2013, p. 278). Fourteen students (four female, ten male)—who ranged in age from 13-18 and from grades 9-12—participated in the focus groups, which were each held in single, two-hour sessions. Discussion topics included “1) students’ experiences and challenges with writing; 2) their technology/social media habits and preferences; and 3) participatory design sessions for applications melding social media and classroom writing” (Sadauskas et al., 2013, p. 278). All of the above discussions were audio-recorded, transcribed, and then iteratively coding for emerging themes using Grounded Theory (Charmaz, 2003).

Results

The findings from this study fell into two main categories: 1) justification for a social media based writing approach; and 2) design recommendations for designing social media based writing applications.

Justification for Social Media Based Writing

The Challenge of Self-Confidence. Both students and teachers agreed that *student self-confidence is a major challenge* in writing instruction. One teacher shared that many

students come to school “*saying ‘I’m a bad writer,’ and they don’t have any confidence in their writing...[they’ve] made a decision that reading is boring and writing is too hard*”. Furthermore, 10 out of the 14 student participants described themselves as “*okay*” or “*bad*” writers. This included several students in AP/Honors English implying that self-confidence transcends students’ actual abilities.

Social Media Engagement. Yet, consistent with (Lenhart et al., 2008, 2010), teachers and students affirmed that *teens are constantly engaged in social media writing activities*, particularly via smartphones, which they “*always*” and “*constantly*” keep within reach, even while they sleep. Teens also reported that they appreciate having a large audience for their thoughts, and being able to share with them at any moment through social media, and—in agreement with (Davis, 2013; Ellison et al., 2007; Gentile et al., 2012; Steinfield et al., 2008; Valkenburg et al., 2006)—that the instant validation of their posts and photos from friends and family positively impacts their self-views, encouraging them to continue to share (Sadauskas et al., 2013). Accordingly, social media sites appear to provide a positive environment for generating and sharing ideas—one where writing self-confidence is less prohibitive than writing in a classroom setting.

The Appeal of Personal Relevance. Finally, as supported by (Atwell, 1998, 2002; Calkins, 1994; Lenhart et al., 2008), teachers find success in using *personally relevant topics to ease students into writing*, and students feel this makes writing “*easier*” and allows them to “*play to their strengths*” (Sadauskas et al., 2013). Accordingly, as students’ social media activity is by nature personally meaningful, leveraging it as a starting point for classroom writing appears to be a logical way to motivate writing improvement.

Design Recommendations

A Cloud-Based, Multi-Platform Web Application. As students use multiple devices throughout the day for their schoolwork (including various computers, tablets, and smartphones at both school and home), a first recommendation was for prewriting technology involving social media to be a *cloud-based, multi-platform web application*, allowing students flexible and ubiquitous use from any Internet-enabled device (Sadauskas et al., 2013).

Auto-Updated Personal Informatics. Additionally, students were especially interested in the notion of “*seeing all of [their online] activity in one place,*” allowing them to “*learn about themselves*” and “*reflect*” while looking for writing ideas. With this in mind, they felt such a system “*should automatically synchronize*” with their social media accounts so that when they are ready to review their data, “*it’s just there*” (Sadauskas et al., 2013). Thus, a second recommendation was for *auto-updated personal informatics* to use during prewriting.

“Scaffolded” Writing Planning. Additionally, teachers agreed that students often do not know where to begin with a writing assignment. Even given the option of choosing their own topic, students claim they “*don’t have anything interesting to write.*” In agreement with (De La Paz & Graham, 2002; Graham & Perin, 2007a), teachers cited “*scaffolding*” (walking students through the writing process) as the most effective strategy for addressing this issue, specifically providing structured questions for generating personally relevant ideas: “*I give them various questions based on experiences they’ve had in the past...memories that are funny or things where they have a lot of emotion.*” Students are also encouraged to generate multiple ideas since their “*first*

ideas” are typically less reflective (and thus less workable), and selecting the “*best*” from a large set of possible topics usually yields better results: “*When they can map out all of their ideas in some way...it really helps them to see that there’s lots of ideas to choose.*” Once a topic is chosen, teachers typically continue to aid students in “*narrowing [the topic] down*” to a usable idea: “*you’ve got this huge monstrosity and you want to pick just a slice...I don’t want to hear about your entire day at Disneyland...I want to hear about a moment in time.*” Popular modalities for this include “*mind maps,*” and “*graphic organizers,*” for fleshing out and organizing ideas in preparation for a draft. Hence, a third recommendation for social media based writing technology was a scaffolded workflow guiding students from a) choosing an initial (social-media-inspired) idea to b) a more focused, specific topic, and then to c) a formal, organized plan to aid in writing a first draft.

Implications for Overall Design

This work validated the overall approach for social media based prewriting, and accordingly, the design process for Sparkfolio began, particularly following the guidelines mentioned above: a) a cloud-based, multi-platform web application that b) automatically synchronized with student social media data for seeding writing ideas and c) provided scaffolded writing planning.

Determining Useful Data Sources - Social Media Usage Survey

Purpose and Rationale

Although the initial probative study provided justification for designing Sparkfolio, a question raised early in the design process involved which social media sites Sparkfolio ought to retrieve data from in order to provide users with useful potential

writing ideas. This was prompted particularly by remarks by students in the aforementioned focus groups that they were becoming less interested in Facebook and more interested in Twitter and Instagram. Consequently, a social media usage survey was administered to high school students to obtain a clear understanding of their social media usage and preferences, and to investigate which popular social media sites might offer the most useful datasets.

Research Questions

Research questions for this study included:

- 1) Which social media sites do high school students use the most/least?
- 2) How often do high school students create social media posts on each social media site?
- 3) What are high school students' attitudes toward each popular social media site?

Method

Participants. A total of 269 high school students completed the survey (52.8% male, 47.2% female). Their mean age was 16.5 ($SD = 1.17$). Although they ranged in grade in school from the ninth to the twelfth grade, a majority of participants were either in grades eleven (47.2%) or twelve (29.4%) as opposed to grades nine (16.7%) and ten (6.7%). This sample was particularly advantageous in informing the present study. The survey was not only conducted at the same high school where the present study was conducted, but the participants for the present study were also eleventh grade students—the grade that was represented the most in the social media survey sample. While participants completed the survey anonymously and there is no way to determine whether

any survey participants also participated in the current study, it can be assumed that survey respondents represent the same population and demographics as the participants in the present study.

Instrument. The survey itself was derived from the Facebook Intensity Scale (FBI; Ellison, Lampe, & Wash, 2012; Ellison et al., 2007; see Appendix A), which consists of six statements such as “Facebook is part of my everyday activity,” “I am proud to tell people I am on Facebook,” and “I feel I am part of the Facebook community” and asks participants to rate them on a five-point Likert scale from “strongly disagree” to “strongly agree.” Two additional questions regard the number of one’s Facebook friends and the amount of time per day spent on Facebook. In addition to asking the original scale’s Facebook usage questions, participants were asked whether they had Twitter and Instagram accounts, and if so, also completed the same set of usage questions for Twitter and Instagram (e.g. “Twitter is part of my everyday activity,” “I am proud to tell people I am on Instagram”). To provide further insight into their usage habits, two additional questions were included for each social media platform: a) “How many posts do you create on Facebook/Twitter/Instagram on average per day?”; and b) “How many posts do you create on Facebook/Twitter/Instagram on average per week?” The instrument was delivered to students and completed via an online survey management system.

Results

Results validated that currently, the most popular social media sites for teens are Facebook, Instagram, and Twitter. The most popular site was Facebook, with 87.7% of participants reporting they have an account with Instagram in second (57.8%) and Twitter in third (47.2%). However, reported usage of these accounts tells a different story.

Facebook users reported a mean of .33 daily posts and 1.51 weekly posts (see Table 1). In contrast, Instagram users reported they post about once a day ($M = .96$) or about 7 times per week ($M = 6.65$), and Twitter users reported posting a mean of nine times daily ($M = 9.09$) and almost 46 times per week ($M = 45.72$).

Additionally, to assess these mean differences, two repeated-measures ANOVAs were conducted—a first with mean daily Facebook, Instagram and Twitter posts as within-group variables and a second with mean weekly Facebook, Instagram and Twitter posts as within-group variables. An F -test for daily posts was significant at the .05 level, $F(2, 172) = 19.05, p < .01$, and pairwise follow-up tests using the LSD method were significant for all three comparisons with $p < .01$ for both the Facebook vs. Twitter and Instagram vs. Twitter comparisons and $p < .05$ for Facebook vs. Instagram. Similarly, an F -test for weekly posts was significant, $F(2, 170) = 16.88, p < .01$, and all pairwise LSD follow-up tests were significant ($p < .01$). Consistent with the “waning enthusiasm” for Facebook among teens reported by (Madden et al., 2013), these results imply that although a majority of students are registered Facebook users, those who use Instagram and (especially) Twitter tend to be much more active users on those sites than on Facebook.

Further evidence for this phenomenon was provided by responses to the item “Facebook/Twitter/Instagram is part of my everyday activity.” While mean responses for Facebook tended to disagree with the statement ($M = 2.59$), responses tended to agree for both Instagram ($M = 3.42$) and Twitter ($M = 3.33$; see Table 2). An additional repeated-measures ANOVA was conducted for the statement “Facebook/Twitter/Instagram is part of my everyday activity” with responses specific to Facebook, Instagram and Twitter as

within-group variables. This test was significant, $F(2, 174) = 27.72, p < .01$, and LSD pairwise follow-up tests were significant ($p < .01$) for the Facebook vs. Twitter and the Facebook vs. Instagram comparisons. However, Twitter vs. Instagram was nonsignificant.

Design Recommendations and Implications

Previously, social media based educational technology has heavily emphasized Facebook (Aydin, 2012). Similarly, multiple usage reports over the past few years have named Facebook the most-used social platform for teenagers (Lenhart et al., 2010). However, in agreement with recent social media use reports (Madden et al., 2013; Madden, 2013), the observed outcomes indicate a strong shift away from active Facebook use among adolescents. While Facebook use may be declining among teens, it was still deemed important to have support for it within Sparkfolio. With almost 90% of students having an account, Facebook had the widest adoption rate in the sample and was consequently identified as the most reliable data source for the tool. It is important to note, however, that it is not necessarily the most viable source for useful story ideas. While not all survey participants had accounts on Instagram (57.8% adoption) or Twitter (47.2% adoption), these sites (according to self-reported student data) are where students appear to post most frequently, which perhaps would yield a richer dataset for writing inspiration. Furthermore, because the adoption rates for both Twitter and Instagram are increasing in comparison with past studies (Aydin, 2012; Madden, 2013), supporting these platforms with Sparkfolio makes logical sense in looking toward the future.

Prototype Design and Participatory Design Sessions

Based on the initial student/teacher interviews (see above), a digital mockup of Sparkfolio was created for the purposes of soliciting user feedback through participatory design sessions. This feedback would inform iterative development of Sparkfolio 1.0. What follows is the rationale for the initial mockup's workflow and the resultant feedback from participatory design sessions.

Prototype Design

Design Challenges. The two primary challenges in designing the initial Sparkfolio mockup regarded data presentation for idea generation and the orchestration of writing planning. Essentially:

1. **Idea Generation** – How should (unbounded) social media data be presented to users as possible writing topics?
2. **Planning** – How will the tool help users plan and flesh out ideas once a topic is chosen?

The following sections will outline how these challenges were addressed.

Addressing Unbounded Options with “Idea Cards.” As discussed in the “Background and Rationale” section above, when asked to choose a writing topic, many students can become overwhelmed by the unbounded nature of this choice—as opposed to the constraint of a specific writing prompt or assignment—and such students have trouble getting started (Atwell, 2002; Sadauskas et al., 2013). It makes sense that presenting students with their own personally relevant social media data would provide reminders of memories and interests that could seed writing ideas. However, as social media datasets can be quite large, using such data to spark creativity presents an equally

unbounded resource for inspiration. Simply aggregating a user's social media activity from multiple platforms and presenting it in a single stream would quickly become just as overwhelming (if not more so) as selecting a topic without it. Consequently, a decision was made to implement constraint as a key component of Sparkfolio's idea generation feature by using the familiar metaphor of playing cards. A mockup was designed in which Sparkfolio would compile a user's imported social media data into a "deck" of cards, with each "card" representing a single social media post (e.g. a single Tweet, status update, or photo). When presenting this content to a user, a constrained "hand" of five of these idea cards would then be dealt. This would avoid providing a large, overwhelming list or stream of data to users. Furthermore, as users may not necessarily know which cards/ideas will be most useful, this approach would avoid user-driven searches and encourage serendipitous discovery of memories that the user would not otherwise have considered. The card metaphor was extended to offer four possible "suits" of cards (each representing a different type of social data), namely text, images, locations, and people. Accordingly, upon being dealt five cards, users could then decide which of these five cards to "hold" before clicking a "redraw" button to replace cards. Users would be free to redraw as many times as they would like until they find one to five idea cards they would like to use as starting points for a writing piece. Using this card analogy as a starting point, a digital mockup of this workflow was created for demonstration in participatory design sessions with students to drive discussion and solicit feedback.

Repurposing Media with a Digital Organizer. Even when students have chosen an initial idea, a new challenge lies in developing that idea in preparation for writing a first draft. A common solution is to offer scaffolded instruction focused on organizing

thoughts and rich description appropriate for the assigned writing genre. This is often supported with one-on-one instructor help and graphic organizers (Atwell, 2002; Danoff et al., 1993; De La Paz & Graham, 2002; Graham & Perin, 2007a; Harris & Graham, 1996; Sadauskas et al., 2013). Thus, early Sparkfolio designs were aimed at guiding students from their initial “idea card” selections toward creating thoughtful, functional writing plans. The rationale was to extend the card metaphor to the planning process. Essentially, once users chose one to five virtual cards as a writing topic starting point, they would be brought to a digital “table” allowing them to sort and organize these cards. As informed by the initial focus groups/interviews (Sadauskas et al., 2013), this approach would use visual graphic organizer techniques in combination with writing elements already familiar to students. Writing plans would be structured based on the assigned genre (e.g. a story, an explanation, a persuasive piece), and through iterative prompts, students would be encouraged to add relevant details. For example, if students were assigned to write a story, they would be prompted to add story elements such as an Exposition, Conflict, Climax, and Resolution—components which have been empirically established as the essential components of a story (i.e. “story grammar”; Freytag, 1900; Stein & Glenn, 1979; Tracy et al., 2009). Each structural element would be signified as a blank placeholder that needs to be filled with content, and students would fill these spaces with either their selected cards or could also add text to them. The addition of textual details would enable the student to elaborate and fill in structural components supplementing their cards and ultimately work toward a detailed, completed story plan. This plan could then be saved in the user’s account and accessed and revised at any later date. To elicit feedback from students on this proposed process, a digital mockup of the

interface for this planning component was created for discussion in participatory design sessions (see Figures 1-6).

Participatory Design Sessions

Purpose and Method. Before creating a fully functional Sparkfolio 1.0, it was of interest to validate the initial design decisions for orchestrating idea generation and planning through participatory design sessions with high school students. Hence, as discussed above, a digital mockup of the proposed Sparkfolio interface and workflow was prepared, illustrating how students might: 1) access their social media data; 2) use it as a source for personally relevant writing ideas; and 3) flesh out and plan those ideas in preparation for a first draft (see Figures 1-6). Focus group interviews were conducted with 21 students (12 female, 9 male) in four one-hour sessions. Student participants were sampled from the same school as the social media usage survey (and the current study), providing consistency across the design and evaluation stages. During these focus groups, a walk-through of the proposed user interface was conducted and students were asked—without any prior explanation—how they would expect or want to interact with each screen, a process aimed at determining the proposed application’s intuitiveness. Feedback on the strengths and weaknesses of the proposed interface and functions was solicited, as well as suggestions for improvement. Similar to the initial student focus groups, discussions were audio-recorded, transcribed, and coded for prominent themes (Charmaz, 2003; Sadauskas et al., 2013).

General Results. Student responses on the proposed interfaces and workflows were primarily positive and enthusiastic, with minimal negative feedback. Two particular themes that emerged were: a) validation of the constrained “idea card” approach; and b)

evidence that the digital planning component would benefit students by providing scaffolding while simultaneously offering flexibility for a wide range of preferred prewriting approaches and modalities.

Justification of “Idea Cards” Approach. One clear trend across all focus groups was excitement about the overall notion of leveraging social media data for writing ideas. One student shared: *“I think it would definitely help with writer’s block if you were given the opportunity [to see personal data] because you could go through and see [ideas & events] you may have forgotten about.”* Another said: *“If you can’t think of a certain moment [to write about], you could see that picture [or other media] and then it would spark the idea, so I like that.”* Additionally, without any prior explanation, students immediately recognized the “card” analogy upon first viewing of the mockup, indicating that both the interface design and the analogy itself were effective. Students were particularly receptive to the constraint of only seeing five “cards” at a time, rather than viewing all of one’s data at once, which they felt would be *“overwhelming”* and *“distracting,”* and even runs the risk of *“putting the procrastination level to a new point”* when choosing a writing topic. The card-based approach, they argued, *“doesn’t overload you”* with too much content to process. Hence, participants both expressed interest in using this method for their own writing and believed it would effectively aid students their age in choosing personally relevant writing topics.

Appropriate and Flexible Scaffolding. Participants felt the digital writing planning component was not only intuitive, but would also meet the needs of a wide variety of students and learning styles. Presented with the interface without any prior explanation, participants not only understood how to interact with the tool, but also immediately

recognized the integrated graphic organizers (e.g. story timeline) and writing elements (e.g. Exposition, Conflict, Climax, Resolution), indicating a high level of intuitiveness. Additionally, the planning component's combination of text and visual elements appealed to multiple learning modalities (Gardner, 1983). One student appreciated that the tool was *"like doing a web [planning diagram]. I love doing those...I'm a very visual person, so that's probably why I like it."* At the same time, students who prefer text-based planning (e.g. outlines) felt the interface was *"a lot like an outline."* Furthermore, several students who typically prefer to plan their writing on paper were drawn to the digital planning tool: *"I prefer paper...and if [my planning work] were on paper, I'd do something like that."* Similar to the idea of "mining memories" discussed previously (Atwell, 2002), another participant pointed out that Sparkfolio would allow her to maintain a bank of usable writing ideas that is always accessible: *"sometimes you don't want to [plan] on paper, but this keeps track of it—and so you could do it like a week beforehand and then come back to it and add more so I think it's really convenient."*

Finally, students believed the overall planning workflow would effectively scaffold their writing planning without creating unnecessary steps for them. Students who prefer detailed writing plans appreciated the ability to do so in the tool. At the same time—consistent with (Berninger et al., 1996; Burtis et al., 1983; McCutchen, 1995)—many participants shared that they prefer not to construct detailed prewriting plans. One admitted: *"I don't like to prewrite. I've never prewritten."* In response to this, another added: *"I just write out [lists of] ideas."* A third student shared that once she has a basic plan (a list of 1-2 words for each idea to include), *"I just start writing."* Students admitted that successful writing necessitates at least some level of planning (*"You need*

to have somewhere to begin rather than just staring at a blank piece of paper”) but instructors often require them to write out detailed outlines they feel are somewhat a waste of time; if they already know what they are going to write and feel confident about their ideas, they believe their time would be better spent on writing a draft: *“You don’t want to make [students] fill out extra details if they’re just ready to start writing.”* Accordingly, asked when a user ought to be “finished” with a Sparkfolio writing plan and move on to draft writing, students unanimously answered: *“when you want to be.”* *“Everyone is different,”* said one student, *“so if you feel confident enough, you should be able to just start writing.”*

Design Implications

Overall, participant feedback indicated that the initial mockup: a) was intuitive; and b) provided both appropriate and flexible scaffolding for a wide variety of students and strategies. Thus, as participants were enthusiastic about both the playing cards and planning components, the initial Sparkfolio design approach was validated and was implemented in a fully functional iteration of the tool, Sparkfolio 1.0.

Sparkfolio 1.0

The design work culminated in the implementation of Sparkfolio 1.0, an online tool that reads data directly from users’ authenticated Facebook, Twitter, and Instagram accounts and—as outlined above—suggests their social media data as possible writing topics in an interface similar to a playing card game, with each social media post, image, friend/follower, or location represented as a “card.” Chosen cards can then be arranged in a planner, where users can add details prompted by research-based organization

questions. Completed plans can then be used while writing a first draft. (Chapter 2 provides further details on the implementation of Sparkfolio 1.0.)

Research Questions

As stated above, the first aim of this work was to create a first-of-its-kind social media based prewriting tool that addresses adolescents' cognitive and affective writing needs. Furthermore, once Sparkfolio 1.0 was implemented, the second objective of this work was to evaluate its effectiveness and contribute initial findings in the area of social media based prewriting. Accordingly, a study was conducted in a high school classroom to investigate of Sparkfolio 1.0's cognitive effects (via a writing quality measure) and affective effects (via a writing motivation measure).

Research Question 1

Given that Sparkfolio 1.0 was designed and developed based on empirical research and in cooperation with instructors and students, of primary interest was whether Sparkfolio 1.0 was ultimately an effective intervention in terms of writing quality and writing motivation. Hence, this study's **first research question** was:

“Does the use of social media data as inspiration for writing during the prewriting process improve adolescents' writing quality and writing motivation in comparison to those who do not?”

Due to Sparkfolio's applied research base and the enthusiastic support from students and instructors during its design process, it was hypothesized that using personal data to select and develop writing topics would, in fact, improve participants' writing quality and motivation in comparison to those who did not.

Research Question 2

Additionally, the collaborative nature of social media allows content creation and curation by multiple individuals who can: a) “tag” and mention each other; b) comment on and “like” each other’s content; and c) re-share each other’s content. This calls the scope of “personal” data into question. While social media posts and content authored by an individual are personal by nature, posts and content authored by friends and others in that individual’s social network may also be considered “personal” if that individual has been mentioned, has commented on or “liked” it, or has re-shared it. With this in mind, this study’s **second research question** investigated the viability of using self-authored social media post data within Sparkfolio 1.0 versus using data authored by others:

“What are the differences in writing quality and writing motivation between adolescents who use self-authored social media data as inspiration for writing during the prewriting process and those who use social media data authored by their friends during prewriting?”

Given Sparkfolio’s design and the inherently personally relevant nature of self-authored data (especially relative to data authored by others), it was hypothesized that participants who used their own personal data would have greater gains in writing quality and writing motivation than those using their friends’ data.

The method that was used to investigate these two research questions is provided in the following chapter.

CHAPTER 2

METHOD

Overview of Experimental Design

This study investigated two research questions (see Chapter 1) in a three-group experimental design with two dependent variables (writing quality and writing motivation) and a single factor—Planning Mode—which had three levels: a) planning ideas for a writing piece while reviewing *one's own* social media data with Sparkfolio, b) planning ideas for a writing piece while reviewing *one's friends'* social media data with Sparkfolio; and c) planning with neither social data nor Sparkfolio. Writing quality was measured using the Arizona state-adopted Holistic Six Traits Rubric (“Assessment: AIMS Writing,” 2013) and writing motivation was measured using the Writing Dispositions Scale (Piazza & Siebert, 2008). 46 high-school student participants were randomly assigned to the three conditions with the provision for an equal amount of participants in each condition. To measure writing quality, participants were asked to complete three personal narrative writing pieces: a) a pretest, during which no participants used Sparkfolio; b) a first treatment narrative, during which participants wrote according to their assigned conditions; and c) a second treatment narrative, during which participants again wrote according to their assigned conditions. The second treatment narrative also served as the writing quality posttest. To measure writing motivation, participants took a pretest and posttest of the Writing Dispositions Scale (Piazza & Siebert, 2008). To investigate the intervention's impact, pre/posttest difference scores for both writing quality and writing motivation were calculated for use in four *a priori* orthogonal contrasts corresponding to the study's research questions. These

analyses were supplemented with: a) a series of multiple regression analyses to explore whether any additional factors such as gender, social media usage, and usage of Sparkfolio itself had any moderating effects on the dependent variables; and b) various qualitative analyses, including open response items regarding Sparkfolio and conferences with participants. The following sections describe this study's participants, variables, design, procedures, and analysis.

Participants

Participants in this study were Arizona public high school English students (aged 16-17) whose school is situated in a fairly affluent southwestern suburban area, with 5% free and reduced lunches. Approximately 2,900 students attend the school, 72% of which are white, 10% Hispanic, 9% Asian, 7% African American, and 1% Native American. Participants were recruited and sampled from two classes of approximately 60 11th grade students each (120 total). Both classes were sections of "American Studies," a blocked, two-hour class aimed at integrating the subjects of American History and English. The large class size is a result of combining two 30-student classes into a single, large classroom, and having a team of two instructors (an English instructor and a History instructor) in the classroom during the two-hour block. The course sections were neither remedial nor "honors" and the course was offered as joint fulfillment for both 11th grade English and American History course credits. From these two classes, a total sample of 46 students (28 females, 18 males) agreed to participate in the study. Selection was based purely on student/parent interest in study participation. The mean age of participants was 16.28 ($SD = .46$), with 33 16-year-olds and 13 17-year-olds.

It should also be noted that—based on results from Arizona’s Instrument to Measure Standards (AIMS) standardized writing test—the school site tends to score above the state average in writing (“Research and Evaluation: AIMS Assessment Results,” 2014). For example, while in 2013 the school was 91% proficient in writing, the state average writing proficiency was 56% (Arizona Department of Education, 2013; “Research and Evaluation: AIMS Assessment Results,” 2014).

Technology Implementation – Sparkfolio 1.0

As discussed in Chapter 1, students in the participatory design focus groups responded positively to the initial digital mockup of Sparkfolio. As a result, the “card” approach to idea suggestion and the graphic organizer approach to story planning were implemented in a fully functional version of Sparkfolio (1.0). The following sections first describe the chosen writing genre for Sparkfolio 1.0 and then outline a typical workflow.

Writing Genre Focus

Rather than attempting to design a prewriting tool for multiple genres before validating it with a full pilot, it was decided that Sparkfolio 1.0 would be aimed solely at helping users prewrite for “personal narrative” compositions. (In K-12 education, “personal narrative” is a commonly used term for an autobiographical story intended to entertain one’s audience.) Focusing on a single writing genre not only simplified the design process, but also minimized the complexity of a first evaluation of the system.

While emphasis in modern high school classrooms is often placed on argumentative writing, the personal narrative genre was selected for three reasons. First, research indicates that personally relevant writing is often a potent starting point for boosting student confidence in their writing, as demonstrated by the results of the

Writer's Workshop and similar models (Atwell, 1998, 2002; Calkins, 1994; Harrison, 2002; Nelson, 2000), ultimately leading to confidence and success in other writing genres. Second, the personal narrative genre naturally lends itself to integrating social media data, the content of which is typically autobiographical. Finally, while argumentative writing is championed in formal educational settings, the ability to effectively tell a story about oneself and personal experiences is also a powerful life skill, with useful applications such as discussing one's work experiences in a job interview or even as anecdotal support within an argument.

Hence, Sparkfolio 1.0 was designed to leverage users' social media data as ideas for personal narrative writing, and the planning portion was structured specifically to aid in personal story construction.

Registration

Before beginning registration for Sparkfolio, users are asked to read the site's Terms of Service (see Figure 7). First, these terms explain that while Sparkfolio will be able to access any Facebook, Twitter, or Instagram accounts users connect to it, Sparkfolio will only *read* data—it will not save or store their entire datasets, and the data will always belong to the users. Second, it is explained that if a user chooses a certain piece of data (e.g. a Tweet or photo) as an idea for a writing piece, Sparkfolio *does* store information about *only* that piece of data (e.g. post date, location, people tagged). Third, users are made aware that because Sparkfolio was created for research purposes, researchers will be able to view *only* the story plans they create—putting users in complete control over the content shared with researchers. In doing so, users' names and identities (as well any other people mentioned or shown in their data) will be kept

confidential. Users are informed that while the resultant story plans may be shared as examples in research papers, reports, and/or presentations, neither their names nor their friends names will be included, and any faces appearing in photos will be blurred. If users agree to these terms, they are then asked to complete a standard registration process, including entering a first/last name, email address, and password.

Connecting Social Media Accounts

After registration, users are then given the option to connect their Facebook, Twitter, and Instagram accounts. There are no requirements for account connection. Users may connect as many or as few accounts as they choose (although Sparkfolio must connect to at least one account to read social data and function properly). If users have multiple accounts on a certain platform, there is also the option to connect more than one account per platform. There is an icon for each of the three platforms (see Figure 8), each of which links to that platform's third-party application authentication page, allowing Sparkfolio to connect to the platform's API and to read the user's social data for use within Sparkfolio.

The data Sparkfolio reads varies by platform. Facebook data that Sparkfolio reads includes all of a user's status updates, photos, friends, and location check-ins, as well as any comments or "likes" they have generated on others' posts ("The Graph API," 2014). For Twitter, Sparkfolio reads a user's 3,200 most recent Tweets—a restriction of the Twitter API ("REST API v1.1 Resources," 2014)—including any images and locations posted in those Tweets. Additionally, Sparkfolio reads the people a user "follows," the most recent 800 Tweets in which the user is mentioned, the 20 most recent Tweets the user has "favorited," and the 100 most recent retweets by the user ("REST API v1.1

Resources,” 2014). Finally, for Instagram, Sparkfolio reads images posted by the user, the people the user “follows,” any posts the user has “liked,” and any locations included in posts (“Instagram API Endpoints,” 2014). While Sparkfolio reads all of the above data for any user who connects an account for each of the three platforms, an additional filter was applied for the purposes of this study to create the three experimental groups addressing the research questions. Thus, while Sparkfolio was granted access to all of the above for the purpose of collecting aggregate data on social media usage, the social data actually displayed for each user in this study varied depending on group assignment (see “Independent Variables” and “Assignment” sections below).

Idea Selection

Once users have connected their desired social media accounts, they are brought to a home screen, where they can click a red “Get Started” button to begin creating their first story plan (see Figure 9). Later, once users have created and saved several story plans, those saved plans are displayed in a “My Stories” section on the home screen, allowing users to open and revise them.

The Idea Card Interface

As the playing card analogy for idea suggestion was validated by participatory design sessions (see Chapter 3), this analogy was emphasized in Sparkfolio 1.0 with a green “felt” background meant to emulate a card “table” (see Figure 10). The cards themselves are also designed to emulate playing cards, with animated card flipping as they are dealt to the user, and a familiar red-and-white playing card pattern on the “backs” of cards when they are facedown. When cards are face-up, they are categorized with four “suits” as described in Chapter 3: text, images, people, and locations. Similar to

playing cards, each social data card includes an icon in the upper left and lower right of the card signifying that card's suit. The "text" suit (indicated by a "document" icon in the corner of the card; see Figure 11) includes any Facebook status updates or Tweets by the user. The "images" suit (indicated by a landscape "photo" icon) includes any photos or images posted on Facebook, Twitter or Instagram. The "people" suit (indicated by a head-and-shoulders person icon) includes any "Facebook friends" or people the user follows on Twitter and Instagram. Finally, the "locations" suit (indicated by a "pushpin" icon) includes any locations the user tagged in Facebook, Twitter, or Instagram posts. Cards are dealt to users randomly, without any filtering algorithm.

"Holding" and "Redrawing" Cards

The user is automatically dealt a five-card hand. By hovering over each card with the cursor, the user can view additional information about the card, including its source (Instagram, Facebook or Twitter), the date and time it was posted, and, if it is an image or person, any text posted as a caption for the image or the text content of the person's Twitter/Instagram/Facebook biography/profile (see Figure 12). A green text box at the top of the card reads "Flip to discard." If users choose not to use a card as a story idea, they can click that card, triggering an animation that flips the card facedown (revealing the red-and-white pattern). For each five-card hand, a user can choose to discard anywhere from zero to five cards—there are no limits or restrictions. Any cards that remain face-up are "held" and not discarded (similar to a game of poker).

At the bottom of the screen, there are three buttons: "New Hand," "Deal [X number of] Cards," and "Save and Continue" (see Figures 10 – 12). Clicking "New Hand" will replace all five of the cards (whether they are held/discarded or not) with five

new cards, and clicking “Deal [X number of] Cards” will replace only the discarded cards with new cards. Users can click “New Hand” and “Deal [X number of] Cards” as many times as they choose. While card games typically do impose limits on redraws, this lack of restrictions is in an effort to provide users as many opportunities as possible to find quality writing topics. Finally, after selecting 1-5 cards as a starting point for the writing piece, the user can click “Save and Continue,” which triggers a pop-up box asking the user to give the story a name and a description (see Figure 13). This creates an initial “saved” version of the story within Sparkfolio. As the user proceeds with story planning beyond this point, all actions are auto-saved, allowing the user to continue work on a planner during a later session from any device or browser with an Internet connection. Once users name and save a story, they are brought to a story planner where they can begin organizing and fleshing out the details of the writing piece.

Story Planner

The story planning component of Sparkfolio is informed by graphic organizers and story grammar elements that are traditionally used in writing instruction (Danoff et al., 1993; Freytag, 1900; Stein & Glenn, 1979; Tracy et al., 2009), and thus already familiar to students (Sadauskas et al., 2013).

Placing, Moving and Positioning Cards

The green felt “playing card” interface is extended to the story planning stage in an effort to encourage a feeling that users are now sorting their cards across a table to organize them. The screen is divided into five components to scaffold story building: 1) an Introduction; 2) a Conflict; 3) another Conflict; 4) a Climax; and 5) a Resolution. These were the same story elements that were included in the digital mockup of

Sparkfolio, and were subsequently validated by high school students in participatory design focus groups as both intuitive and self-explanatory based on their prior knowledge on story structure (see Chapter 1). Each of these five elements represents a horizontal row in the story planning interface (see Figure 14). Across the top of the screen are one to five thumbnails, one for each of the cards chosen by the user in the “idea card” stage as story starting points (see Figure 14). When one of these thumbnails is clicked, a box asks the user which of the five rows the card should be placed in—the Introduction, first/second Conflict, Climax, or Resolution (see Figure 15). This process is repeated until as many cards as the user chooses are placed in the planner. However, Sparkfolio does not require that all cards be placed in the planner as it is anticipated that during the planning process, some users may realize some card choices were more useful than others. This flexibility is ultimately aimed at aiding users in creating story plans that are workable, rather than requiring unnecessary steps forcing them to include unnecessary selections.

Text Details

Once the desired cards have been placed in the story planner, users can add text to outline story details. The design of this feature was informed by established story grammar concepts and practice as described below.

Design Rationale. While high school students in the series of design studies indicated familiarity with story structure terminology coined by the Freytag (1900) model such as “exposition”, “rising action”, “climax”, and “resolution/denouement” (see Chapter 1 and Sadauskas et al., 2013), they also indicated that including only these components as planning aids is not always helpful. Consistent with (Brooks, 2012; De La Paz & Graham, 2002; Graham & Perin, 2007a; Upton et al., 2002; Vanderslice, 2002)

and the initial discussion with teachers and students (Sadauskas et al., 2013), students often need to be walked through writing planning step-by-step with detailed, direct procedures they can eventually internalize for self-regulation.

Adapting the “WWW/What = 2/How = 2” Model. Accordingly, to help users generate useful story details during the planning phase, Sparkfolio employed a modified version of the “WWW/What = 2/How = 2” story grammar strategy (see Chapter 1; Danoff et al., 1993; Harris & Graham, 1996). While the WWW/What = 2/How = 2 strategy has demonstrated effectiveness in improving the quality of both fiction and personal narrative writing among elementary and middle school students (Danoff et al., 1993; Graham, Harris, & Mason, 2005; Harris et al., 2006; Lane et al., 2008; Mason, Harris, & Graham, 2002; Santangelo, Harris, & Graham, 2008; Tracy et al., 2009), relatively few studies have explored the model’s potential with high school writers. This is likely due to the story complexity expected of high school students, who—as described by the English Language Arts Common Core Standards—are asked to create “well-structured event sequences” and to “sequence events so that they build on one another to create a coherent whole and build toward a particular tone or outcome” (“English Language Arts Standards, Writing, Grade 11-12,” 2014). The only question in the WWW/What = 2/How = 2 model that could account for these components is “What happens when the main character tries to do it?”, but it does not explicitly call for multiple events that culminate in a particular outcome (i.e. Freytag’s “rising actions” and “climax”; 1900). Because few empirically-justified story-structuring models for high school students exist, the decision was made to modify and expand the WWW/What = 2/How = 2 model for implementation in Sparkfolio to guide users in constructing stories

with a “progression of experiences or events” (“English Language Arts Standards, Writing, Grade 11-12,” 2014). To mirror the five idea cards that could potentially be used in the story planner, the WWW/What = 2/How = 2 items were organized into the five main components mentioned above: 1) the Introduction, 2) a first Conflict, 3) a second Conflict, 4) a Climax, and 5) a Resolution (see Appendix B). The Introduction included the “Who,” “Where,” and “When” questions and “What do the main characters want to do?” (with simplified rewording for easier readability in the application; see Appendix B), as well as “What happens when they try to do it *at first*?” This reframed question calls for the inclusion of an “initiating” or “precipitating” event—an event that sets the story in motion for subsequent events. This is actually the only one of the eight essential story components posed by Stein & Glenn (1979) that was not accounted for in the seven-item WWW/What = 2/How = 2 model (Danoff et al., 1993). Following the Introduction are a first Conflict and a second Conflict. Both Conflicts include two questions aimed at expanding the story’s plot into a series of events: a) “What do the main characters want to do *next*?” and b) “What happens when they try to do it?” This inclusion of the word “next” was intended to prompt users to insert multiple events and conflicts into their stories leading toward the climax (“English Language Arts Standards, Writing, Grade 11-12,” 2014), a quality regarded as essential to good storytelling (Seger, 1994; Tobias, 2011) and commonly referred to as the “rising action” in literature (Freytag, 1900) or the “second act” in drama/screenwriting (Field, 1982). In this same vein, a fourth story component—the Climax—is named in Sparkfolio and includes the question “What is the most exciting part of the story, when we find out whether the characters do what they want to do?” As the Climax is widely regarded as the most vital story element—the one

upon which a story hinges (McKee, 1997; Tobias, 2011)—it was a priority to explicitly include as a prompt for story planning in Sparkfolio. The fifth and final story planner component is the Resolution, which includes the two “How” questions from WWW/What = 2/How = 2: a) “How does the story end?”; and b) “How do the main characters feel?” This adaptation not only made the WWW/What = 2/How = 2 framework more suitable for high school students, but also ensured it aligned with the Common Core Standards for writing stories and personal narratives (“English Language Arts Standards, Writing, Grade 11-12,” 2014).

Adding and Modifying Text Details. After the idea cards have been placed in the story element rows as desired, the user can click the “Add Details” button on the left (see Figure 16), which toggles a box containing the adapted WWW/What = 2/How = 2 questions for that story element. For example, when “Add Details” is clicked for the Introduction row, the five questions pertaining to the story’s introduction are included (see Figure 17). Under each question is an “Add another detail” link which, when clicked, reveals a text box where the user can type details pertaining to that question. Aside from these scripted questions, users are also able to include any additional details they choose via an “Other Details” item included at the bottom of the box. Each detail is auto-saved as it is typed. Clicking an “X” in the upper right corner of the box returns the user to the main story planner, where the new typed details appear as additional “cards” in the corresponding row. Each card includes the story question on the top and the completed details on the bottom (see Figures 18-19). This process can be repeated until all desired story details are completed. Additionally, simply clicking these cards allows the user to modify their text details. Similar to the limitless redrawing in the idea cards

portion of Sparkfolio, the story planner does not require any particular amount of details completed (or number of words). This was in an effort to provide flexible, scaffolded planning. The story construction questions offer opportunities for struggling writers to create detailed story plans, yet more advanced writers who are “ready to start writing” once they have a basic plan are not forced to complete unnecessary steps (see “Participatory Design Sessions,” Chapter 1).

Exporting the Writing Plan

Once users decide they are finished with a story plan, they can refer to the web version of the story plan as they write a first draft. However, if they choose, they can also click the “Export” button in the upper right, which will automatically generate a PDF version of the story planner, which includes the five story components (Introduction, first and second Conflict, Climax and Resolution) as well as the text of every story detail question, paired with the user response. Because this exported version shrinks images and uses a smaller font than the Sparkfolio interface, it provides an “outline” of sorts that can be printed or saved for quick reference while writing, with minimal physical page-turning or digital scrolling, reducing split attention (Chandler & Sweller, 1992; Clark, Nguyen, & Sweller, 2006).

Returning to Story Plans on the Home Screen

As described above, story plans are auto-saved every time a detail is added or changed, allowing users to continue working on story plans anywhere, on any Internet-enabled device. Once a user logs in, all saved story plans are displayed on the Home screen under a “My Stories – stories you’ve already created” heading and can be reopened for reference or modification.

Independent Variable: Planning Mode (Three Levels)

As the research questions concern social media's influence in planning writing, the study's primary **independent variable** was **Planning Mode**, which had three levels (whether participants used *their own self-authored* social media data with Sparkfolio during prewriting, *social media data authored by their friends* with Sparkfolio during prewriting, or *neither social data nor Sparkfolio* during prewriting), resulting in three experimental conditions:

- **Treatment 1 – “My Media”:** Planning with Sparkfolio using *one's own* social media posts and activity (posts, photos, and content *authored by the Sparkfolio user*)
- **Treatment 2 – “Network Media”:** Planning with Sparkfolio using social media posts and activity *authored ONLY by friends/connections/followers—NOT the Sparkfolio user*. However, friends' data was filtered to only include content the Sparkfolio user had previously interacted with (e.g. by “liking,” “favoriting,” or “retweeting” or posting a comment).
- **Control:** Planning without Sparkfolio and without any social media data. Instead, these students were asked to prewrite using whatever methods with which they were most comfortable.

Because this study's research questions dealt only with the prewriting portion of the writing process, participants were asked to complete the subsequent portions of the writing process however they normally would. In the case of the particular classrooms participating in this study, the standard writing procedure was for students to: 1) receive writing assignments/prompts in class; 2) spend whole-class time discussing instructions

for clarification; 3) have some in-class work time—typically 20-30 minute blocks—to begin prewriting and drafting; and 4) complete the rest of their work outside of class—including drafting, revising, writing a final draft, and submitting that final draft to a digital assignment management system. Accordingly, Planning Mode as described above was simply integrated into the standard procedure for the participating classrooms, essentially inserting the three conditions as the in-class prewriting time and having students complete their work in the same way they would for any other class writing assignment.

Teacher and Researcher Roles in Intervention

In a tertiary meta-analysis, Archer et al. (2014) identify three major factors contributing to the effectiveness of ICT interventions in schools: a) teacher training and on-site technical support for new/unfamiliar technology; b) fidelity of implementation; and c) whether the intervention was teacher-delivered or researcher-delivered. Essentially, highly effective interventions were associated with having instant, in-person support on hand for technology in the event of technical issues, and that both the fidelity of implementation and overall intervention effectiveness are higher when a researcher delivers the intervention as opposed to a teacher.

Accordingly, because this study involved using newly-designed technology (Sparkfolio 1.0) that was unfamiliar to both participants and the cooperating teacher, the researcher was on-site and in the classroom for the entirety of the experiment to address any technology questions or issues. More importantly, this also provided the researcher the opportunity to deliver the intervention himself from beginning to end, thus ensuring

fidelity of implementation. The participants' teacher was also present for the entire experiment, but served an auxiliary role as the researcher directed the study's activities.

Assignment

Participants were randomly assigned to each of the study's three conditions, with the provision that each condition would have an equal number of participants (approximately 15 per condition). Random assignment was administered by having all participants register for Sparkfolio as new users. As they registered, the first participant was assigned to the Control group, the second participant was assigned to the My Media group, and the third was assigned to the Network Media group. This pattern repeated as all participants registered and were assigned to the three conditions. This resulted in 15 "My Media" participants, 15 "Network Media" participants, and 16 "Control" participants.

Dependent Variables

This study's primary dependent variables were the changes in **writing quality** and **writing motivation** before and after the intervention, as described below.

Writing Quality

Overview

Writing quality was measured with a pretest-posttest design asking participants to write three personal narratives—a pretest narrative, a first treatment narrative, and a second treatment narrative (which also served as the posttest). Although the study participants produced three narratives, only the pretest and posttest writing samples were used for analysis for this study—primarily because it was of interest to see the effects of the treatment once participants had become familiar with Sparkfolio, which is more likely

to have occurred by the third narrative as opposed to the second narrative (which was the treatment groups' first experiences with the tool). Each personal narrative was 500-800 words in length. Participants were given one week to complete each of the three personal narrative writing assignments (see "Procedure" section below for details).

Discussion of Internal and External Validity

Participants were given time to work in class (particularly for prewriting according to their assigned conditions), and were then asked to complete their writing work for the study outside of class, including typing their work for digital submission to their teacher and the researcher. While completing their work outside of class may raise concerns regarding the research design (particularly the lack of a controlled environment afforded by an in-class, standardized-test type intervention), this approach was chosen and justified for several reasons. First, while a primary advantage of a standardized writing test environment is the ability to enhance internal validity, a problem lies in generalizing to real-world, everyday writing. Rarely—outside of a testing environment—is writing done in such a vacuum. While potential concerns for having participants write outside of class include: a) outside help on the assignment from family or friends, b) plagiarism, and c) the multitude of resources available via the Internet, it is argued that modern writing—in both academic and professional settings—does not restrict access to such resources. In fact, collaboration and the use of online resources are often encouraged. Furthermore, due to the curricular and time constraints associated with an English classroom (i.e. simultaneously addressing reading and writing standards with finite class time), in-person classroom time is often reserved for direct teaching and interactive discussion. Thus, because writing is by nature an individual activity, it is

common practice to ask students to do such work on their own, outside of class. For example, during this particular study, the cooperating teacher was somewhat bound by the school district's curriculum—she was teaching a literature unit required by the district and needed to keep students progressing through the unit to comply with an external curricular timetable. Similar to many of her colleagues, she regularly allocates portions of her class to either reading or writing instruction. Thus, during this research study, the class's customary writing time was dedicated to the study's activities and the customary reading time was dedicated to the predetermined reading curriculum. With all of the above in mind, it is argued that having participants work outside of class on their writing for this study actually enhances the real-world authenticity of its findings. If English instructors were to deploy Sparkfolio on a large scale, it is highly likely that it would be used in this manner—with limited in-class writing time and a majority of writing done outside of class, which would include full access to resources such as family, friends and the Internet. Essentially, this study's approach offers a glimpse at the potential effects of Sparkfolio and other applications like it if they were adopted in real high school classroom settings.

On an additional note, efforts were made to eliminate plagiarism as a potential confound by having all participants submit their final writing assignments to TurnItIn, an industry-leaning online writing management system which checks each student submission for originality against the vast collection of texts on the Internet and flags any potential instances of plagiarism ("TurnItIn - Our Company," 2014). With this in mind, all writing samples submitted by study participants were confirmed as original works by the TurnItIn system.

Assessment and Scoring

Participants' personal narratives were scored using Arizona's state-adopted Holistic Six Traits Rubric (see Appendix C; "Official Scoring Guide: Arizona's Instrument to Measure Standards - Holistic Rubric Based on 6 Traits of Writing," 2010), which measures various aspects of writing across a quantitative scale and is the same rubric used for evaluating writing in its standardized writing test, Arizona's Instrument to Measure Standards (AIMS). Originally developed in the 1980s by a national council of writing teachers in search of a versatile writing assessment model to guide instruction, the Six Traits model has since been established nationally as the gold standard for assessing K-12 writing ("About 6+1 Trait Writing," 2012).

The Six Traits themselves regard six different aspects of writing: a) Ideas and Content—essentially the topics and creativity of the writing; b) Organization—the writing's structure; c) Voice—the personality of the writing and its alignment with the writing's purpose; d) Word Choice—the use of vivid, descriptive, and appropriate language; e) Sentence Fluency—the writing's flow and cohesiveness; and f) Conventions—the writing's syntax, grammar, capitalization and punctuation (Spandel & Stiggins, 1996). Each of these Six Traits are typically scored on a scale from 1 to 6, with a score of 1 being the lowest quality for the given trait and 6 being the highest quality ("About 6+1 Trait Writing," 2012; Spandel & Stiggins, 1996). The 1-to-6 scale is considered to be an ordinal (and not interval) scale because the scores correspond to levels of mastery rather than a traditional grading scale (which usually involves a percentage of items completed correctly). For example, in Arizona, the AIMS Writing test has four ordinal categories signifying a student's level of mastery: a) "Falls Far

Below” the established standards; b) “Approaches” the standards; c) “Meets” the standards; and d) “Exceeds” the standards (“Assessment: AIMS Writing,” 2013). In terms of the Six Trait rubrics, a score of 1 or 2 on a given trait indicates that a student’s writing “Falls Far Below” the standards for that trait, a score of 3 indicates the student’s writing “Approaches” the standards, a score of 4 indicates the student’s writing “Meets” the standards, and a score of 5 or 6 indicates the student’s writing “Exceeds” the standards.

Traditionally, the Six Writing Traits approach involves scorers evaluating a given student writing piece for each of the Six Traits individually, resulting in a set of six scores for each writing piece (see Appendix D for the Six Traits Rubrics). However, prompted by other U.S. states who recently combined the Six Traits into a single, Holistic Rubric (particularly for standardized writing tests), Arizona adopted the Holistic Six Traits Rubric as its official writing assessment model for AIMS in Spring 2011 (“Assessment: AIMS Writing,” 2013). This holistic (and economical) approach to writing assessment has recently gained traction nationwide, particularly evidenced by the use of a holistic writing rubric as an evaluation tool for the writing portions of the initial versions of the Partnership for Assessment of Readiness for College and Careers (PARCC) tests—a set of exams aimed at addressing the Common Core State Standards (“About PARCC,” 2014, “Grades 6-11 - Condensed Scoring Rubric for Prose Constructed Response Items,” 2014). As the PARCC exams and/or others like them are poised to replace many state-created standardized tests during the next few years, it appears that scoring writing holistically is becoming the standard for writing assessment, at least for standardized testing.

It is also important to note that holistic scoring and trait-specific scoring are different by nature. Whereas holistic scoring considers a writing piece as a cohesive whole, the scoring of individual traits involves considering each trait independent of others. With this in mind, the mean score across the Six Traits for a given writing piece does not necessarily always equal its Holistic Rubric score. While—for instance—a relatively low score in Sentence Fluency may register when evaluating for that specific trait individually, it may not have as much weight when considering a paper holistically, as the interplay between other traits may supersede Sentence Fluency (or any other given trait) in importance.

For this particular study, a third-party English teacher with ten years of teaching experience scored all writing samples for this study using the Holistic Six Traits Rubric (see Appendix C; “Official Scoring Guide: Arizona’s Instrument to Measure Standards - Holistic Rubric Based on 6 Traits of Writing,” 2010). The teacher was well acquainted with the Holistic Six Traits Rubric as well as the individual rubrics for each of the Six Traits (“Six Trait Analytic Writing Rubric,” 2014; see Appendix D) and had used both as writing evaluation metrics for her own students for the majority of her career. Additionally, this teacher did not have any knowledge of the study’s purpose or research questions while scoring the writing, and all student names and identifiers were removed from the writing samples prior to scoring. Each writing sample was also given a coded name that did not indicate whether it was a sample from the pretest, first intervention, or second intervention in an effort to eliminate scoring order as a potential bias. Furthermore, in addition to the holistic scoring, the English teacher scored all writing samples for each of the individual Six Writing Traits (“Six Trait Analytic Writing

Rubric,” 2014), resulting in one holistic score and six trait scores for each writing sample. This was in an effort to determine whether the intervention impacted any of the Six Writing Traits specifically.

Writing Motivation

Writing motivation was measured using the Writing Dispositions Scale (or WDS; Piazza & Siebert, 2008), an 11-item instrument measuring affect toward writing that includes statements such as “I am willing to spend time on long papers,” “Writing is fun for me,” and “I always look forward to writing class,” and asks participants to choose from 5-point Likert scale options, ranging from “strongly disagree” to “strongly agree” (see Appendix E). The scale itself is the result of iterative development and validation from survey responses of over 850 students. Both an exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted, resulting in the 11-item instrument, which measures three constructs regarding students’ feelings toward writing: confidence, persistence, and passion (Piazza & Siebert, 2008). While originally developed for elementary and middle school students, the WDS was chosen for this study particularly because very few instruments regarding writing affect specifically for students at the high school level have been developed—a vast majority of the writing instruction literature involving high school participants solely investigates performance (i.e. writing quality measures). In contrast, much of the school-age affective writing scales in existence are designed for elementary level students. Among this prior work on writing motivation instruments, the WDS clearly stood out due to: a) its validity and reliability confirmed by its comprehensive factor analyses and large sample size; b) its 11-item brevity, providing a quick yet potent instrument; c) its identification of three

affective constructs for potential analysis—confidence, persistence, and passion; and d) the clear, self-explanatory wording of its 11 items, which—while originally written for younger students—seemed the most appropriate for high school students in comparison to all other considered scales.

This study’s participants completed the WDS twice—once as a pretest and once as a posttest. The WDS was administered using an online survey management system and took approximately ten minutes to complete.

Other Measures

Four additional data sources were used to supplement and provide further insight into the dependent measures: a) gender; b) logged Sparkfolio data; c) short conferences with participants; and d) a Sparkfolio Usability Survey.

Gender

Each participant’s gender was recorded for examination during data analysis to determine whether it had any bearing on the outcome variables. Gender was not taken into account during experimental assignment, but was an important consideration for all analyses as there were more female participants (28) than male participants (18).

Logged Sparkfolio Data

Logged Data from All Participants – Social Media Usage

As Sparkfolio is primarily fueled by its users’ own social media activity, it was of interest to explore whether the degree of participants’ social media usage may have impacted writing quality and writing motivation. Accordingly, because all participants needed to register for Sparkfolio for random assignment to the three conditions, they were also asked to connect and authenticate their social media accounts (Facebook,

Twitter, and Instagram) with Sparkfolio. This allowed Sparkfolio to log aggregate social media usage data from all participants' connected accounts (including the Control group). The rich, voluminous nature of social media data provided vast opportunities for analysis. However, in an effort to align this data with the study's dependent variables and effectively interpret their relationships, data collection and analyses were conducted through the lens of Sparkfolio's functionality, and thus was based on the "deck" of "idea cards" generated for each participant.

As outlined in the "Implementation" section above, Sparkfolio creates a "deck" of "idea cards" for each participant. Each single textual post/Tweet, image, person, or geolocation results in a single card created. This includes self-authored posts, posts in which the user is tagged or mentioned by others, and posts the user interacted with (via "liking," commenting, "favoriting," "retweeting," etc.). Accordingly, metadata collected for each card included: a timestamp, the social media source (Facebook, Twitter or Instagram), the suit (text, image, person, or location), the author (whether text or an image was posted by the user or by someone else in the user's network), and the type of interaction (e.g. a status update/tweet, a comment or response to another user, a tag, a retweet, a "like," etc.). Participants were informed—via written consent forms that were also discussed verbally—that while Sparkfolio would only store *content* they deliberately selected for story ideas, it would also collect this nonpersonal aggregate data about their social media usage. For example, while timestamps, post types, data sources, and authorship data were collected, the actual text/image/location/person content was removed from the aggregate data prior to its storage on Sparkfolio's server, leaving only numeric indications of social media usage for researcher viewing/analysis.

The primary interest in collecting aggregate social data was framed by this study's research questions. As the first research question regards whether the use of social media data during prewriting impacts writing quality and writing motivation, a relevant question about social data in particular is whether the amount of one's social data had any moderating effect on performance and motivation. Additionally, because the second research question asks whether the authorship of social data (self-authored vs. authored by others in one's network) has any effect on writing quality and motivation, it was of interest to investigate whether the frequency of self-authored posts affected writing quality and writing motivation. With this in mind, two social media usage variables were collected for analysis: a) the number of social data "cards" imported for a given user; and b) a user's mean authored posts per day.

Number of Social Data "Cards" Imported. The number of cards for each user provides an overall index for social media usage, as it essentially tallies all social media activity across multiple platforms, including one's number of: friends/followers, self-authored posts, comments, likes/favorites, retweets, mentions/tags by other users, etc. It is worth noting that Facebook, Twitter, and Instagram do each have their own limits for third-party application access. At the same time, these limits were consistent across all three experimental groups. Consequently, examining the number of social data "cards" imported provided a fairly accurate illustration of the degree of each participant's social media usage between groups. (NOTE: It is important to remember that while the same types of data were imported across all three groups, Sparkfolio filtered that data before it was presented to the My Media and Network Media groups, according to their assigned conditions.)

Mean Authored Posts Per Day. Since it was of interest to examine whether the degree of active post authorship (rather than primarily responding to others' posts via likes and comments) was a moderating factor for the writing quality and writing motivation results, the amount of self-authored posts between all groups prior to the experiment was also included in analyses. While Sparkfolio recorded the total number of self-authored posts in each participant's deck, this presented a problem in comparing users to each other. Based on each participant's usage (and API limits), the timespan of posts varied for each participant. For example, Twitter only grants third-party applications access to an authenticated user's most recent 3,200 posts ("REST API v1.1 Resources," 2014). If participants seldom authored posts (and especially if they had less than 3,200 total tweets), the timestamps for their imported tweets often ranged from several years ago to present. In contrast, participants who authored multiple tweets daily had only their 3,200 most recent tweets imported, which often meant—for heavier users—their timestamps ranged from less than a year ago to present. With this in mind, to standardize authored posts, the total number of each participant's authored posts imported was divided by the range in days of their social media data, resulting in the mean number of "authored posts per day" for each user.

Logged Data from Sparkfolio Users – Sparkfolio Usage

In addition to the social media usage data logged for all users, data specific to the treatment groups' Sparkfolio usage was also collected. This included: a) the number of times each user logged in; b) the total number of idea cards viewed (and the total number of *unique* cards viewed) by each user; c) the number of idea card redraws by each user; and d) the number of stories each user created. Furthermore, the story planners

themselves were logged, allowing: a) analysis of the amount of story details created by each user; b) an investigation of the number of words generated in planners by each user; and c) qualitative examination of the story planners themselves.

Student Conferences

While treatment group participants were given time to use Sparkfolio for prewriting in class, many participants did not finish prewriting and planning in class and also used Sparkfolio outside of class. Additionally, based on observations of participants using Sparkfolio in class, some participants seemed to progress to the planning portion of Sparkfolio much quicker than others. With this in mind, to ensure treatment fidelity (that all participants assigned to Sparkfolio groups used both the cards and planning portions of the tool), participants were asked to share their Sparkfolio plans for their writing with the researcher two days prior to the due date of each treatment narrative in a systematic manner. This allowed participants ample time to work with Sparkfolio for planning, and (because it was close to the assignment's due date) allowed the researcher to determine an accurate picture of the "final" planners and planning activity for each participant using Sparkfolio during the course of the study (in addition to the *post hoc* Sparkfolio logged data described above). During this short, one-to-two-minute conference, participants showed the researcher the Sparkfolio plan for the assignment they were working on. The researcher recorded how many of the five portions of the organizer had been completed or used. As some participants included a high level of detail in their planners and others simply used one-to-two-word reminders of details they already knew and remembered, a binary code was used in recording the completeness of participants' story plans. Sections with at least one detail were counted as "completed" and empty sections were counted as

“incomplete.” In addition to sharing their story plans with the researcher, participants were also asked for general comments about their experiences and processes using Sparkfolio during planning to qualify their progress on their story plans and garner feedback on Sparkfolio itself.

Usability Survey

To explore whether participants’ perceptions of Sparkfolio’s usability had any effect on writing quality or writing motivation, a usability scale was administered to each of the My Media and Network Media participants at the completion of the study (Control participants were excluded because they did not use Sparkfolio). The instrument was a modified version of the System Usability Scale (SUS), a widely-employed usability scale which consists of ten statements such as “I thought the system was easy to use” and “I felt confident using the system” and asks participants to rate the statements on a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree” (Brooke, 1996). The SUS was originally created due to a need for a general usability scale that could be used to evaluate a wide range of systems against each other. Since its original development in 1986, the SUS “has become an industry standard, with references in over 1300 articles and publications” (“System Usability Scale (SUS),” 2014).

However, in implementing this instrument for this study, three of the scale’s statements were reworded to accommodate adolescent participants and facilitate their understanding (see Appendix F). For example, the item “I found the various functions in this system were well-integrated” was reworded to “I found that the features in this system were put together well” in anticipation that adolescent students might not fully

understand the technical terms “functions” and “well-integrated,” particularly within the same phrase.

The SUS items were supplemented with six additional open-ended questions. The first two questions addressed the two primary components of Sparkfolio—the idea cards and the story planner. A first question asked “How useful was the ‘cards’ part of Sparkfolio for coming up with writing topics?” and a second asked “How useful was the story planner in Sparkfolio for planning and organizing your writing?” (see Appendix F). The subsequent four questions regarded the system in general, including: a) what participants liked about Sparkfolio; b) what they disliked; c) any difficulties they had while using it; and d) suggestions for improving the system. This instrument was used to provide additional insight into participants’ experiences while using Sparkfolio and to potentially explain any variances in writing quality and writing motivation as well as to aid in qualifying any outliers resulting from usability issues.

Procedure

Study activities took place near the end of the Fall 2013 semester, over the course of five weeks in the two participating classrooms, with each week consisting of five days (each including a one-hour class session). These activities are summarized in the following table and explained in detail below.

	Day 1	Day 2	Day 3	Day 4	Day 5
WEEK 1	WDS Pretest	Writing Pretest – Prewriting & Drafting	Writing Pretest – Drafting	Writing Pretest – Revising	Writing Pretest – Revising & Final Draft
WEEK 2	Writing Pretest Final Draft Turned In			No School – Holiday	No School - Holiday
WEEK 3	Experimental Assignment & Sparkfolio Tutorial	Treatment Narrative 1 – Prewriting & Drafting	Treatment Narrative 1 – Drafting	Treatment Narrative 1 – Revising	Treatment Narrative 1 – Revising & Final Draft
WEEK 4	Treatment Narrative 1 Turned In	Treatment Narrative 2 – Prewriting & Drafting	Treatment Narrative 2 – Drafting	Treatment Narrative 2 – Drafting	Treatment Narrative 2 – Revising & Final Draft
WEEK 5	Treatment Narrative 2 Turned In; WDS Posttest; Complete SUS				

Week 1 – Pretests

Day 1

Participants were issued their study ID numbers, which would replace their names on all study materials and thus remove identifying information from study data prior to analysis. Next, before participants had any exposure to or knowledge of the study’s activities and supporting technology, the Writing Dispositions Scale (WDS) was administered as an online survey to establish a writing motivation baseline for each participant. This survey took participants approximately ten minutes to complete.

Day 2

Participants were instructed to write a 500-800 word personal narrative in response to the following prompt: *“Tell a true story about a time you faced a challenge.*

Include details about the setting (time and place), what the challenge was, how you dealt with the challenge, and whether or not you overcame the challenge in the end.”

Participants were asked to prewrite, draft, revise, and complete a final draft of their narratives, due at the beginning of Week 2. (This writing sample would serve as each participant’s writing quality pretest.) After discussing the assignment’s instructions as a group for clarification, participants were given the remainder of the class session (approximately 20-30 minutes) for prewriting and drafting their work.

Day 3

Due to the curricular constraints discussed in the Writing Quality section above, the Day 3 class session was primarily focused on a reading unit. However, five minutes of the session were dedicated to reminding students about the pretest writing assignment, which needed to be completed outside of class. Participants also were encouraged to use all portions of the writing process (rather than writing a single draft and turning it in), and were urged to complete a first draft by the end of Day 3, thus allowing time for revising before the due date.

Day 4

Similar to Day 3, the class session was focused on reading, but a five-minute in-class discussion emphasized the writing assignment’s due date and reminded participants that they ought to have completed their first drafts the previous day, and should now be revising their work outside of class.

Day 5

Five minutes in class were spent reminding participants of the writing pretest’s due date at the beginning of Week 2. The cooperating teacher gave instructions for

formatting their work (e.g. font, spacing, etc.) and submitting it to TurnItIn. These instructions were not new to students—they were the established formatting and digital submission instructions required for all previous writing in the course, and simply a reiteration of procedures the participants were accustomed to.

Week 2 – Pretest Submission and School Holiday

Day 1

Participants submitted final drafts of their writing pretests to TurnItIn for both teacher and researcher review.

Days 2–5

Due to a holiday (Thanksgiving), school was not in session for Days 4-5, and many participants had plans to leave town as early as Days 2 and 3. It was also assumed that beginning a new treatment narrative just before a holiday and asking students to write during a school break would likely impact the treatment fidelity as well as overall writing quality and motivation. This resulted in agreement with the cooperating teacher that study activities would resume in Week 3, after the school holiday.

Week 3 – Experimental Assignment, Sparkfolio Tutorial, and Treatment Narrative 1

Day 1

Participants registered for Sparkfolio and granted Sparkfolio permission to access the social media accounts of their choice as described above. During this process, participants were also randomly assigned to the three experimental conditions. To determine whether participants would be using Sparkfolio or not, they were asked to click a “Get Started” button. Participants assigned to the *Control* condition were shown the following message:

“You have been randomly chosen as a student who will not use Sparkfolio during this study. However, please be sure to connect your social accounts if you haven’t already. Although you won’t be using Sparkfolio for this study, you will have an opportunity to use it once the study is over.”

When participants assigned to the two *treatment* groups clicked “Get Started,” they were brought into the full versions of Sparkfolio for their respective conditions. The researcher then introduced these treatment group participants to Sparkfolio with a tutorial.

Treatment participants were not informed that there were My Media and Network Media conditions, but were informed that the idea cards they would be seeing in Sparkfolio could potentially come from their own social media data and their friends’ social data.

Treatment participants then practiced planning a writing piece by drawing and selecting idea cards and then using them to populate the story planner and add details. During this time, participants in the Control group did not use Sparkfolio, but practiced whatever prewriting strategies they normally use.

Days 2-3

Participants were instructed to write a draft of a 500-800 word personal narrative in response to the following prompt: *“Think about a special moment in your life. Write a story about what happened. Include details about the setting (time and place), events leading up to that moment, and what made it special.”* Participants were asked to prewrite, draft, revise, and complete a final draft of their narratives, which would be due at the beginning of Week 4. In doing so, they prewrote and planned their writing according to their assigned conditions. Treatment participants were provided with computers and two 20-30 minute work sessions (one during Day 2 and one during Day 3)

to use Sparkfolio for prewriting, while Control participants used that time to prewrite without Sparkfolio. In addition, treatment participants were told they were free to use Sparkfolio beyond these sessions and outside of class if they chose. It is also important to note that all participants received the adapted WWW/What = 2/How = 2 story grammar questions (see above and Appendix B) on a paper handout and were encouraged to use them to plan, draft and revise their writing. As these story grammar questions were implemented in Sparkfolio, their inclusion on the paper handout was in an effort to provide all participants (particularly the Control group) with the same story planning framework and thus measure the effects of the Sparkfolio tool itself, holding the adapted WWW/What = 2/How = 2 questions constant.

Similar to Week 1, all participants were urged to finish a first draft by the end of Day 3 to allow revising time before the due date. Participants were also told that the researcher would be asking to see their Sparkfolio story plans during class on Day 5, and to be sure that they were using Sparkfolio accordingly.

Day 4

Participants were provided with a five-minute in-class reminder: a) that by this time they ought to be finished with a first draft and revising their work however they were most comfortable and using the adapted WWW/What = 2, How = 2 questions as a guide; b) about the assignment's due date; and c) that during class on Day 5 the researcher would be looking at their Sparkfolio story plans.

Day 5

The researcher held one-to-two-minute conferences with each of the treatment group participants, asking to see their Sparkfolio story planning work. As described

above, the researcher recorded how many of the five story organizer sections had been completed, and asked participants for general comments about their experience using Sparkfolio, both to qualify their progress on their story plans and for usability feedback on Sparkfolio itself. Additionally, participants were reminded: a) that they should be finished revising and working on final drafts of their writing; b) about the assignment's due date; and c) instructions for submitting their work digitally to TurnItIn.

Week 4 – Treatment Narrative 2

Day 1

Participants submitted final drafts of their first treatment narratives to TurnItIn for both teacher and researcher review.

Days 2-3

Participants were instructed to write a draft of a 500-800 word personal narrative in response to the following prompt: *“Think about a time you will never forget. It doesn’t necessarily need to be a huge event—just something memorable like a fun moment with friends or family, a new experience, or a challenge you faced. Tell about what happened from beginning to end, including details about the setting (time and place), and what made the moment memorable.”* This writing assignment served as the writing quality posttest. Similar to the process in Week 3, participants were asked to prewrite, draft, revise, and complete a final draft of their narratives, which would be due at the beginning of Week 5. Again, they prewrote and planned according to their assigned conditions, and treatment participants were provided with computers and two 20-30 minute sessions (one during Day 2 and one during Day 3) to use Sparkfolio while Control participants used that time to prewrite without Sparkfolio. Again, all participants were given a paper

handout including the adapted WWW/What = 2/How = 2 story grammar questions and were encouraged to use them while planning, writing, and revising their work. Treatment participants were again told they were free to use Sparkfolio beyond these sessions. Again, participants were urged to complete a first draft by the end of Day 3, allowing for revising time. Finally, participants were told that the researcher would again ask to see their Sparkfolio story plans during class on Day 5.

Day 4

Similar to the previous week, participants were reminded: a) that they should be finished with a first draft and revising it—using the adapted WWW/What = 2/How = 2 questions in particular; b) about the assignment's due date; and c) that the researcher would ask to see their Sparkfolio story plans during class on Day 5.

Day 5

As in the previous week, the researcher again conferenced with all treatment group participants regarding their Sparkfolio story plans. In addition, participants were reminded: a) that they should be finished revising and working on final drafts of their writing; b) about the assignment's due date; and c) instructions for submitting their work to TurnItIn.

Week 5 – Posttest Completion

Day 1

Having submitted final drafts for their third and final writing assignment, all participants completed a posttest of the WDS, which was administered online and served as the writing motivation posttest. This posttest took participants approximately ten minutes to complete. Additionally, after completing the WDS posttest, participants in the

two treatment groups completed the Sparkfolio Usability Survey, which was also administered online and took approximately 15 minutes to complete.

Implementing a Social Media Application in a School Setting

The explosive popularity of social media among teenage students has resulted in many schools and districts blocking social media sites on their school Internet connections in an effort to reduce both student distraction and inappropriate interactions while at school. These concerns are justifiable, and this work does not necessarily argue for full, unrestricted student access to all social media sites while at school. However, student interest in social media is undeniable, and the design and development of Sparkfolio was an effort to provide access to the personally relevant content of students' social media data while still keeping them focused on the writing task at hand within an online prewriting environment (and not having them freely browse social media sites, which would likely steer them off task).

However, an obvious obstacle to Sparkfolio's implementation in schools is the need for access to Facebook, Twitter, and Instagram. Because Sparkfolio must authenticate with these sites and read data directly from them, using Sparkfolio on a connection prohibiting access to them is problematic. While work on a subsequent iteration of Sparkfolio will include support for addressing this issue (and will be discussed in Chapter 4), Sparkfolio's first deployment for this study required special arrangements with the cooperating school district's technology department.

The school site where this study was conducted did, in fact, have restricted social media access on their student Internet connections. All school computers and devices used by students required them to log in with their own district-issued accounts, and a

district Internet filter blocked students from visiting both Facebook and Instagram. (Interestingly, students did have full access to Twitter.) As this study had previously been approved by executive members of the school district, a request was made to the district technology department to either: a) allow unrestricted access to Facebook and Instagram for only students involved in the study; or b) allow a predetermined set of student computers to have full, unrestricted Internet access, strictly and only for the purposes of the study. For both of these possibilities, it was emphasized that both the teachers and the researcher would heavily monitor students to ensure they were on task and using Sparkfolio rather than visiting other websites.

The latter of the options was agreed upon, and in cooperation with the district and school site technology professionals, a single cart of 45 student laptops was granted full, unrestricted Internet access for the duration of the study, with the provision that the laptops would only be used by participants (strictly for the purposes of the study) during class with teacher/researcher supervision, and that the laptops would otherwise be locked in the cart and unused by other students and teachers.

It is acknowledged that an undertaking such as this would not be a realistic request in many school settings and thus not necessarily scalable. As mentioned above, continued design work on Sparkfolio aims to address this issue of accessing sites commonly blocked on student Internet connections. At the same time, this work does aim to question the complete restriction of social media sites in a school setting. It is argued (particularly via this study's findings; see Chapter 3) that thoughtfully designed applications leveraging social media for educational purposes used under the supervision

of an instructor have the potential to engage students in new and exciting ways, presenting opportunities for gains in learning and motivation.

Analysis

Dependent Variables

The primary analyses consisted of four *a priori* orthogonal contrasts (two for writing quality and two for writing motivation) aimed at addressing this study's two research questions. These contrasts held Planning Mode as a between-subject factor. For two contrasts, the change in writing quality (from pretest to posttest) was the dependent variable, and for the other two contrasts, the change in writing motivation (from pretest to posttest) was the dependent variable.

Difference Calculation

For overall writing quality, difference scores were computed by simply subtracting each student's Holistic Six Traits Rubric score on the pretest from the posttest. Similarly, for the individual Six Traits, the pretest for each individual trait was subtracted from the trait's posttest, resulting in six difference scores. For writing motivation, difference scores were computed as follows. First, because the 11-item WDS includes ten "positive" statements regarding writing (e.g. "Writing is fun for me" and "I would like to write more in school") and one "negative" statement ("I am not a good writer"), participants' responses for this negative item were reverse-coded for both the pretest and posttest. Next, each participant's responses for the 11 items were added together for a total WDS pretest score and a total WDS posttest score for each participant. These totals were then both divided by 11 to determine each student's mean scaled response for the pretest and for the posttest. Finally, the change in writing motivation was

calculated by subtracting each participant's mean scaled pretest response from his/her mean scaled posttest response.

A Priori Orthogonal Contrasts

For each of the two dependent variables, two *a priori* orthogonal contrasts were conducted (for a total of four contrasts) according to this study's research questions.

Research Question 1: Treatment Groups vs. Control Group. The first research question regards whether participants who used Sparkfolio demonstrated more improvement in writing quality and writing motivation in comparison to those who did not use Sparkfolio. Accordingly, a contrast for the change in writing quality and a contrast for the change in writing motivation were conducted with the following null hypothesis:

$$H_0: \left(\frac{\mu_{\text{My Media}} + \mu_{\text{Network Media}}}{2} \right) - \mu_{\text{Control}} = 0$$

Research Question 2: My Media Group vs. Network Media Group. The second research question asks whether participants who used Sparkfolio with their own self-authored social media data demonstrated more improvement in writing quality and writing motivation in comparison to those who used Sparkfolio with social media data authored by their friends. Thus, a contrast for the change in writing quality and a contrast for the change in writing motivation were conducted using the following as a null hypothesis:

$$H_0: \mu_{\text{My Media}} - \mu_{\text{Network Media}} = 0$$

Baseline Analyses

Additionally, to determine any between-group differences in writing quality and writing motivation prior to the treatment, two ANOVAs—both of which with Planning Mode as a between subject factor—were conducted. The dependent variable for the first ANOVA was the writing quality pretest score, and the second was the mean scaled response from the writing motivation pretest (see above).

Additional Writing Quality Analyses: Six Writing Traits

To supplement the overall writing quality analysis afforded by the Holistic Six Traits Rubric, difference scores (the change in score from pretest to posttest) for each of the Six Writing Traits were also analyzed. To explore baseline between-group differences, a series of six ANOVAs were conducted with Planning Mode as a between-subject factor and the six trait-specific pretest scores as the dependent variables. Next, two *a priori* orthogonal contrasts (pertaining to the two research questions) were conducted for each of the Six Traits, for a total of 12 contrasts.

Additional Writing Motivation Analyses: Three WDS Constructs

As the WDS measures three constructs—confidence, persistence and passion (Piazza & Siebert, 2008)—additional analyses were conducted to determine any between-group differences regarding these constructs. First, for both the WDS pretest and posttest, mean scores for each construct were calculated. Each participant's "confidence" responses (items 1, 5, and 11, with item 5 reverse-coded as described above) were added together and divided by three for a mean scaled confidence response. The same procedure was applied to the four "persistence" items (3, 4, 7 and 10) and the four "passion" items (2, 6, 8 and 9). Next, difference scores were calculated for each construct by subtracting

these mean scaled pretest scores from the mean scaled posttest scores, resulting in scores representing each participant's change in confidence, change in persistence, and change in passion during the course of the study. Additional *a priori* orthogonal contrasts (as outlined above) were conducted with experimental condition as a between-group factor, and the change in confidence, change in motivation, and change in passion as dependent variables. Furthermore, a series of three ANOVAs was conducted, aimed at determining any baseline between-group writing motivation differences in terms of the three WDS constructs. For these analyses, Planning Mode was again the single between-subjects factor, and the dependent variables were the mean scaled pretest scores for confidence, persistence, and passion.

Multiple Regression Analyses

To explore whether factors such as social media usage or gender may have moderated results for the dependent variables, four multiple regression analyses were conducted, each one corresponding to the four *a priori* orthogonal contrasts—two addressing the first research question and two addressing the second research question.

Research Question 1: Treatment Groups vs. Control Group

Two multiple regressions were conducted in connection with the first research question—one with the change in overall writing quality as the dependent variable and one with the change in overall writing motivation as the dependent variable. For both analyses, the following independent variables were entered as potential predictors using the forward selection method:

- a) Gender (as a dichotomous variable—either female or male);
- b) Treatment (as a dichotomous variable—either treatment or no treatment);

- c) CardsImported (the total number of a participant’s social media “cards” generated by text, images, people, and locations via the Sparkfolio import);
and
- d) MeanAuthoredPerDay (the mean daily number of social media posts authored by the participant based on Sparkfolio import).

Research Question 2: My Media Group vs. Network Media Group

Another two multiple regressions addressed the second research question—again, one with the change in overall writing quality as the dependent variable and a second with the change in overall writing motivation as the dependent variable. Because these two analyses only included participants in the two treatment groups, variables related to Sparkfolio usage were added to the set of possible predictors, which included:

- a) Gender (see above);
- b) MyVsNetwork (a dichotomous variable—either My Media or Network Media);
- c) CardsImported (see above);
- d) MeanAuthoredPerDay (see above);
- e) TotalLogins (number of Sparkfolio logins by the participant);
- f) TotalCardsSeen (total number of idea cards shown to the participant in Sparkfolio);
- g) UniqueCardsSeen (number of unique cards shown to participant—same as TotalCardsSeen, but cards shown multiple times were counted as “1” rather than counting duplicate showings);
- h) Redraws (number of redraws of idea cards in Sparkfolio; each card replaced =

1 redraw);

- i) StoriesCreated (total number of story plans created by the participant);
- j) PlannerTotalDetails (the total number of nodes created on Sparkfolio story planners by the participant);
- k) PlannerTotalWordCount (total number of words used in Sparkfolio story planners by the participant); and
- l) MeanSUSFinal (the mean of scaled responses on the System Usability Scale; see below for details on coding and scoring).

Similar to the multiple regression analyses for the first research question, these variables were all entered as possible predictors for the change in overall writing quality and the change in overall writing motivation using forward selection.

Coding and Scoring the System Usability Scale (SUS). Because the survey included the System Usability Scale (SUS), the ten SUS items were first scored accordingly (Brooke, 1996). Responses to positively worded items such as “I think that I would like to use this system frequently” were coded as follows: a) strongly disagree = score of 0; b) disagree = score of 1; c) neutral = score of 2; d) agree = score of 3; and e) strongly agree = score of 4. These positively worded items included statements 1, 3, 5, 7, and 9. Next, responses to negatively worded items (e.g. “I found the system unnecessarily complex”) were reverse-coded: a) strongly disagree = score of 4; b) disagree = score of 3; c) neutral = score of 2; d) agree = score of 1; and e) strongly agree = score of 0. Negative statements included items 2, 4, 6, 8, and 10. Next, each participant’s total score for the ten items was then multiplied by 2.5 to obtain each participant’s total SUS score, resulting in a scale from 0 to 100, with 0 being the lowest usability level and 100 being

the highest (Brooke, 1996). However, it is important to note that SUS scores on this scale are not considered to be “percentages” of usability (“System Usability Scale (SUS),” 2014), but instead simply a score on an interval scale with a range of 100.

Because this SUS scoring can often be difficult to interpret, mean scaled SUS responses were also calculated, by taking the mean coded response across all ten items for each participant. As described above, positively-worded SUS statements (items 1, 3, 5, 7, and 9) were coded as strongly disagree = 0, disagree = 1, neutral = 2, agree = 3, and strongly agree = 4. Negatively-worded SUS statements (items 2, 4, 6, 8, and 10) were coded as strongly disagree = 4, disagree = 3, neutral = 2, agree = 1, and strongly agree = 0. With this in mind, mean scaled responses could then be placed on a scale from 0 (low agreement with usability) to 4 (high agreement with usability), a metric more conducive to interpretation. Accordingly, the *mean scaled SUS scores* were used in the multiple regression as the MeanSUSFinal variable (as opposed to the *final* SUS scores).

Qualitative Data

The following qualitative data sources were examined and iteratively coded for prominent themes and trends using Grounded Theory (Charmaz, 2003):

- a) the six *Open Response Items* from the Sparkfolio Usability Survey (cards, planner, likes, dislikes, difficulties, and suggestions for improvement); and
- b) notes from *Student Conferences*.

(Note: While the number of planner components completed by students were recorded during the Student Conferences, it was later determined that logged Sparkfolio data regarding the number of nodes added to story plans by each student would provide a

more reliable and detailed portrayal of Sparkfolio planner use. Consequently, only qualitative data from student comments were analyzed.)

The results of all of the above analyses are outlined in the following chapter.

CHAPTER 3

RESULTS

This chapter will first report general researcher observations while conducting the experiment. Then, to illustrate participants' use of Sparkfolio, two sample story plans from the study are presented. Next, results for the two dependent variables—the change in writing quality and the change in writing motivation—are provided, along with the results of a series of multiple regressions associated with this study's research questions. Also included are results from qualitative analyses of the open-response Sparkfolio Usability Survey items and from one-on-one conferences with participants who used Sparkfolio.

General Observations

During the course of the experiment, one particularly prominent observation was an overall interest in the assignments among all participants near the beginning of the study, but a decline in interest with each additional assignment. Consistent with the Writer's Workshop approach, participants were initially excited to write about personally relevant content of their choosing (Atwell, 1998, 2002; Calkins, 1994; Taylor, 2000). For instance, a participant in the Network Media group commented, *"I love these assignments because we get to write about whatever we want."* A My Media participant added, *"We never really get the opportunity to write about stuff we care about, so this is a nice change."* However, as the second and third personal narratives were assigned, participants' enthusiasm was not as high. Having just received the third assignment, a Control group participant shared, *"I feel like I already wrote about my best ideas in the other two [assignments]."* A Network Media participant remarked, *"This is kind of a lot*

of writing to do in just a few weeks.” Several other participants shared this sentiment—that writing three personal narratives in four weeks was more writing than they preferred. This may have been amplified by conducting the experiment near the end of the Fall semester, which not only included the Thanksgiving holiday, but also found participants balancing their writing assignments with end-of-semester studying and projects in preparation for grades closing and their final exams. As explained by a Network Media participant, *“It’s not a great time to have writing assignments because I have a bunch of tests I’m trying to study for.”* However, many other participants responded positively to the experiment. Both My Media and Network Media participants shared enthusiastic remarks about Sparkfolio (without being prompted) while using it in class, such as *“This is really cool!”* and *“I want to use this for my other classes.”* Even participants in the Control group appreciated the writing practice the experience was providing. One Control group student told the researcher, *“I know I’m not using Sparkfolio or anything, but I feel like I’m getting really good at narratives after writing a bunch of these [assignments].”* Although it is perhaps expected that adolescents’ interest in writing would diminish when asked to write multiple assignments in succession, it is possible that conducting the experiment near the end of a semester particularly contributed to this observation. While the results of the experiment imply that Sparkfolio positively impacted writing quality despite this waning enthusiasm (see “Writing Quality” below), it would be advantageous for future research to be conducted at a time in the school year that is further from the holidays and the end of a semester, to see if a similar effect is observed.

Sample Story Plans

To provide context for the results outlined later in this chapter and to illustrate Sparkfolio's capabilities, two sample story plans from the study are presented below—a first created by a My Media participant and a second from a Network Media participant.

My Media

A female My Media participant created the story plan shown in Figure 18 (names have been covered and faces have been blurred to protect identities). She shared in a one-on-one conference that while looking through her idea cards, she came across a picture of holiday food (see the image of Halloween cookies in the second “Conflict” row of Figure 18). Next, as she continued to search, she “*saw tweets about Thanksgiving*” [which was around the time of the study]. She then began “*thinking about Thanksgiving food, which reminded me of a Thanksgiving memory from a long time ago, before I even used social media*”—namely, a Thanksgiving when she and her father were hosting family members for dinner and ran out of food, resulting in eating Whataburger (the only place that was open) for their Thanksgiving dinner. Once she had this initial idea, she began fleshing out details using the story planner, first identifying the setting, characters, and situation (see the “Introduction” row in Figure 18), followed by the first conflict (running out of the only food left in the house—potatoes), a second conflict (attempting to find an open restaurant on Thanksgiving, when many businesses are closed), a climax (finding an open Whataburger), and a resolution (arriving home victoriously with food for the family). She then used this planner to write a humorous story about how—as she wrote in her narrative—having “*no food whatsoever*” resulted in “*piling into my dad’s car in search of a place that was open on Thanksgiving*” and ordering “*30 burgers*” at Whataburger,

which found its unsuspecting workers “*definitely caught off guard.*” Hence, it was not necessarily a single idea card that sparked her memory, but instead a progression of cards that resulted in her final idea, which she was then able to develop using the story planner. While the idea cards actually utilized in her story planner may not intuitively tell a story on their own, the iterative card shuffling and reflection illustrated by her process is precisely the type of “memory mining” that Sparkfolio was aimed at cultivating.

Network Media

A male Network Media participant wrote the story planner shown in Figure 19 (again, names/faces/locations have been removed to maintain confidentiality). Although the Network Media condition meant he was only shown idea cards authored by friends in his network (and none authored by him), he still found Sparkfolio to be a very useful prewriting tool, saying in a one-on-one conference that he “*got lots of ideas from my cards*” and casually shared enthusiastic remarks throughout the study about Sparkfolio (e.g. “*I love this*” and “*This has been really helpful*”). The idea for his story was seeded by the final idea card (see the “Resolution” row of Figure 19), an image posted by a friend about a memorable “6 am practice” with his lacrosse team, and the subsequent viewing of other lacrosse-themed data. This reminded him of moving from his former high school to his current high school, primarily due to the new high school’s lacrosse program. This move—while a difficult transition—resulted in a successful season and culminated in earning him a lacrosse scholarship at a renowned university he will attend after his high school graduation. As illustrated in the story planner, he outlines his initial hesitation to switch schools, the eventual change and the ultimate realization that it was “the best decision he ever made.” His planner not only indicates that self-authored data

may not be necessary to successfully plan with Sparkfolio, but also demonstrates flexible use of the planner's WWW/What = 2/How = 2 prompts, as he was able to create multiple episodes and details within each of the five story component rows, resulting in a thoughtful and elaborate personal narrative about his journey from a small-time lacrosse program to committing to playing for a large university.

Writing Quality

The following sections present results regarding writing quality, the first of this study's two primary dependent variables, including analyses for overall writing quality and the individual Six Writing Traits.

Overall Writing Quality

Pretest & Posttest Scores

The sample mean for the writing quality pretest was 4.04 ($SD = .67$; see Table 3). The Control group had the highest mean score ($M = 4.25$, $SD = .58$), followed by the Network Media group ($M = 4.00$, $SD = .65$) and the My Media group ($M = 3.87$, $SD = .74$). As means differed slightly between groups, an analysis was performed to investigate whether random assignment resulted in groups of comparable writing aptitude (i.e. whether any group had any clear writing quality advantage over the other). However, an ANOVA with experimental condition as a between-subject factor and pretest writing quality scores as the dependent variable was nonsignificant, $F(2, 43) = 1.35$, $p = .27$, implying that based on this sample, it is inconclusive whether these mean differences indicate actual between-group differences.

On the writing quality posttest, the sample mean was slightly lower than the posttest ($M = 4.02$, $SD = .71$; see Table 3). However, in contrast to the pretest, the My

Media group had the highest mean score ($M = 4.13$, $SD = .84$), the Network Media group had the second highest ($M = 4.07$, $SD = .70$), and the Control group had the third highest ($M = 3.88$, $SD = .62$). Differences between these pretest and posttest scores are discussed below.

Change in Writing Quality

As shown in Table 3, the two treatment groups increased in writing quality from pretest to posttest and the Control group decreased. The My Media group ($M = .27$, $SD = .59$) demonstrated a higher increase in writing quality than the Network Media group ($M = .07$, $SD = .96$). However, the control group changed the most, with a $-.38$ decrease in writing quality ($SD = .72$). Overall, the sample mean indicated a slight decrease in writing quality ($M = -.02$, $SD = .80$). This, of course, raises the question as to why the Control group decreased in writing quality from the pretest to the posttest, resulting in a negative overall sample mean. This can in part be explained by observations during the experiment, as many students shared that they were less-than-enthusiastic about the amount of writing they were asked to do, so perhaps this decrease for the Control group is due to lack of interest after completing three writing assignments in four weeks, thus decreasing student effort by the third and final writing assignment. Even if this was the case, these results imply that despite the potential monotony of completing multiple writing assignments in a short period of time, the treatment still helped students increase their writing quality.

To assess the impact of experimental condition on the change in writing quality, two *a priori* orthogonal contrasts addressing the study's research questions were

conducted with experimental condition as a between-subject factor and the change in writing quality as the dependent variable. The results were as follows.

Research Question 1: Treatment Groups vs. Control Group

This study's first research question asked whether participants who used Sparkfolio would demonstrate more improvement in writing quality compared to those who did not. It was hypothesized that participants who used Sparkfolio would, in fact, improve in writing quality to a higher degree than the Control group. As indicated above, both the My Media and Network Media groups did increase in writing quality (.27 and .07 respectively), while the Control group decreased (-.38). Furthermore, an *a priori* orthogonal contrast revealed that this treatment vs. Control difference was significant at the .05 level, $F(1, 43) = 5.14, p = .03$ (see Table 4), suggesting that the treatment was effective, with a medium-to-large effect size ($\eta^2 = .11$ and $f = .35$). The observed power was .60. These results imply that the treatment was effective; participants who used Sparkfolio had significantly greater gains in overall writing quality than participants in the Control group.

Research Question 2: My Media Group vs. Network Media Group

The second research question asked whether My Media participants would have higher writing quality gains compared to Network Media participants, and it was hypothesized that My Media participants would demonstrate more improvement in writing quality compared to the Network Media group. As indicated above, the My Media group ($M = .27$) did show more improvement than the Network Media group ($M = .07$). However, a contrast for this difference was nonsignificant, $F(1, 28) = .50, p = .48$ (see Table 4). Furthermore, with $\eta^2 = .01$ and $f = .11$ (a small observed effect), this

relationship was relatively weak. The observed power was .11. With these results in mind, it appears that the authorship of idea cards used in Sparkfolio did not necessarily have any impact on overall writing quality—that is, in terms of overall writing quality, it did not matter whether the data used for idea generation in Sparkfolio was authored by the participants themselves or by others in their social networks.

Six Writing Traits

As the above writing quality scores were based on a holistic rubric, it was also of interest to determine which specific aspects of writing (if any) were particularly impacted during the intervention, especially given the significant results for the first research question. For instance, a logical follow-up question would be, “Does the use of social media data as inspiration for writing during the prewriting process improve adolescents’ writing quality *in any of the Six Traits in particular* in comparison to those who do not?” Accordingly, pretests and posttests were scored for each of the individual Six Writing Traits (Ideas & Content, Organization, Voice, Word Choice, Sentence Fluency, and Conventions) in addition to the Holistic Six Traits scores. Difference scores for each of the individual Six Traits were also calculated to analyze any trait-specific gains during the experiment.

To investigate whether there were any significant differences between each group’s baseline writing abilities at the beginning of the experiment, a series of six ANOVAs were conducted with Planning Mode as a between-subject factor and the pretest scores for each of the Six Writing Traits as the dependent variables. All six of these tests were nonsignificant, (see individual test results below) and it is thus uncertain

whether these between-group pretest score differences reflect actual differences in trait-specific abilities between groups.

More importantly, to supplement the holistic assessment of the change in writing quality, twelve *a priori* orthogonal contrasts were conducted. These twelve contrasts held Planning Mode as a between-subject factor and the change in score for each of the Six Traits as dependent variables. For each of the Six Traits, the two contrasts related to the research questions were applied (for a total of twelve contrasts), providing the opportunity to investigate the research questions on an individual trait level—e.g. whether Sparkfolio aided participants with any writing trait(s) in particular. While all such analyses for both research questions were nonsignificant (see results below), the descriptive statistics for the six difference scores (see Table 5) provide a tentative indication of the writing traits that appear to have been influenced by Sparkfolio, particularly the traits of Organization, Word Choice, Sentence Fluency, and Conventions (see below). Although they were nonsignificant, these results offer possibilities for future research, particularly exploring whether significant change scores for the traits of Organization, Word Choice, Sentence Fluency and Conventions might be present in a larger sample.

The following sections present results for the pretest, posttest, and difference scores for each of the Six Traits, as well as results of analyses pertaining to this study's two research questions.

Pretest, Posttest, and Difference Scores

Ideas and Content. On the pretest, the sample mean for Ideas and Content was 4.07 ($SD = .74$; see Table 5). The Control group scored the highest ($M = 4.19$, $SD = .75$),

followed by the My Media ($M = 4.07$, $SD = .70$) group and the Network Media group ($M = 3.93$, $SD = .80$). As described above, an analysis was conducted to investigate whether the experimental groups significantly differed in terms of Ideas and Content abilities, based on the pretest. An ANOVA with experimental condition as a between-subject factor and pretest Ideas and Content score as the dependent variable was nonsignificant, $F(2, 43) = .32$, $p = .72$. The posttest sample mean ($M = 3.96$, $SD = .87$; see Table 5) was slightly lower than the pretest. Again, this can be partially explained by participants' comments that they were being asked to write more than they were accustomed to during the course of the experiment. The mean score for both the Network Media and Control groups was 4.00 (Network Media $SD = .93$; Control $SD = .82$). The mean My Media group score was slightly lower ($M = 3.87$, $SD = .92$). To ascertain the change in Ideas and Content from pretest to posttest, difference scores were calculated by subtracting the above pretest scores from the posttest scores. The resultant sample mean for change in Ideas and Content was $-.11$ ($SD = 1.02$; see Table 5), indicating that as a whole, participants decreased slightly on the Ideas and Content trait from pretest to posttest. Interestingly, while the My Media ($M = -.20$, $SD = .77$) and Control ($M = -.19$, $SD = 1.05$) groups both decreased by approximately .2 points, the Network Media group increased ($M = .07$, $SD = 1.22$). These results are interpreted in the "Research Questions 1 and 2" sections below.

Organization. For the trait of Organization, the pretest sample mean was 4.04 ($SD = .51$; see Table 5). The Control group scored the highest ($M = 4.19$, $SD = .54$), the My Media group scored the second-highest ($M = 4.00$, $SD = .53$), and the Network Media group scored the lowest ($M = 3.93$, $SD = .46$). An ANOVA with experimental condition

as a between-subject factor and pretest Organization score as the dependent variable was nonsignificant, $F(2, 43) = .55, p = .58$. The mean Organization score for the sample on the posttest was 4.02 ($SD = .65$; see Table 5), a minimal decrease from the sample pretest mean. The My Media group had the highest mean Organization posttest score ($M = 4.07, SD = .80$) and the mean for both the Network Media and Control groups was 4.00 (Network Media $SD = .65$, Control $SD = .52$). As described in the Ideas and Content section above, difference scores were calculated to determine the change in Organization from pretest to posttest, resulting in an overall sample mean of $-.02 (SD = .77$; see Table 5). This indicates that for the sample as a whole, pretest and posttest means were essentially the same, with a very minimal decrease. However, both the My Media ($SD = .88$) and Network Media ($SD = .70$) groups increased in Organization by $.07$. In contrast, the Control group decreased ($M = -.19, SD = .75$). These results were of particular interest as they aligned with the hypothesis for the first research question (see below).

Voice. The mean sample pretest score for Voice was 3.98 ($SD = .65$; see Table 5), with the My Media group scoring the highest ($M = 4.20, SD = .41$), followed by the Control group ($M = 3.88, SD = .81$) and the Network Media group ($M = 3.87, SD = .64$). An ANOVA indicated that these between-group pretest differences were nonsignificant, $F(2, 43) = .13, p = .88$. The mean sample posttest score was 4.02 ($SD = .71$; see Table 5). Again, the highest-scoring group was My Media ($M = 4.20, SD = .77$), with Network Media scoring the second-highest ($M = 4.00, SD = .76$) and the Control group scoring the third-highest ($M = 3.88, SD = .62$). As with Ideas and Content and Organization, difference scores were calculated to determine the change in Voice scores from pretest to posttest. The sample mean for the change in Voice scores was $.04 (SD = .82$; see Table

5), indicating that Voice was the only individual trait for which an overall sample increase was observed. However, it appears that this sample mean increase was primarily due to the Network Media group, who increased by .13 ($SD = .92$). In contrast, the mean change for both the My Media ($SD = .53$) and Control ($SD = .97$) groups was .00.

Word Choice. For the trait of Word Choice, the pretest sample mean was 4.04 ($SD = .59$; see Table 5). With a mean score of 4.19, the Control group scored the highest ($SD = .54$), followed by the My Media group ($M = 4.07$, $SD = .46$) and the Network Media group ($M = 3.87$, $SD = .74$). Between-group pretest differences were nonsignificant, $F(2, 43) = 1.63$, $p = .21$. There was a slight overall decrease in Word Choice scores in the posttest, with a sample mean of 3.91 ($SD = .76$; see Table 5). The My Media group had the highest posttest Word Choice scores ($M = 4.13$, $SD = .83$), with the Network Media group in second ($M = 3.87$, $SD = .64$) and the Control group in third ($M = 3.75$, $SD = .77$). Difference scores were calculated for the change in Word Choice scores, and the sample mean was -.13 ($SD = .86$; see Table 5). However, group means for this trait were particularly different and appeared to agree somewhat with the hypotheses for both research questions. While the Control group decreased by almost half a point in Word Choice ($M = -.44$, $SD = .81$), the Network Media group did not change ($M = .00$, $SD = 1.00$) and the My Media group increased by .07 ($SD = .70$). These results agree with the hypothesis for Research Question 2, and although the Network Media group did not change, the differences between the change scores for the treatment groups and the Control group were of interest in examining Research Question 1 (see below).

Sentence Fluency. The sample mean for Sentence Fluency on the pretest was 4.02 ($SD = .58$; see Table 5). While the My Media ($M = 4.07$, $SD = .59$) and Control ($M =$

4.06, $SD = .44$) groups only differed slightly, the Network Media scored the lowest ($M = 3.93$, $SD = .70$). An ANOVA for these between-group differences yielded nonsignificant results, $F(2, 43) = .88$, $p = .42$. The mean sample posttest score for Sentence Fluency was 3.85 ($SD = .60$; see Table 5). The My Media group had the highest posttest score ($M = 4.07$, $SD = .70$; see Table 5), followed by the Network Media ($M = 3.80$, $SD = .41$) and Control ($M = 3.69$, $SD = .60$) groups. Difference score calculation yielded a sample mean of $-.17$ for the change in Sentence Fluency ($SD = .80$; see Table 5). The My Media group did not change from pretest to posttest ($M = .00$, $SD = .85$), but the Network Media ($M = -.13$, $SD = .83$) and Control ($M = -.38$, $SD = .72$) groups both decreased. While none of the three groups increased in Sentence Fluency, it is worth noting that: a) the Control group's decrease was the greatest; b) the Network Media group's decrease was less than half of the Control group's; and c) the My Media group did not decrease at all. This stratification was of interest in terms of the two research questions. As noted above, the observed learner fatigue from completing three writing assignments in four weeks may explain decreases in writing quality for this experiment. Under the assumption that learner fatigue explains these decreases, it appears that the treatment groups exhibited these decreases to a lesser degree than the Control group (which aligns somewhat with the hypothesis for the first research question), and that the My Media group exhibited the decreases to a lesser degree than the Network Media group (which aligns somewhat with the hypothesis for the second research question). Thus, *a priori* contrasts were used to more closely examine these differences (see below).

Conventions. For the Conventions writing trait, the pretest sample mean was 3.96 ($SD = .42$; see Table 5). The Network Media ($SD = .00$) and Control ($SD = .63$) groups

both scored 4.00 on the pretest, and the My Media group had a pretest score of 3.87 ($SD = .35$). Similar to the results of ANOVAs for the previous five traits, these differences in Conventions pretest scores were nonsignificant, $F(2, 43) = .48, p = .62$. On the posttest, the sample mean for Conventions was 3.76 ($SD = .48$; see Table 5). The highest-scoring group on the posttest was the Network Media group ($M = 3.87, SD = .35$), followed by the My Media ($M = 3.73, SD = .46$) and Control ($M = 3.69, SD = .60$) groups. Difference scores resulted in a sample mean of -.20 for the change in Conventions score ($SD = .58$; see Table 5), indicating that the sample demonstrated the greatest negative change in the Conventions trait. The Control group decreased the most ($M = -.31, SD = .79$), and both the My Media ($SD = .52$) and Network Media ($SD = .35$) groups decreased by .13. Similar to the results for the changes in score for Sentence Fluency, while all groups decreased in Conventions, it is worth noting that the Control group had a greater decrease than the treatment groups, which agrees somewhat with the hypothesis for the first research question (see below). Given the aforementioned participant sentiments that they were asked to do a great deal of writing in a short period of time, the overall decrease in Conventions on the posttest seems logical; a decreased interest in a writing assignment would likely result in decreased proofreading and attention to mechanics, which could in turn be reflected by Conventions scores.

Research Question 1: Treatment Groups vs. Control Group

The first research question regarded whether the treatment groups (who used Sparkfolio) would improve in writing quality in comparison to a control group. Due to significant results for this research question from a holistic perspective (see above), the research question was next assessed at the writing trait level to explore whether using

Sparkfolio appeared to result in trait-specific writing quality gains. Six *a priori* orthogonal contrasts examining treatment groups vs. Control group differences were conducted with experimental condition as a between-subject factor and the change scores for each of the Six Writing Traits as the six dependent variables. Of particular interest were the analyses for the traits of Organization, Word Choice, Sentence Fluency, and Conventions (as noted above). While all six analyses had nonsignificant results, the observed effect sizes for Organization, Word Choice, Sentence Fluency, and Conventions suggest that a future, larger-scale study would be beneficial to further investigate these effects.

Ideas and Content. A contrast for the Ideas and Content trait was nonsignificant, $F(1, 43) = .14, p = .71$ (see Table 6). The observed effect was minimal, with $\eta^2 = .00$ and $f = .05$. The observed power was .07. Based on these results, it does not appear that Sparkfolio gave the treatment groups any significant advantage or disadvantage in the area of Ideas and Content.

Organization. As both the My Media and Network Media groups increased in Organization and the Control group decreased, the Organization trait was of interest in exploring the first research question at the trait level, but between-group differences were nonsignificant $F(1, 43) = 1.10, p = .30$ (see Table 6). Although a small-to-medium effect was observed ($\eta^2 = .03; f = .16$), observed power was low ($1-\beta = .18$). While Sparkfolio may have provided treatment participants with advantages in terms of Organization in comparison to the Control group, the results from this sample cannot definitively support that claim. However, future work with a larger sample (and more power) may yield more conclusive results with regards to the trait of Organization.

Voice. As the Network Media group increased in Voice scores but the My Media and Control groups did not change, it was unsurprising that a contrast for the Voice trait was nonsignificant, $F(1, 43) = .07, p = .80$ (see Table 6). Furthermore, the observed effect was minimal, with $\eta^2 = .00$ and $f = .05$, and the observed power was .06. It appears that whether participants used Sparkfolio or not, their Voice scores were unaffected.

Word Choice. As outlined above, given the observed decrease in participant enthusiasm to write by the posttest, the descriptives for the change in Word Choice score aligned with the hypothesis for the first research question. With a pronounced decrease for the Control group, no change for the Network Media group, and an increase for the My Media group, it appeared that in spite of participants' decreasing enthusiasm in general (demonstrated by the Control group), the use of Sparkfolio may have resulted in positive results for the My Media group and equalized the Network Media group. *A priori* orthogonal contrast results, however, were nonsignificant, $F(1, 43) = 3.22, p = .08$ (see Table 6). At the same time, a medium effect was observed for Word Choice ($\eta^2 = .07; f = .27$), the largest observed effect among the Six Traits. The observed power was .42. With these results in mind, it is possible that Sparkfolio positively impacted the treatment participants' Word Choice scores, but future work with a larger sample may provide more clarity.

Sentence Fluency. Change scores for Sentence Fluency were generally negative, with no changes for the My Media group, a .13 decrease for Network Media, and a .38 decrease for the Control group (see Table 5). Yet, as explained previously, the treatment groups appeared to have "less" negative changes than the Control group, and given the observations of decreasing participant enthusiasm during the course of the experiment, it

was of interest whether Sparkfolio might have minimized the effects of decreased enthusiasm. While the results of a contrast test were not significant, $F(1, 43) = 1.55$; $p = .22$ (see Table 6), a small-to-medium effect was observed ($\eta^2 = .04$; $f = .19$). The observed power was .23. Perhaps Sparkfolio helped participants minimize the negative effect of repeated writing assignments over a short period of time with regards to Sentence Fluency, but again, a larger-scale study (with more power) could possibly yield more definitive results.

Conventions. With both the My Media and Network Media groups decreasing by .13 and the Control group decreasing by .31, the Conventions trait seemed to particularly be affected by the enthusiasm factor. Yet, similar to Sentence Fluency, the treatment groups appeared to decrease in Conventions to a lesser degree than the Control group. A contrast was nonsignificant, $F(1, 43) = .97$; $p = .33$ (see Table 6), but also similar to Sentence Fluency, a small-to-medium effect was observed ($\eta^2 = .02$; $f = .15$). The observed power was .17. While the results for Word Choice, Organization and Sentence Fluency appear to more adequately explain the significant results for the overall change in writing quality, it appears that an investigation of Conventions may also be worth including in future, larger-scale work.

Research Question 2: My Media Group vs. Network Media Group

The second research question regarded the differences between the My Media and Network Media groups in terms of the change in writing quality from pretest to posttest. It was hypothesized that the My Media group would have higher gains than the Network Media group. Although the change in holistic writing score was higher for the My Media group than the Network Media group, this difference was nonsignificant (see above). Yet,

it was of interest to examine whether there were any significant trait-specific differences for this contrast (particularly Word Choice, Sentence Fluency, and Conventions; see above). Thus, similar to the analysis for the first research question, a series of six *a priori* orthogonal contrasts (examining My Media vs. Network Media differences) were conducted with experimental condition as a between-subject factor and the change scores for the Six Traits as the dependent variables. Unsurprisingly, all contrasts were nonsignificant. The results for each trait are outlined below.

Ideas and Content. For Ideas and Content, the results were the inverse of the hypothesis, with My Media decreasing ($M = -.20$; see above) and Network Media increasing ($M = .07$). The orthogonal contrast was nonsignificant, $F(1, 28) = .50$; $p = .48$ (see Table 6). It is worth noting that with $\eta^2 = .01$ and $f = .11$, a small effect was observed, but with an observed power of .11. While these results raise potential questions about the differences between the two treatment groups, it is important to note that the contrasts for all five other writing traits yielded much smaller effect sizes (see below), and that Ideas and Content was the only writing trait for which the Network Media group increased and the My Media group decreased. It is hesitantly posited that—pending further research—these results may be due to other, unmeasured factors.

Organization. Both the My Media and Network Media groups had the same mean change in Organization score (.07; see above). Thus with no between-group difference, $F(1, 28) = .00$; $p = 1.0$ (see Table 6), a nonsignificant result, implying that authorship of social data used in Sparkfolio had no effect on the Organization of participants' writing.

Voice. For the trait of Voice, the Network Media group increased ($M = .13$; see above) and the My Media group did not change ($M = .00$). A contrast was nonsignificant,

$F(1, 28) = .19; p = .66$ (see Table 6), with a minimal—if any—observed effect ($\eta^2 = .0, f = .06$) and minimal observed power ($1-\beta = .07$). Based on this minimal observed effect, it appears that Voice was not affected by the between-group differences in social data card authorship.

Word Choice. The mean change in Word Choice score for the My Media group was .07 and the Network Media group mean did not change ($M = .00$). As mentioned above, this difference was of interest to the second research question. Given participant reports of lack of enthusiasm by the third writing assignment (and the demonstrative .44 decrease for the Control group), it appeared that the treatment may have afforded My Media participants a slight advantage and equalized the Network Media group. However, a contrast was nonsignificant, $F(1, 28) = .05; p = .83$ (see Table 6), with an almost nonexistent effect ($\eta^2 = .00, f = .03$) and low observed power ($1-\beta = .06$). Accordingly, it is unclear whether social data authorship had any bearing on these between-group differences for the change in Word Choice.

Sentence Fluency. As the My Media group's mean change in Sentence Fluency was .00 (see above) and the Network Media group decreased by .13, this difference was of potential interest for the second research question. While treatment students did not improve in Sentence Fluency, the Control group had a more pronounced decrease. With that in mind, it appeared that the My Media group's treatment yielded no negative results and the Network Media's treatment yielded negative results to a lesser extent than the Control group. Thus, the My Media vs. Network Media difference appeared somewhat aligned with the hypothesis for the second research question. However, a contrast was nonsignificant, $F(1, 28) = .21; p = .65$ (see Table 6), and both the observed effect ($\eta^2 =$

.01, $f = .07$) and observed power ($1 - \beta = .07$) were minimal. Accordingly, it did not appear that the two treatment groups differed greatly in terms of the change in Sentence Fluency, thus suggesting it was not impacted by social data authorship.

Conventions. Similar to Organization, the My Media and Network Media groups had the same mean change in Conventions score (-.13; see above). Likewise, $F(1, 28) = 0$; $p = 1.00$ (see Table 6). These results were not surprising, as it does not seem logical for social data authorship within Sparkfolio to have much of an effect on the Conventions used in a writing piece.

Writing Motivation

Results for the second dependent variable—writing motivation—are outlined below based on the overall WDS score (Piazza & Siebert, 2008) and three individual constructs: confidence, persistence, and passion.

Overall Writing Motivation

Pretest & Posttest Scores

The sample's mean scaled response for the WDS pretest was 2.50 ($SD = .58$; see Table 7), indicating for the most part, students tended to respond with either “disagree” or “neutral” for the WDS items (and “agree” and “neutral” for the negatively-worded item “I am not a good writer”), which can be interpreted as an overall slightly negative disposition toward writing. Pretest group means were quite similar, with the Control group having the highest score ($M = 2.54$, $SD = .59$), and both the My Media ($SD = .72$) and Network Media groups ($SD = .44$) with means of 2.48. To determine whether there were any significant between-group differences in writing motivation prior to the treatment, an ANOVA was conducted with Planning Mode as a between-subject factor

and these overall writing motivation pretest scores as a dependent variable. Given the similarities of the group means, it was not surprising that results were nonsignificant, $F(2, 43) = .05, p = .95$. It cannot be assumed that these minor between-group differences were actually present, and considering the comparable means and standard deviations, it is likely that between-group differences in overall writing motivation prior to the experiment were minimal.

The sample mean for the posttest was slightly higher than the pretest ($M = 2.51, SD = .55$; see Table 7). The Control group had the highest mean posttest score ($M = 2.57, SD = .52$), the My Media group had the second-highest ($M = 2.55, SD = .63$), and the Network Media had the lowest ($M = 2.41, SD = .51$).

Change in Writing Motivation

The sample mean for the overall change in writing motivation was .01 ($SD = .38$; see Table 7), indicating a very slight increase. Interestingly, the group means indicate that the My Media ($M = .06, SD = .37$) and Control ($M = .03, SD = .41$) groups increased and the Network Media group decreased ($M = -.07, SD = .36$). This Network Media decrease can be partially supported by qualitative data from the Sparkfolio Usability Survey and participant conferences (see “Qualitative Analyses” below). Network Media participants tended to report having more trouble finding usable data for story planning compared to the My Media group. Also worth noting is that My Media students had approximately twice the increase in motivation over the Control group.

Using these change in writing motivation scores as a dependent variable, two *a priori* orthogonal contrasts (one for each research question) were conducted with experimental condition as a between-subject factor. Results were as follows.

Research Question 1: Treatment Groups vs. Control Group

The first research question asked whether participants who used Sparkfolio would have higher gains in writing motivation in comparison to those who did not, and it was hypothesized that the treatment groups would have higher motivation gains than the Control group. However, as described above, both the My Media ($M = .06$) and Control groups ($M = .03$) increased in overall writing motivation and the Network Media group decreased ($M = -.07$). This ran counter to the hypothesis. Unsurprisingly, an *a priori* orthogonal contrast for the treatment groups vs. the Control group was nonsignificant, $F(1, 43) = .07, p = .79$ (see Table 8), with a low observed effect ($\eta^2 = .00; f = .05$) and low observed power ($1 - \beta = .06$). These results imply that using Sparkfolio did not provide the treatment participants with any overall motivation gains in comparison to the Control group. This is especially supported when considering the Likert-scaled metric; the group means lie in a narrow range (from $-.07$ to $.06$), which represents only $.13$ of a Likert point. Considering the sample size ($n = 46$), it is unlikely that these sample means represent actual between-group differences. Thus, it appears that using Sparkfolio did not afford the treatment groups any significant advantages over the Control group in terms of overall writing motivation.

Research Question 2: My Media Group vs. Network Media Group

The second research question asked whether My Media participants would have higher gains in overall writing motivation in comparison to Network Media participants, and it was hypothesized that the My Media participants would, in fact, have higher gains. As the change in overall writing motivation was $.06$ for My Media and $-.07$ for Network Media, the results were in agreement with the hypothesis. That is, it appears that using

self-authored data in Sparkfolio resulted in an overall increase in writing motivation while using data authored by others yielded a decrease. However, a contrast was nonsignificant, $F(1, 28) = .84, p = .37$ Table 8, with low observed power ($1-\beta = .15$). It is worth noting that there was a small-to-medium observed effect ($\eta^2 = .02; f = .14$), but as stated above, it is also important to consider that these group means represent Likert-scaled responses (and thus a difference of .13 of a Likert point). It is possible that using self-authored social data with Sparkfolio may have slightly increased overall writing motivation and using network-authored data may have slightly decreased overall writing motivation, but given the sample size for this orthogonal contrast ($n = 30$), this is a tentative interpretation that may yield more conclusive results in future work with a larger sample.

Three Motivation Constructs

One reason the Writing Disposition Scale (WDS) was used to measure motivation was its identification of three constructs pertaining to writing dispositions: a) confidence, b) persistence, and c) passion (Piazza & Siebert, 2008). While results for the overall scale were nonsignificant, it was of interest to explore whether there were any significant results pertaining to the study's research questions that were specific to any of the three constructs. Accordingly, as described in Chapter 2, the mean scaled pretest and posttest responses for each of the three constructs were calculated. The mean scaled response for "confidence" was calculated by adding each participant's responses to items 1, 5, and 11 (with 5 reverse-coded) and dividing by three. A similar procedure was taken to find the mean response for the "persistence" items (3, 4, 7, and 10) and for the "passion" items (2, 6, 8, and 9).

Pretest, Posttest, and Difference Scores

Confidence. The sample mean for confidence on the pretest was 3.14 ($SD = .85$; see Table 9), indicating that as a sample, participants generally felt “neutral” about their writing confidence, with a slight tendency toward agreeing that they were confident. The Network Media group was the most confident ($M = 3.33$, $SD = .64$), followed by the My Media group ($M = 3.24$, $SD = .90$) and the Control group ($M = 2.85$, $SD = .95$). This implies that while all groups tended to feel “neutral” about their writing confidence at the time of the pretest, the treatment groups were more likely to agree that they were confident and the Control group was more likely to disagree. To examine whether these between-group pretest differences were significant, an ANOVA was conducted with experimental condition as a between-subject factor and the mean pretest confidence score as the dependent variable. With $F(2, 43) = 1.43$ and $p = .25$, the results were nonsignificant. For the posttest, the mean confidence response for the sample was 3.09 ($SD = .82$; see Table 9). The group means differed less than on the pretest, but the Network Media group still led in confidence with a mean of 3.16 ($SD = .78$), followed closely by the My Media group ($M = 3.11$, $SD = .75$) and the Control group ($M = 3.02$, $SD = .95$). Based on these scores, the My Media ($M = -.13$, $SD = .76$) and Network Media ($M = -.18$, $SD = .31$) groups decreased in writing confidence, while the Control group ($M = .17$, $SD = .83$) increased (see Table 9). Interestingly, it appears that all groups tended to move toward the “neutral” score of 3 from the pretest to the posttest. It is unclear as to why the treatment groups decreased in confidence (as this runs counter to the hypothesis for the first research question). It is possible that participants who were asked to use

Sparkfolio felt that it required additional steps with an unfamiliar program, ultimately resulting in slightly lower confidence (see below for additional interpretation).

Persistence. With a sample mean of 2.55 ($SD = .68$; see Table 9), participants as a group tended to feel about halfway between “disagreeing” and feeling “neutral” with statements regarding their persistence in writing on the pretest. The My Media ($M = 2.47$, $SD = .77$) and Network Media ($M = 2.45$, $SD = .71$) had similar means and standard deviations, while the Control group had a slightly higher persistence score ($M = 2.72$, $SD = .58$). Similar to the analysis for the pretest confidence score, an ANOVA with Planning Mode as a between-subjects factor and mean pretest persistence score was conducted. Results were nonsignificant, $F(2, 43) = .75$, $p = .48$. The sample mean for the posttest was 2.59 ($SD = .63$). The Control group scored the highest on the posttest in persistence ($M = 2.72$, $SD = .62$; see Table 9), followed by the My Media group ($M = 2.57$, $SD = .73$) and the Network Media group ($M = 2.48$, $SD = .54$). According to these scores, the My Media group increased in persistence by .10 ($SD = .52$; see Table 9), the Network Media group increased by .03 ($SD = .55$), and the Control group did not change at all ($M = .00$, $SD = .45$). These results acquiesced with the hypotheses for both research questions. The treatment groups had higher gains in persistence than the Control group (Research Question 1) and the My Media group had a higher gain in persistence than the Network Media group (Research Question 2).

Passion. For the passion construct, the pretest sample mean was 1.98 ($SD = .67$; see Table 9), implying that participants tended to “disagree” with statements regarding their passion for writing. At the time of the pretest, the Control group was the most passionate ($M = 2.13$, $SD = .62$), followed by the My Media ($M = 1.93$, $SD = .83$) and

Network Media ($M = 1.87$, $SD = .56$) groups. An ANOVA with experimental group as a between-subject factor and the mean pretest passion response as the dependent variable was nonsignificant, $F(2, 43) = .61$, $p = .55$. On the posttest, the sample mean for passion was 1.99 ($SD = .75$; see Table 9). The My Media group scored the highest ($M = 2.10$, $SD = .92$), the Control group scored second-highest ($M = 2.08$, $SD = .71$), and the Network Media group scored the lowest ($M = 1.78$, $SD = .61$). Thus, the sample mean for change in passion was .01 ($SD = .37$; a slight increase). The My Media group increased in passion by .17 ($SD = .32$) while the Network Media ($M = -.08$, $SD = .35$) and Control ($M = -.05$, $SD = .41$) groups decreased. Worth noting is that the Network Media group decreased by almost twice as much as the Control group. These results were of particular interest to the second research question—the My Media group increased in passion while the Network Media group decreased.

Research Question 1: Treatment Groups vs. Control Group

The first research question asked whether the treatment groups would have higher gains in motivation than the Control group, and it was hypothesized that Sparkfolio participants would, in fact, have higher gains than non-Sparkfolio participants. Three *a priori* orthogonal contrasts for the treatment groups vs. the Control group were conducted with the change in each of the three constructs as the dependent variables. While persistence in particular appeared to agree with the hypothesis, all three contrasts were nonsignificant, the results for which can be found in Table 10.

As described above, the treatment groups decreased in confidence while the Control group increased, which ran counter to the hypothesis for Research Question 1. Although the *a priori* contrast was nonsignificant— $F(1, 43) = 2.36$, $p = .13$ (see Table

10)—a medium effect was observed ($\eta^2 = .05, f = .23$), with an observed power of .32. It is possible that Sparkfolio users reported decreases in confidence due to the additional steps they were asked to complete by simply using Sparkfolio. Another interpretation is the possibility that this reported decrease in confidence is more a reflection of using an unfamiliar tool for writing than anything else. Third, it could be that treatment group participants began the experiment with overconfidence in their writing abilities (commonly due to a lack of metacognitive skills in a certain domain; see Kruger & Dunning, 1999) but through their experience with Sparkfolio's scaffolded writing planning, they became more aware of the complexity of writing. It is well-documented that writing is decidedly not an easy endeavor (Flower & Hayes, 1980; Hayes, 1996; Zimmerman & Risemberg, 1997), a sentiment confirmed by prolific professional writers, who assert that with more experience comes increased perception of writing's inherent difficulties (Graham & Harris, 2006). With this in mind, it is possible that while increasing their writing quality via Sparkfolio (see "Writing Quality" section above), the treatment groups may also have gained an appreciation for the act of writing's complexity, which can actually be interpreted as a "positive" result. The realization of writing's inherent challenges could potentially foster an emphasis on metacognition and problem-solving among adolescent writers. In particular, the story planning portion of Sparkfolio may have been the impetus for these results, especially as the trait of Organization appeared to have the highest gains for the treatment groups in comparison to the Control group. Finally, these results could also simply be due to chance or some other unforeseen variable. Thus, this is a potential avenue for future research. A larger sample may provide justification for one or more of these interpretations.

Research Question 2: My Media Group vs. Network Media Group

The second research question regarded whether students who used self-authored media in Sparkfolio would have higher gains in motivation compared to those who used media authored by others in their social networks, and it was hypothesized that the My Media group would, in fact, have higher gains than the Network Media group.

Accordingly, three *a priori* orthogonal contrasts were conducted for My Media vs. Network Media with the change in each of the three constructs as the dependent variable. The passion construct was of particular interest as the My Media group increased ($M = .17$) and the Network Media group decreased ($M = -.08$). While a contrast for passion was nonsignificant— $F(1, 28) = 3.54, p = .07$ —it is worth noting that with $\eta^2 = .08$ and $f = .29$, a medium-to-large effect was observed, and the observed power was .45. Thus, it is possible that social data authorship did positively affect passion, but this argument cannot be supported unless more definitive results are found, likely in a future study with a larger sample. Regarding the confidence and persistence constructs, the results for both contrasts were nonsignificant with very small observed effects and observed power (see Table 10). As self-authorship vs. friends/network authorship of Sparkfolio idea cards does not seem to have any impact on either of these constructs, they will not be discussed at length.

Multiple Regression Analyses

As outlined in Chapter 2, four multiple regression analyses were conducted—two for the first research question and two for the second research question. The results of these analyses were as follows.

Research Question 1: Treatment Groups vs. Control Group

Two multiple regression analyses pertained to Research Question 1, which examined differences in writing quality and writing motivation between the treatment groups and the Control group. The dependent variable for the first analysis was the change in writing quality, and the dependent variable for the second analysis was the change in writing motivation. Four independent variables (Gender, Treatment, CardsImported, and MeanAuthoredPerDay) were included in the regression as possible predictors, using the forward selection method. Descriptive statistics for these predictors are reported below, followed by the multiple regression results.

Predictor Descriptives

Gender. As discussed in Chapter 2, there were more female participants (28) than male participants (18). This was solely based on student/parent interest in study participation. Participants were randomly assigned to the experimental groups regardless of gender, and as a result, the female-to-male ratio varied between groups (see Table 11). While the Network Media group (8 females, 7 males) and Control group (9 females, 7 males) had both genders relatively equally represented, the My Media group was comprised of 11 females and 4 males. While this gender distribution may have played a role in the study's results, gender did not appear to be an accurate predictor for either writing quality or writing motivation in any of the regression analyses (see regression results below). In future work, it would be beneficial to obtain a sample with an equal number of females and males and to account for gender during experimental assignment to further explore its potential implications, but for this particular sample, gender did not seem to be of any consequence in terms of the dependent variables.

Treatment. For the Research Question 1 multiple regressions, treatment was included as a dichotomous variable. Participants were coded as either: a) receiving the treatment, or b) not receiving the treatment. Accordingly, there were 30 “treatment” participants (15 from the My Media group and 15 from Network Media), and 16 “no treatment” groups (16 from the Control group).

CardsImported. The sample mean for the total number of social data “cards” imported was 5393.83, but this varied widely across all participants ($SD = 4161.70$; see Table 12). The My Media group had the highest mean cards imported ($M = 6415.60$, $SD = 4453.24$), followed by the Network Media group ($M = 5068.40$, $SD = 4059.50$), and the Control group had the lowest ($M = 4741.00$, $SD = 4057.64$). At face value, these between-group mean differences appear to be large, but it is also important to note the consistently high standard deviation of about 4100 across all groups, and also that the three group means were within .4 standard deviations of each other. Most importantly, CardsImported was not identified as a reliable predictor for any of this study’s dependent variables (see regression results below).

MeanAuthoredPerDay. The mean authored posts per day for the sample was 1.87 ($SD = 1.44$; see Table 13), indicating that participants as a whole tended to author just under two posts per day across their Facebook, Twitter, and Instagram accounts. The Network Media group had the highest mean posts per day ($M = 2.15$, $SD = 1.61$), the My Media group had the second-highest ($M = 1.93$, $SD = 1.53$), and the Control group had the lowest ($M = 1.55$, $SD = 1.44$). While these descriptives imply differences between groups, MeanAuthoredPerDay was not identified as a dependable predictor for writing

quality or writing motivation in any of the four multiple regressions (see regression results below).

Writing Quality Results

A first multiple regression analysis was conducted to evaluate how well gender, the treatment (or lack thereof), the number of social data cards imported, and the mean authored posts per day predicted the change in writing quality, using a forward selection approach. The treatment variable was the sole predictor included in the resultant linear regression, and was significantly related to the change in writing quality, $F(1, 44) = 5.20$, $p = .03$. With $R = .33$ and $R^2 = .11$, approximately 11% of the variance of the sample's change in writing quality can be accounted for by a linear prediction model including the treatment as the sole predictor. These results were very similar to the orthogonal contrast for the change in writing quality for Research Question 1. Considering that they were obtained using forward selection, it seems that the change in writing quality was not affected by gender or either of the social media usage measures. Thus, Sparkfolio appears to have effectively increased writing quality regardless of a participant's gender or social media usage habits.

Writing Motivation Results

For the second multiple regression analysis, the same variables (gender, treatment, CardsImported, and MeanAuthoredPerDay) were entered using forward selection to investigate their accuracy in predicting the change in writing motivation. However, all results were nonsignificant. None of the variables (not even treatment) were found to be reliable predictors for the change in writing motivation. This was not surprising, as all group means were close to zero, and in particular because the two

treatment groups were inconsistent—the My Media group increased ($M = .06$; see Table 7) and the Network Media group decreased ($M = -.07$). The nonsignificant results of the orthogonal contrasts were supported, and neither social media usage nor gender appeared to have any impact on the change in writing motivation.

Research Question 2: My Media Group vs. Network Media Group

The second research question dealt with differences in the authorship of social data used in Sparkfolio between the My Media and Network Media groups. Two multiple regressions were conducted, one with writing quality as the dependent variable and the second with writing motivation as the dependent variable. For both analyses, twelve independent variables (Gender, MyVsNetwork, CardsImported, MeanAuthoredPerDay, TotalLogins, TotalCardsSeen, UniqueCardsSeen, Redraws, StoriesCreated, PlannerTotalDetails, PlannerTotalWordCount, and MeanSUSFinal) were included as possible predictors, and again forward selection was used. Reported below are descriptive statistics for the potential predictors, as well as the results of both multiple regressions.

Predictor Descriptives

Gender. As described above (and shown in Table 11), the My Media group had a higher female-to-male ratio than the Network Media group. Again, while equal gender representation is desirable for future work, gender did not appear to reliably predict the change in writing quality or the change in writing motivation at all (see regression results below).

MyVsNetwork. Similar to the Research Question 1 regressions, the experimental condition for the Research Question 2 analyses was coded as a dichotomous variable—

whether a participant was in the My Media or Network Media group. As reported previously, each group included 15 participants.

CardsImported. While the My Media group ($M = 6415.60$) had a higher mean number of imported cards than the Network Media group ($M = 5068.40$; see above and Table 12), this variable did not appear to provide accurate prediction for the change in writing quality or the change in writing motivation (see regression results below).

MeanAuthoredPerDay. Similarly, although the My Media group had a higher daily authored post frequency than the Network Media group (see Table 13), MeanAuthoredPerDay was not identified as a reliable predictor for the change in writing quality or the change in writing motivation (see regression results below).

TotalLogins. As shown in Table 14, there was essentially no difference between the number of Sparkfolio logins for the My Media group ($M = 6.40$, $SD = 1.64$) and the Network Media group ($M = 6.53$, $SD = 2.03$). It did not appear that any between-group differences could be attributed to the number of logins, and the multiple regression analyses supported this, as the variable was not an accurate predictor for the change in writing quality or the change in writing motivation.

TotalCardsSeen. While the My Media group viewed a mean of 1049.20 cards in Sparkfolio while searching for ideas ($SD = 678.30$; see Table 15), the Network Media group viewed nearly twice as many ($M = 1890.60$, $SD = 1824.36$). Although neither of the regression analyses revealed TotalCardsSeen as a predictor for either of the dependent variables (see regression results below), this difference may underscore the relative usefulness of self-authored data as opposed to data authored by others. On average, it took the Network Media group nearly twice as many card views as the My Media group

to advance to the story planning stage. This observation will be discussed further in Chapter 4.

UniqueCardsSeen. The UniqueCardsSeen variable was similar to TotalCardsSeen—it accounted for cards seen multiple times by only counting unique cards once. Unsurprisingly, the results were similar to TotalCardsSeen. The Network Media group ($M = 1065.47$, $SD = 1241.38$; see Table 16) viewed nearly twice as many unique cards as the My Media group ($M = 552.53$, $SD = 386.17$). Also worth noting is the much smaller standard deviation for the My Media group—almost one-third of the Network Media group’s standard deviation. Although UniqueCardsSeen was not found to be a predictor for the change in writing quality or the change in writing motivation (see regression results below), these results again imply that the My Media group found useful data for story planning more easily and more quickly than the Network Media group. Additional discussion on this phenomenon can be found in Chapter 4.

Redraws. As the number of redraws is by nature related to TotalCardsSeen and UniqueCardsSeen, similar results were found. While redraws did not accurately predict either of the dependent variables (see regression results below), the My Media group had nearly half as many redraws ($M = 244.13$, $SD = 148.26$; see Table 17) as the Network Media group ($M = 441.73$, $SD = 406.38$). These results will be further discussed in Chapter 4.

StoriesCreated. The total number of stories created by participants did not widely differ between groups, and consequently was not identified as a predictor for the change in writing quality or the change in writing motivation (see regression results below). As shown in Table 18, the My Media group created a mean of 1.73 stories ($SD = .59$) and the

Network Media group created a mean of 1.40 ($SD = .83$). It should be noted that although the procedure asked all participants to create at least two story plans (one for each treatment narrative), this was not necessarily the case, as participants varied in their readiness and prewriting processes for each assignment. While strongly encouraged to use all Sparkfolio features for both treatment narratives, some participants simply felt they were confident and ready to start writing first drafts before doing so. As Sparkfolio was created with the purpose to support students in prewriting until they are ready to begin a first draft (and with the awareness that students are discouraged when asked to complete full, detailed writing plans for a grade even when they feel they are ready to begin the actual writing product), participants were urged to complete two story plans, but not forced or required to do so (see “Participant Conferences” section below for additional discussion).

PlannerTotalDetails. The *PlannerTotalDetails* variable tallied the number of nodes completed on story planners by each participant. The My Media group completed a mean of 18.80 detail nodes ($SD = 14.32$; see Table 19) while the Network Media group completed nearly half as many ($M = 11.2$, $SD = 9.47$). The multiple regression results did not include *PlannerTotalDetails* as an accurate predictor (see below), but it appears that the My Media group was more willing to work with the story planner than the Network Media group. Considered alongside the *TotalCardsSeen*, *UniqueCardsSeen*, and *Redraws* variables, it seems that data authorship did have an impact on Sparkfolio use between groups—essentially that the My Media group found idea cards twice as quickly as the Network Media group and then created twice as many story details while planning. More discussion on this can be found in Chapter 4.

PlannerTotalWordCount. Echoing many of the other logged data variables, the My Media group ($M = 210.20$, $SD = 186.50$; see Table 20) wrote more than twice the amount of words on their story planners as the Network Media group ($M = 95.33$, $SD = 108.12$). This is consistent with the prevailing theme that the My Media group appeared to find ideas more readily and engage more in the story planning process than the Network Media group. Although the amount of words created does not necessarily imply higher quality planning, it does highlight a heightened level of use and engagement among the My Media participants. *PlannerTotalWordCount* was found to be a valid predictor for the change in writing motivation, but not for the change in writing quality (see regression results below).

MeanSUSFinal. Both the final System Usability Scale (SUS) scores and mean scaled SUS scores are shown in Table 21. The final SUS score metric ranges from 0 (the lowest degree of usability) to 100 (the highest degree of usability). With this in mind, the sample mean for final SUS score was 59.75 ($SD = 13.32$), indicating that as a sample, participants considered Sparkfolio to be more usable than not. The My Media group scored higher ($M = 62.67$, $SD = 11.71$) than the Network Media group ($M = 56.83$, $SD = 14.56$). As the only difference between the two groups' Sparkfolio experiences was the way their social data was presented to them, this approximately 5.8-point difference can tentatively be attributed to Planning Mode. As described in Chapter 2, mean scaled scores for SUS responses were also calculated, and were ultimately the scores used in the multiple regression analyses. These scores can also be found in Table 21. Again, the scale for these scores is 0 (low agreement with usability) to 4 (high agreement with usability). With a sample mean of 2.39 ($SD = .53$), participants as a whole tended to fall between

agreeing with and feeling “neutral” about Sparkfolio’s usability. Furthermore, with a group mean of 2.51 ($SD = .47$), the My Media group tended to be slightly closer to “agreement” than “neutral,” while the Network Media group ($M = 2.27$, $SD = .58$) tended to be much closer to “neutral” than “agreeing.” These results were particularly relevant to the second research question, as the My Media group tended to respond more positively to Sparkfolio in terms of usability than the Network Media group did. In fact, MeanSUSFinal was found to be a reliable predictor for the change in writing quality, but not for the change in writing motivation (see regression results below).

Writing Quality Results

A multiple regression analysis was conducted with the twelve variables described above as a single set of potential predictors for the change in writing quality, using the forward selection method. Only one variable, the mean scaled SUS score, was identified as a significant predictor, $F(1, 28) = 4.50$, $p = .04$. With $R^2 = .14$, approximately 14% of the variance of the sample’s change in writing quality can be accounted for by the mean scaled SUS score. Interestingly, the Pearson correlation coefficient for this relationship was $-.37$, which implies that the lower a participant ranked Sparkfolio’s usability, the greater the gain in writing quality. It is unclear why this relationship was observed.

One possible explanation is the degree of information and communications technology (ICT) literacy for each participant. It may be that participants who had more experience with digital tools and technology found Sparkfolio easy to use—so easy, in fact, that they were distracted by the card-flipping and social media browsing and not focused on the task at hand—finding writing ideas and planning work. In contrast, perhaps participants with less technology exposure focused less on “playing” with

Sparkfolio and—while they found it less usable—focused more on using it solely for prewriting. It has been documented that few studies with technology interventions for adolescents also measure ICT literacy (Arnone, Small, & Reynolds, 2010), and very few instruments exist that actually allow researchers to do so (Lau & Yuen, 2014).

Unfortunately, this study was no exception—no data on participants’ ICT literacy was collected, and so the involvement of ICT literacy in these results is speculative. In future work, it would be advantageous to use an ICT literacy measure (perhaps Lau & Yuen's; 2014) to further investigate this possibility.

Another potential explanation for the negative relationship between SUS scores and the change in writing quality is participants’ expectations for Sparkfolio. It is possible that given the initial explanation of the tool, they imagined more features or the functionality of a well-established site such as Facebook, which is the result of a massive effort involving years of iterations and testing. While Sparkfolio 1.0 was fully functional, this study marked Sparkfolio’s first use by students (and thus its first evaluation). Furthermore, it is possible that participants who were already disposed to detailed prewriting wanted to push Sparkfolio’s planning capabilities to its limit, and thus rated it lower on usability despite the help it provided in increasing writing quality. Again, further research is required to ascertain whether this negative relationship between MeanSUSFinal and the change in writing quality is replicated.

Writing Motivation Results

A fourth and final multiple regression analysis was conducted—using forward selection—with the change in writing motivation as the dependent variable and the twelve variables mentioned above as possible predictors. As a result,

PlannerTotalWordCount was identified as the sole predictor, $F(1, 28) = 7.34, p = .01$. As $R = .46$ and $R^2 = .21$, approximately 21% of the variance of the sample's change in writing motivation can be accounted for by this prediction model. Based on these results, it is evident that PlannerTotalWordCount is an accurate predictor for the change in writing motivation. However, it is difficult to establish causality, as this relationship is a (fairly strong) correlation. It is possible that writing more words on story planners resulted in greater motivation gains. At the same time, it is also possible that the act of using Sparkfolio in general resulted in motivation gains, which in turn prompted participants to engage more in planning and ultimately resulted in higher word counts. Although causality is inconclusive, it appears that creating detailed story plans with Sparkfolio either: a) results in heightened motivation; or b) indicates increased motivation from using the tool in general. As PlannerTotalWordCount and the change in writing motivation are clearly correlated, their relationship provides additional direction for future research.

Qualitative Analyses

The following section will outline the qualitative findings from the open-response Sparkfolio Usability Survey items and from the one-on-one conferences with participants. General results regarding the coding scheme and prominent themes are described first, followed by results from each of the two data sources.

General Results

Thirty participants (15 My Media and 15 Network Media) completed the six survey items (resulting in 180 total responses) and participated in two conferences with the researcher (for a total of 60 responses), providing an overall total of 240 qualitative

responses. All responses were initially coded and categorized, and similar and/or redundant categories were iteratively combined. During this process, it was determined that the content of responses was essentially the same on both the survey items and the conference conversations, and so the same coding scheme was ultimately used for both data sources. Aside from nine responses (3.75% of total responses) that were not classifiable due to either ambiguity (e.g. “*I don’t know*”) or incoherence (e.g. “*the website to write*” for the survey item regarding what was confusing or difficult), all responses were assigned one or more codes based on their content. Prominent themes were:

- a) *Useful*: Sparkfolio was described as useful for coming up with ideas/story details;
- b) *Easy to Use*: Sparkfolio was described as easy to use;
- c) *Finding Ideas*: It was sometimes difficult to find writing ideas from social data;
- d) *Suggestions*: Ideas for supplementary Sparkfolio features;
- e) *Criticism*: Negative comments about existing Sparkfolio features/usability;
- f) *Social Media Use*: Participants sharing that they do not use social media often (and thus had less content to choose from);
- g) *Already Had Ideas*: Participants sharing that—once they received a writing prompt—they already knew what they wanted to write about before using Sparkfolio; and
- h) *Planner Only*: Sentiments explicitly citing the story planner as useful and the idea cards as not so useful.

Specific examples of these themes are provided below, along with items particularly associated with them.

Open Response Sparkfolio Usability Survey Items

Idea Cards

A first survey item asked, “How useful was the ‘cards’ part of Sparkfolio for coming up with writing topics?” The two most common responses across groups involved a) describing Sparkfolio as useful; and b) reporting it was difficult to find writing ideas from social data. Although these two categories appear to be at odds with each other, their group-level frequencies provide more clarity.

Useful. Five out of 15 My Media participants (33%) described the idea cards as useful. For example, one participant felt Sparkfolio “*helped bring ideas and thoughts to the table.*” Another said: “*I got my ideas for both narratives from Sparkfolio.*” A third described the cards as “*beneficial because I got to use pictures to help me think about the things in the past.*” In contrast, only two out of 15 Network Media participants (13%) responded similarly, with one clearly positive comment (“*I was able to come up with ideas a lot easier than just off the top of my head*”) and one response indicating marginal usefulness (“*It varied, but it did lend some ideas.*”) These results suggest that the authorship of social data had an effect on participants’ perceptions of card usefulness—those using self-authored data (My Media) tended to see them as more useful than those who used network-authored data (Network Media).

Finding Ideas. Seven out of 15 My Media participants (47%) had responses indicating they had difficulties finding usable ideas. For example: “*I don’t often post about anything I find meaningful enough to write about. I typically just post simple*

thoughts that are funny, or a few pictures with friends. I like to write [personal narratives] about heavier topics.” However, 12 out of 15 Network Media participants (80%) described difficulties in finding ideas from their card decks. One said her cards “*were all old, irrelevant pictures of random people.*” Another Network Media participant shared that “*Most of the stuff that would come up on the cards was things I would never want to write about, some even completely irrelevant to me.*” These responses indicate that the Network Media group clearly had more trouble locating social data that prompted workable ideas than the My Media group. While 47% of My Media participants also reported difficulties, when considered alongside the “usefulness” responses above, it appears that they still had considerable advantages in this area compared to the Network Media group. This is underscored by: a) the Network Media group’s redraw/cards-seen counts, which were almost twice that of the My Media group (see “Multiple Regression Analyses” section); and b) perhaps more importantly by the My Media group’s greater increase in writing quality (.27) compared to the Network Media group’s (.07).

Furthermore, the high perceived difficulties in finding ideas for both groups may also be attributed to participants expecting to instantly find useful writing ideas, but instead needing to spend more time than they anticipated to find them. As illustrated by logged data for the number of a) story plans created, b) story details added, and c) words used in story planners (see “Multiple Regression Analyses” section), participants did eventually find usable data and were able to create story planners with it. Thus, it is likely that responses to this survey item can be more accurately described as answers to the question “How *instantly* useful was the ‘cards’ part of Sparkfolio for coming up with writing topics?” Although managing adolescents’ expectations for educational technology is a

lofty undertaking, this issue could be potentially addressed by adding filtering algorithms for identifying useful cards for story ideation in a future version of Sparkfolio in an effort to expedite the idea card selection process. For example, using the metadata associated with each card, priority could be placed on cards with high engagement from other users. Posts with a large number of likes/favorites, comments, and/or replies may indicate engaging content that is more likely to become a repurposed as a story idea.

Story Planner

A second open-ended survey item asked participants, “How useful was the story planner in Sparkfolio for planning and organizing your writing?” The most common responses across both groups described the story planner as “useful,” including five out of 15 (33%) My Media participants and seven out of 15 (47%) Network Media participants. One My Media participant *“liked how it asked questions. The questions that Sparkfolio asked me about my story were very great at reminding me to include details.”* Other My Media participants thought the planner *“helped break down certain parts of the story”* and *“set a good format for the paper and it made it easier to write the narratives.”* Similarly, a Network Media participant said the planner *“was a very effective prewriting source which resulted in me being able to bring my thoughts together quicker than if I wasn’t using it.”* A second Network Media participant felt *“the main draw to [Sparkfolio] is the ease of organization and overall prewriting. Normally, I never do any kind of prewriting, but with this site, I found it helpful for once.”* Unsurprisingly, it appeared that perception of the planner was not affected by the authorship of social data, and thus the story planner was more well-received in comparison to the social-data-dependent idea cards.

Likes and Dislikes

Within-group trends were observed while examining the responses for “What did you *like* about the system?” and “What did you *dislike* about the system?” Responses tended to be split between describing Sparkfolio as useful and having difficulty finding ideas. For example, six out of 15 My Media participants (40%) described Sparkfolio as useful in their responses for the “like” item (e.g. *“It helped promote ideas and create a story from beginning to end”*), while six out of 15 My Media participants (40%) reported difficulties finding useful media for the “dislike” item (e.g. *“It did not spark many ideas”*). Similarly, four out of 15 Network Media participants (27%) said Sparkfolio was useful in their “like” responses (e.g. *“It gave me some really good ideas. Once I saw the pictures, I knew exactly what I was writing about”*), and four out of 15 Network Media participants (27%) cited difficulties finding useful media for the “dislike” item (e.g. *“My cards didn’t give me any ideas to write about, although I can see how it may for some people”*). Essentially, these results suggest that when participants were asked about their likes and dislikes about Sparkfolio, there were not necessarily any between-group differences in perceived usefulness or difficulties finding ideas.

Confusing or Difficult Features

When asked “What did you find confusing or difficult to use?”, the most common answers actually remarked that nothing was difficult—that the system was easy to use. For example: *“I found nothing to be really confusing. It was all really easy to use”*; *“Nothing was confusing. It was actually quite simple”*; and *“Nothing. It was easy.”* 15 out of 30 participants (50%) responded this way. Worth noting, however, is that while ten out of 15 My Media participants (67%) described the system as easy to use, only five out

of 15 Network Media participants (33%) responded similarly. It appears that although the only difference between groups was social data authorship, this difference had at least somewhat of an impact on Sparkfolio's perceived usability. Those who worked with self-authored data while planning were twice as likely to say the system was easy to use as those who used network-authored data.

Suggested Improvements

The final survey item asked participants "What improvements would you suggest?" Three out of 15 Network Media participants (20%) provided ideas for supplementary Sparkfolio features (e.g. *"Maybe once a card is selected, have [other cards] pop up from around the time period that it was posted"*), while six out of 15 Network Media participants (40%) gave negative comments about Sparkfolio's features and/or functionality (e.g. *"When you discard a card, it shouldn't come back"* and *"If you clicked too many times on the cards you were trying to hold, it sometimes wouldn't stay held."*). In contrast, for the My Media group, five out of 15 participants (33%) offered ideas for additional features (e.g. *"Adding other social networks"* and *"Make the cards so you can save them and make the perfect deck"*), and no participants gave negative criticisms of existing features or usability. Similar to the "confusing or difficult" item above, it appears that although both groups used the same exact application except for differences in social data authorship, this data authorship colored perceptions of the application. Those who used self-authored data (My Media) were more prone to making positive comments and those who used network-authored data (Network Media) were more likely to offer negative comments.

General Comments

Overall, the survey results imply that although both groups were equally positive about the story planner, the My Media group tended to be more responsive to the idea cards feature, while the Network Media group had more negative comments about the idea cards. In general, the My Media group appeared to have a more positive experience with the application, while in comparison, the Network Media group were more negative. In terms of the second research question, while the change in writing motivation between groups was nonsignificant, the My Media group seemed to be more motivated than the Network Media group based on open-ended survey responses.

Furthermore, as discussed above in the “Idea Cards” item section, it appears that many participants felt the idea cards could have been more useful for idea generation. Social data authorship aside, it is argued that this issue could be addressed by leveraging metadata to filter cards during the “dealing” stage of Sparkfolio. Priority could be placed on dealing cards to the user that have features indicating potentially interesting stories (e.g. a large number of likes or comments). Such options will be explored as subsequent versions of Sparkfolio are created.

Participant Conferences

The following section summarizes participant responses during the one-on-one conferences. As described above, each of the 30 treatment participants (15 My Media and 15 Network Media) participated in two conferences, conducted two days prior to the due date for each of the “treatment” personal narrative writing assignments. This resulted in a total of 60 responses. Prominent themes are presented and discussed below.

Useful

The clearest trend in the participant conferences was participants describing Sparkfolio as useful. This included 17 out of the 30 My Media responses (57%) and 11 out of 30 Network Media responses (37%). It was quite apparent that the My Media group exhibited more positive feelings about the application, including comments such as: *“It gave me ideas from things that have happened to me,” “It brought back memories,”* and *“The cards helped me think.”* At the same time, Network Media participants also found that they *“got lots of ideas from the cards...Sparkfolio helped me work quickly”* and that the cards *“helped me build out my idea.”* Similar to the survey results above, when paired with logged data on number of cards seen, redraws, and story planner details/word counts as well as the writing quality results, these responses indicate that using self-authored media was more associated with positive experiences, greater engagement in the tool, less time spent searching for ideas, and higher writing quality gains in comparison to the Network Media group.

Finding Ideas

To supplement the “usefulness” results above, two out of 30 My Media responses (7%) described difficulty finding ideas using the cards (e.g. *“I didn’t get any ideas from my cards”*) while six out of 30 Network Media responses (20%) reported similarly (*“The pictures I’m seeing in the cards don’t ‘bring me back.’ I want to write about something that moves me.”*) The frequency of this response type between groups offers further justification for self-authored data providing greater overall utility.

Already Had Ideas

During conferences, a few participants shared that upon receiving the prompts for their writing assignments, they instantly came up with ideas for writing topics, and furthermore, some of these participants even felt ready to start writing because they had already planned their work in their heads. Six out of 30 My Media responses (20%) and five out of 30 Network Media responses (17%) contained such descriptions. All treatment participants were asked daily to use the idea cards and story planner portions to ensure treatment fidelity (even if they already had ideas) and the conferences were used as a check-in on this process. Many participants felt they benefitted from using Sparkfolio despite already having ideas—particularly the story planner portion: *“I knew what I was going to write already, so I didn’t use the idea cards, but the planner was a good organizer for my ideas.”* However, there were still some students who did not create a total of two story plans during the course of the experiment, as evidenced by the StoriesCreated variable (see Table 18). Yet, it is important to note that all treatment participants did use the idea cards component of Sparkfolio during multiple sessions for both treatment assignments, and furthermore, all treatment participants created at least one Sparkfolio story plan across the two treatment assignments. As described in Chapter 2, Sparkfolio was designed to help students come up with personally relevant writing ideas and plan them accordingly, but only to the extent that they need it. Many students in the participatory design focus groups voiced frustration with teachers requiring them to turn in fully fleshed-out writing plans for a grade when they feel they are ready to simply start writing (and spending extra time on creating an outline often feels like a waste of their time). Along those lines, both My Media and Network Media participants were

required to use Sparkfolio during allotted class times and were very strongly encouraged to create detailed story plans for both treatment narratives, but were not held back if they felt they were ready to start writing after, for instance, a moment of inspiration from simply looking at idea cards. Thus, it is argued that treatment fidelity was maintained. Even participants who initially felt “ready to write” still used Sparkfolio as part of the prewriting process for both writing assignments, providing opportunities for the tool to color their writing performance and motivation—even if a participant created one, but not two story plans. With all of this in mind, there did not appear to be any between-group differences in this “already having an idea” observation.

Social Media Use

A small amount of participants in both groups shared that because they are not frequent social media users, they did not find their idea cards useful in choosing story topics (e.g. “[Sparkfolio] depends on your social media use; I have a pretty weak Twitter account” and “I don’t post a lot of personal stuff on Twitter so the data wasn’t so useful for my writing.”). This included three out of 30 My Media responses (10%) and four out of 30 Network Media responses (13.33%). With this in mind, there were not drastic between-group differences, and as shown by the multiple regression analyses, neither the amounts of cards imported nor the mean authored social media posts per day had a significant impact on the writing quality or writing motivation results. However, it is important to keep such students in mind for future iterations of Sparkfolio. As Sparkfolio 1.0 assumes that all users have usable social data, possible provisions for infrequent social media users (or non-users) could be the ability to upload one’s own digital photos (photos that have not been posted on social media sites) or perhaps even the option to

bypass the idea cards and go directly to the story planning screen. In fact, it appears that several participants would have appreciated such a “planner only” option.

Planner Only

Although it was not the most common response, it is worth noting that some participants felt only the story planning component (and not the idea cards portion) was useful. For example, a My Media participant said: *“I don’t use social media a lot so the cards don’t always work for me, but the planner is useful.”* Similarly, a Network Media participant described the cards as *“bland, but the organizer is still useful for writing.”* Another Network Media participant shared that she would be more willing to use Sparkfolio *“if I wasn’t required to use the cards...and providing just the planning system.”* This sentiment was found in one out of the 30 My Media responses (3%) and four out of 30 Network Media responses (13%). While this category applied to only a few responses, it again underscores the results shared above regarding the Network Media group’s relative disinterest in network-authored data in comparison to the relative engagement and interest in self-authored data among My Media participants.

All of the above analyses were considered and synthesized while addressing this study’s research questions. The following chapter presents an overview of these findings and discusses their relevance to answering the research questions.

CHAPTER 4

DISCUSSION

Overall, results provided statistically significant support for the first research question's hypothesis (regarding the Treatment groups vs. the Control group), but only for the change in writing *quality* ($f = .35$). Results for the change in writing *motivation* were *not* significant and the observed effect was minimal ($f = .04$). Additionally, although results for the second research question (My Media vs. Network Media) were nonsignificant, the descriptive statistics for the changes in writing quality and motivation aligned with the hypothesis, and both the writing quality and writing motivation contrasts yielded small observed effects ($f_{\text{quality}} = .11$; $f_{\text{motivation}} = .14$), providing tentative support for the second research question's hypothesis.

Research Question 1

The first research question asked: “*Does the use of social media data as inspiration for writing during the prewriting process improve adolescents' writing quality and writing motivation in comparison to those who do not?*” It was hypothesized that using social media data for inspiration during prewriting *would* improve both writing quality and writing motivation. As described below, the writing quality results supported the hypothesis, while the writing motivation results did not.

Writing Quality

Based on an *a priori* orthogonal contrast, the two treatment groups had statistically significantly higher gains in writing quality (see Tables 3 & 4), compared to the Control group, with a medium-to-large observed effect ($f = .35$). Thus, it appears that using Sparkfolio for generating ideas and planning was, in fact, effective in increasing

writing quality. Additionally, while results were nonsignificant at the individual writing trait level, it seems that Sparkfolio was particularly helpful in increasing writing quality in the areas of Organization, Word Choice, Sentence Fluency, and possibly Conventions (or at least in preventing decreases in these traits when students are asked to complete multiple writing assignments in succession). Furthermore, a multiple regression analysis confirmed that the significant change in overall writing quality was not impacted by gender or social media usage prior to the experiment, providing additional evidence that the change in writing quality can be attributed to the use of Sparkfolio. While this study was the first-ever deployment of Sparkfolio and was comprised of a 46-participant sample, the results indicate that Sparkfolio did, increase the writing quality of the participants who used it, in comparison to those who did not. Accordingly, the hypothesis for the first research question was upheld for the writing quality dependent variable.

Writing Motivation

In terms of the change in writing motivation, differences between groups were minimal, with all three groups changing by less than .1 of a Likert-scale point (see Table 7). The My Media and Control groups slightly increased while the Network Media group slightly decreased. Unsurprisingly, an *a priori* orthogonal contrast for the treatment groups vs. the Control groups was nonsignificant with a minimal observed effect ($f = .05$; see Table 8). Moreover, the treatment groups decreased in the *confidence construct* while the Control group increased (see Table 9). Although this difference was nonsignificant, a medium effect was observed ($f = .23$; see Table 10). At face value, the confidence shift results appear to imply that Sparkfolio decreases confidence, but it is also possible that using Sparkfolio made participants more aware of writing's complexity, an awareness

which has been demonstrated to both increase and indicate writing proficiency and metacognition (see Chapter 6; Flower & Hayes, 1980; Graham & Harris, 2006; Hayes, 1996; Zimmerman & Risemberg, 1997). However, in a multiple regression analysis, none of the assessed factors significantly predicted the change in writing motivation. This, combined with minimal changes across groups from pretest to posttest, suggests that using Sparkfolio did not appear to provide any motivational advantage or disadvantage to participants in comparison to those who did not. Thus, the hypothesis for the second research question was not supported in terms of writing motivation.

General Discussion

As computerized learning systems and algorithms for supporting education become increasingly pervasive, the use of personalized learning is quickly gaining traction in education; in fact, integrating personalized learning in K-12 settings is considered a “solvable” challenge “because the underlying technologies needed to support personalized learning are readily available now” via Internet-enabled devices, a wide variety of applications, and easily-tracked personal informatics (Johnson, Adams Becker, Estrada, & Freeman, 2014, p. 44). With these tools at educators’ disposal, providing adaptive and relevant learning is simply a matter of determining optimal ways to leverage them. In this spirit, many educational technology applications in recent years have attempted to harness the engagement and interactive qualities of social media for learning purposes (Aydin, 2012). In particular, such work has focused on: a) capitalizing on fostering discussion and participation (e.g. Bowman & Akcaoglu, 2014; Dougherty & Andercheck, 2014; Jong, Lai, Hsia, Lin, & Liao, 2014; Khaddage & Bray, 2010; Lampe, Wohn, Vitak, Ellison, & Wash, 2011; Mazman & Usluel, 2010; Prescott, Stodart, Becket,

& Wilson, 2013; Wang, Woo, Quek, Yang, & Liu, 2012); b) using social media sites as learning/content management systems (e.g. Khaddage & Bray, 2010; Phosaard, 2007; Wang et al., 2012); and c) for supporting the acquisition of a second language (e.g. Abdul Razak, Saeed, & Ahmad, 2013; Cambi & Campos, 2013; Hu, 2014; Kabilan, Ahmad, & Abidin, 2010). However, despite the global attention on integrating social media technology into learning environments, few efforts have leveraged the massive personal datasets students actively and voluntarily curate for educational ends.

Accordingly, the results of the current study suggest that utilizing students' personal datasets (which naturally include memories, interests, and text-based conversation) to bring personal relevance into the classroom—a vastly unexplored approach—presents potential learning impacts. The ability to easily link learning to real-life prior experiences and individual interests at the student level stands to scaffold learning with both cognitive and affective needs in mind. Of course, while the accessing, repurposing, and storing students' personal data must be done securely and confidentially to protect individuals' privacy, this work implies that doing so shows promise in personalizing learning, particularly to foster personally relevant learning experiences.

Research Question 2

This study's second research question was: *“What are the differences in writing quality and writing motivation between adolescents who use self-authored social media data as inspiration for writing during the prewriting process and those who use social media data authored by their friends' during prewriting?”* It was hypothesized that adolescents using self-authored data would have greater gains in writing quality and writing motivation than those using data authored by others. While a majority of the

results were nonsignificant, considering them as a whole provides a tentative argument for upholding the hypothesis—that using self-authored social media data appears to be both more time-efficient, engaging, and impactful in comparison to using network-authored data during prewriting.

Writing Quality

From pretest to posttest, the My Media group had higher gains in writing quality than the Network Media group (see Table 3), but despite the small observed effect ($f = .11$; see Table 4), the results were nonsignificant, and future work (perhaps with a larger sample) may yield more definitive results. Hence, it is possible that using self-authored social data for planning in Sparkfolio yielded higher writing quality gains than using social data authored by others in one's network (tentatively in the areas of Word Choice and Sentence Fluency), but additional research is required for confirmation.

Yet, it appears that usability better explains the variance in the change in writing quality than Planning Mode. In a multiple regression analysis, the mean scaled SUS score was the only significant predictor for the change in writing quality, but this was a negative relationship, implying that the higher a participant rated Sparkfolio's usability, the lower the gain in writing quality. These results—while unexpected—may be explained by ICT literacy and/or participants' (perhaps) unrealistic expectations of Sparkfolio, particularly its ability to locate useful social data using a purely random idea card dealing algorithm rather than one that deliberately filters for cards with story-ready metadata (see “Qualitative Analyses” in Chapter 3).

In summary, although it is possible that planning with Sparkfolio using self-authored social data has a small positive effect on writing quality in comparison to using

data authored by others, additional research is required to provide more definitive evidence for this observation.

Writing Motivation

For the overall change in writing motivation, the My Media group increased and the Network Media group decreased. While these changes were minor (and only .13 of a Likert-scale point apart), a small effect was observed ($f = .14$). This effect may be verified with additional research, but cannot necessarily be supported with this study's results. More interestingly, however, planning in Sparkfolio with self-authored data particularly appeared to have a positive impact on the *passion construct*, while using data authored by others negatively affected passion, resulting in a medium-to-large observed effect ($f = .29$). While this difference was nonsignificant, it is worth further exploration.

However, based on a multiple regression, it appears that Planning Mode was not an accurate predictor for the change in writing motivation. Instead, the best (and only) reliable predictor for the change in writing motivation was the total number of words each participant wrote in Sparkfolio story plans. This can be interpreted in several ways. It could be that spending more time planning with Sparkfolio (i.e. creating plans with higher word counts) resulted in higher writing quality. However, it could also be that the total planner word count was a reflection of positive experience with Sparkfolio, which could positively correlate with the change in writing quality.

Several other Sparkfolio usage variables—although nonsignificant as predictors for motivation change—are worth noting. First, the Network Media group viewed a little less than twice the number of cards that the My Media group viewed (see Tables 15 & 16), suggesting that it took the Network Media group approximately twice as long to find

usable data for story ideas. Moreover, the My Media group created almost twice as many total story details as Network Media (see Table 19), and wrote more than twice as many words on their story planners as Network Media (see Table 20). This implies that self-authored data resulted in more engagement in the tool, particularly while using it to plan and organize. These sentiments were echoed by qualitative results (see Chapter 3), which also suggested that the My Media condition provided more useful idea card content and a more positive overall experience than reported by Network Media participants.

Overall, using self-authored data to plan within Sparkfolio may have a small positive effect on writing motivation and using data authored by others may have a small negative effect, but this argument cannot be justified without additional research.

General Discussion

The descriptive results for Research Question 2 were in line with the hypothesis—that self-authored data would provide higher writing quality and motivation gains than network-authored media. However these results were nonsignificant and cannot be fully supported without additional research. At the same time, based on logged Sparkfolio data, the Network Media group: a) spent nearly twice the time as the My Media group searching for idea cards; b) generated nearly half as many story details on their planners; c) wrote less than half the words on their planners; and d) had only 1/4 the writing quality gain in comparison to the My Media group. Furthermore, based on the qualitative Sparkfolio Usability Survey responses and student conferences, the My Media group were more likely to report that they found Sparkfolio useful in comparison to the Network Media group. It thus appears that using one's self-authored social data is both a

better use of students' time and results in greater writing gains. In this regard, the hypothesis for the second research question was tentatively supported.

Yet, the results do not completely discredit network-authored data. The Network Media group did, in fact, have a small writing quality gain. Accordingly, it is argued that including both self-authored and network-authored social data could potentially benefit adolescent writers, but with an emphasis on self-authored data as the primary idea source and network-authored media as a secondary supplement (perhaps with an idea card filtering algorithm that suggests self-authored data 2/3 of the time and network-authored media 1/3 of the time). Such an approach may provide insight as to which aspects of social data yield beneficial story ideas by asking participants to select from both self-authored and network-authored data side-by-side.

Summary of Overall Findings

Significant results supported the first research question's hypothesis for writing quality, suggesting that using Sparkfolio for writing planning resulted in greater writing quality gains for the two treatment groups in comparison to the Control group. However, due to minimal, nonsignificant changes in writing motivation, the hypothesis was not supported for motivation. Although both *a priori* orthogonal contrasts for the second research question were nonsignificant, the hypothesis was tentatively supported for both writing quality and writing motivation based on descriptive statistics, logged Sparkfolio usage data, and qualitative participant responses.

Contributions

The aim of this work was to address the cognitive and affective challenges of adolescent writing instruction with a social media based prewriting tool. Accordingly, the

primary contribution of this study is the resultant creation, implementation, and evaluation of Sparkfolio, a first-of-its kind tool for adolescent writers that simultaneously appeals to the affective and cognitive components of writing by providing: a) easy access to personally relevant and intrinsically-motivating ideas for writing; and b) structure and scaffolding for planning writing. Furthermore, as a result of this study, Sparkfolio's impact on writing quality has been validated with statistically significant results, as the treatment groups had significant writing quality gains in comparison to the Control group.

A more general—but perhaps even more important—implication of this work is the potential cognitive and affective benefits of leveraging social media data for personalized learning, especially through linking educational activities and content to one's own personally relevant experiences, memories and interest. As discussed above, a majority of educational research surrounding social media regards harnessing its communicative affordances for learning purposes. However, using the vast datasets about students that they themselves are intrinsically motivated to curate is unexplored territory in educational settings. Although the protection and ethical use of personal data is a vastly important consideration for such work, the present study suggests that such an approach has the potential to positively impact learners by providing “automated” personal connections to learning and cultivating those connections with scaffolded activities.

Future Work

Short-Term

The most immediate aims of future work will involve efforts to replicate and/or strengthen this study's findings and to continue iteratively developing Sparkfolio based on feedback from its initial implementation.

Replication

As Sparkfolio is a first-of-its-kind learning application and was piloted in a sample of 46 high school students, of primary interest is whether a larger sample of students would yield similar results. Perhaps such work would provide more definitive results for variables with noticeable between-group differences that yielded nonsignificant results (e.g. the traits of Organization and Word Choice, the change in motivation for My Media vs. Network Media, the WDS constructs of passion and confidence, etc.). Additionally, it is of interest to conduct similar studies during different parts of the school year. As the present study was conducted near the end of the Fall semester, it may be that the upcoming final exams/projects and holidays (Thanksgiving, Christmas, Hanukah, etc.) had somewhat of an impact on participants' performance and motivation. For example, the Control group's decrease in writing quality from pretest to posttest may be partially explained by the time in the school year—with students focused more on finals and holiday vacations than lower-stakes writing assignments. Moreover, it may be beneficial to include additional measures in future studies, including an ICT literacy pretest to determine whether participants' computer literacy in general interacts with the experimental conditions (see Chapter 3), and perhaps an “expectations of usability” pretest. As described in the “Qualitative Analyses” section of Chapter 3, it

appeared that Sparkfolio users felt finding usable data for stories did not happen as quickly as they would have liked. With that in mind, it is possible that providing a usability expectations pretest (administered after a demo of Sparkfolio but before actually using it) with items such as “How quickly/easily do you expect to find usable data for stories in Sparkfolio?” may provide additional insight into the results of the dependent variables, and could also inform future iterations of Sparkfolio.

Improving Sparkfolio

As the story planner was relatively well-received by participants, it appears that the idea cards portion of Sparkfolio is an area for refinement. To inform this development, an exploration of the most useful data sources among Sparkfolio users would be appropriate. Of particular interest would be which of the suits (text, images, people, or locations) are most commonly used for story ideas, as well as which of the three social media sites (Facebook, Twitter, and Instagram) appear to be used most frequently for story planning. Furthermore, an analysis of the timestamps for idea cards used in story planners would be beneficial, particularly to investigate whether newer, more recently-created data or older data (or some combination) are most useful. Such analyses could inform the creation of filtering algorithms that could be employed during the idea cards “dealing” component based on each card’s metadata. Another area of interest along these lines is whether a completely random approach to dealing cards is more beneficial (perhaps due to serendipity) than an approach with some sort of prioritized content filtering algorithm. Finally, as mentioned above, future work could also further explore the utility of self-authored data vs. network-authored data by providing both to each user and determining the “self” to “network” ratio of used media

in story planners. All of the above will be considered during the development of Sparkfolio 2.0.

Long-Term

One long-term aim of this work is to develop multiple use paths for Sparkfolio—paths that vary based on the user’s prewriting needs. The current system provides users with random cards from their social media data, which is a sensible approach for students who have no idea what to write about. However, this can be prohibitive for students who already have initial ideas for their writing topics. For example, several participants in this study shared that upon receiving a prompt for a writing assignment, they knew right away what they wanted to write about and felt randomly browsing for idea cards was counterproductive. At the same time, such students reported that the story planner portion was useful for organizing ideas and adding details. With this in mind, one possible new option for Sparkfolio could involve a “Planner Only” path. Essentially, a user could indicate “I already know what I want to write about and am ready to plan,” which would allow the user to bypass the idea cards and proceed directly to the story planner. Additionally, some participants indicated that they often had general ideas for writing topics prior to using Sparkfolio, but were hoping to find idea cards associated with that general topic (e.g. Halloween, summer, a vacation to California, etc.) so they could locate more specific posts to trigger memories. Such participants noted that they would have liked a possible third use path—one allowing them to enter keywords to search for content, which would allow only the search results to be dealt to them as idea cards. As this request for a “Search” option is sensible, future iterations of Sparkfolio will explore this possibility.

Additionally, options will be explored in the area of requiring unrestricted access to Facebook, Twitter, Instagram, and any other connected social media accounts on school networks as described in Chapter 2 (see “Notes on Implementing a Social Media Application in a School Setting”), perhaps by finding alternate methods for retrieving data within common school network restrictions rather than requesting social media access for certain computers or connections. Furthermore, as mentioned in Chapter 3 (see “Social Media Use” in the “Qualitative Analyses” section), other efforts may include options for manually uploading media or data (e.g. one’s digital photos that have not been posted on a social media site) as a solution for infrequent social media sharers who would still like to use Sparkfolio to jog memories and plan based on them.

Finally, it is of interest to explore Sparkfolio’s impact in other writing genres (e.g., fiction, expository, persuasive), with other users (e.g. higher education students, creative professionals, artists, bloggers, etc.), and with the addition of other social media sites’ data (e.g. Pinterest, Tumblr, WordPress, and FourSquare).

Final Remarks

Despite a low national writing proficiency and a general disinterest in school writing among adolescents, they are intrinsically motivated to write informally on social media sites. While it would be sensible to bring this natural engagement with sharing personal content into the writing classroom, little work has explored such possibilities. However, this first-of-its-kind study gave students the opportunity to use their social media data as inspiration for writing assignments and helped them organize those ideas in preparation for a first draft through an online application called Sparkfolio. Results indicated that those students who used Sparkfolio had statistically significantly higher

gains in writing quality than students in a control group, which not only provides a new avenue for improving adolescent writing, but also implies that (securely) leveraging students' own social media data in an educational context holds potential in personalizing learning, particularly in offering opportunities for making personally relevant connections in learning environments.

Table 1

Descriptive Statistics for Post Frequency, by Social Media Site

	Posts Per Day			Posts Per Week		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Facebook Users	0.33	0.84	236	1.51	3.45	236
Instagram Users	0.96	1.92	149	6.65	13.35	151
Twitter Users	9.09	24.12	125	45.72	101.71	124

Table 2

Descriptive Statistics for “Everyday Activity” Responses

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
“Facebook is part of my everyday activity.”	2.59	1.14	236
“Instagram is part of my everyday activity.”	3.42	1.31	126
“Twitter is part of my everyday activity.”	3.33	1.06	155

Table 3

Descriptive Statistics for Overall Writing Quality Scores (N = 46)

Planning Mode	Pretest		Posttest		Change		N
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
My Media	3.87	.74	4.13	.84	.27	.59	15
Network Media	4.00	.65	4.07	.70	.07	.96	15
Control	4.25	.58	3.88	.62	-.38	.72	16
Total	4.04	.67	4.02	.71	-.02	.80	46

Table 4

A Priori Orthogonal Contrast Results for Overall Writing Quality Scores (N = 46)

Research Question	F	p	η^2	f	$1-\beta$
RQ1: Treatment vs. Control	5.14	.03	.11	.35	.60
RQ2: My Media vs. Network Media	.50	.48	.01	.11	.11

Table 5

Descriptive Statistics for Individual Six Writing Trait Scores (N = 46)

Writing Trait	Planning Mode	Pretest		Posttest		Change		N
		M	SD	M	SD	M	SD	
Ideas and Content	My Media	4.07	.70	3.87	.92	-.20	.77	15
	Network Media	3.93	.80	4.00	.93	.07	1.22	15
	Control	4.19	.75	4.00	.82	-.19	1.05	16
	Total	4.07	.74	3.96	.87	-.11	1.02	46
Organization	My Media	4.00	.53	4.07	.80	.07	.88	15
	Network Media	3.93	.46	4.00	.65	.07	.70	15
	Control	4.19	.54	4.00	.52	-.19	.75	16
	Total	4.04	.51	4.02	.65	-.02	.77	46
Voice	My Media	4.20	.41	4.20	.77	.00	.53	15
	Network Media	3.87	.64	4.00	.76	.13	.92	15
	Control	3.88	.81	3.88	.62	.00	.97	16
	Total	3.98	.65	4.02	.71	.04	.82	46
Word Choice	My Media	4.07	.46	4.13	.83	.07	.70	15
	Network Media	3.87	.74	3.87	.64	.00	1.00	15
	Control	4.19	.54	3.75	.77	-.44	.81	16
	Total	4.04	.59	3.91	.76	-.13	.86	46
Sentence Fluency	My Media	4.07	.59	4.07	.70	.00	.85	15
	Network Media	3.93	.70	3.80	.41	-.13	.83	15
	Control	4.06	.44	3.69	.60	-.38	.72	16
	Total	4.02	.58	3.85	.60	-.17	.80	46
Conventions	My Media	3.87	.35	3.73	.46	-.13	.52	15
	Network Media	4.00	.00	3.87	.35	-.13	.35	15
	Control	4.00	.63	3.69	.60	-.31	.79	16
	Total	3.96	.42	3.76	.48	-.20	.58	46

Table 6

A Priori Orthogonal Contrast Results for Individual Six Writing Trait Scores (N = 46)

Research Question	Writing Trait	<i>F</i>	<i>p</i>	η^2	<i>f</i>	<i>1-\beta</i>
RQ1: Treatment vs. Control	Ideas and Content	0.14	0.71	0.00	0.05	0.07
	Organization	1.10	0.30	0.03	0.16	0.18
	Voice	0.07	0.80	0.00	0.05	0.06
	Word Choice	3.22	0.08	0.07	0.27	0.42
	Sentence Fluency	1.55	0.22	0.04	0.19	0.23
	Conventions	0.97	0.33	0.02	0.15	0.16
RQ2: My Media vs. Network Media	Ideas and Content	0.50	0.48	0.01	0.11	0.11
	Organization	0.00	1.00	0.00	0.00	0.05
	Voice	0.19	0.66	0.00	0.06	0.07
	Word Choice	0.05	0.83	0.00	0.03	0.06
	Sentence Fluency	0.21	0.65	0.00	0.07	0.07
	Conventions	0.00	1.00	0.00	0.00	0.05

Table 7

Descriptive Statistics for Overall Writing Motivation (N = 46)

Planning Mode	Pretest		Posttest		Change		N
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
My Media	2.48	.72	2.55	.63	.06	.37	15
Network Media	2.48	.44	2.41	.51	-.07	.36	15
Control	2.54	.59	2.57	.52	.03	.41	16
Total	2.50	.58	2.51	.55	.01	.38	46

Table 8

A Priori Orthogonal Contrast Results for Overall Writing Motivation (N = 46)

Research Question	F	p	η^2	f	$1-\beta$
RQ1: Treatment vs. Control	0.07	0.79	0.00	0.05	0.06
RQ2: My Media vs. Network Media	0.84	0.37	0.02	0.14	0.15

Table 9

Descriptive Statistics for WDS Constructs (N = 46)

Construct	Planning Mode	Pretest		Posttest		Change		N
		M	SD	M	SD	M	SD	
Confidence	My Media	3.24	.90	3.11	.75	-.13	.76	15
	Network Media	3.33	.64	3.16	.78	-.18	.31	15
	Control	2.85	.95	3.02	.95	.17	.83	16
	Total	3.14	.85	3.09	.82	-.04	.68	46
Persistence	My Media	2.47	.77	2.57	.73	.10	.52	15
	Network Media	2.45	.71	2.48	.54	.03	.55	15
	Control	2.72	.58	2.72	.62	.00	.45	16
	Total	2.55	.68	2.59	.63	.04	.50	46
Passion	My Media	1.93	.83	2.10	.92	.17	.32	15
	Network Media	1.87	.56	1.78	.61	-.08	.35	15
	Control	2.13	.62	2.08	.71	-.05	.41	16
	Total	1.98	.67	1.99	.75	.01	.37	46

Table 10

A Priori Orthogonal Contrast Results for WDS Constructs (N = 46)

Research Question	Writing Trait	F	p	η^2	f	$1-\beta$
RQ1: Treatment vs. Control	Confidence	2.36	0.13	0.05	0.23	0.32
	Persistence	0.18	0.67	0.00	0.06	0.07
	Passion	0.62	0.44	0.01	0.12	0.12
RQ2: My Media vs. Network Media	Confidence	0.03	0.86	0.00	0.03	0.05
	Persistence	0.13	0.72	0.00	0.05	0.06
	Passion	3.54	0.07	0.08	0.29	0.45

Table 11

Gender by Condition (N = 46)

Planning Mode	<i>Females</i>	<i>Males</i>	<i>N</i>
My Media	11	4	15
Network Media	8	7	15
Control	9	7	16
Total	28	18	46

Table 12

Descriptive Statistics for Total Social Data “Cards” Imported (N = 46)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	6415.60	4453.24	15
Network Media	5068.40	4059.50	15
Control	4741.00	4057.64	16
Total	5393.83	4161.70	46

Table 13

Descriptive Statistics for Self-Authored Post Frequency (N = 46)

Planning Mode	Total Imported		Posts Per Day		Posts Per Week		N
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
My Media	1833.67	1664.45	1.93	1.53	13.45	10.71	15
Network Media	2086.93	1737.81	2.15	1.61	15.02	11.27	15
Control	1950.69	1690.59	1.55	1.18	10.84	8.21	16
Total	1956.96	1662.79	1.87	1.44	13.05	10.04	46

Table 14

Descriptive Statistics for Total Logins (N = 30)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	6.40	1.64	15
Network Media	6.53	2.03	15
Total	6.47	1.81	30

Table 15

Descriptive Statistics for Total Cards Seen (N = 30)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	1049.20	678.30	15
Network Media	1890.60	1824.36	15
Total	1469.90	1418.44	30

Table 16

Descriptive Statistics for Unique Cards Seen (N = 30)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	552.53	386.17	15
Network Media	1065.47	1241.38	15
Total	809.00	940.20	30

Table 17

Descriptive Statistics for Number of Redraws (N = 30)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	244.13	148.26	15
Network Media	441.73	406.38	15
Total	342.93	316.91	30

Table 18

Descriptive Statistics for Total Stories Created (N = 30)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	1.73	.59	15
Network Media	1.40	.83	15
Total	1.57	.73	30

Table 19

Descriptive Statistics for Planner Total Details (N = 30)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	18.80	14.32	15
Network Media	11.20	9.47	15
Total	15.00	12.54	30

Table 20

Descriptive Statistics for Planner Total Word Count (N = 30)

Planning Mode	<i>M</i>	<i>SD</i>	<i>N</i>
My Media	210.20	186.50	15
Network Media	95.33	108.12	15
Total	152.77	160.77	30

Table 21

Descriptive Statistics for Overall SUS Scores (N = 30)

Planning Mode	Final SUS Score*		Mean Scaled Score**		N
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
My Media	62.67	11.71	2.51	.47	15
Network Media	56.83	14.56	2.27	.58	15
Total	59.75	13.32	2.39	.53	30

*The Final SUS Score is defined as the sum of the responses for all SUS items (with appropriate reverse-coding) multiplied by 2.5 (Brooke, 1996).

**The Mean Scaled Score is defined as the mean response for all SUS items (with appropriate reverse-coding). It has been included to ease interpretation.

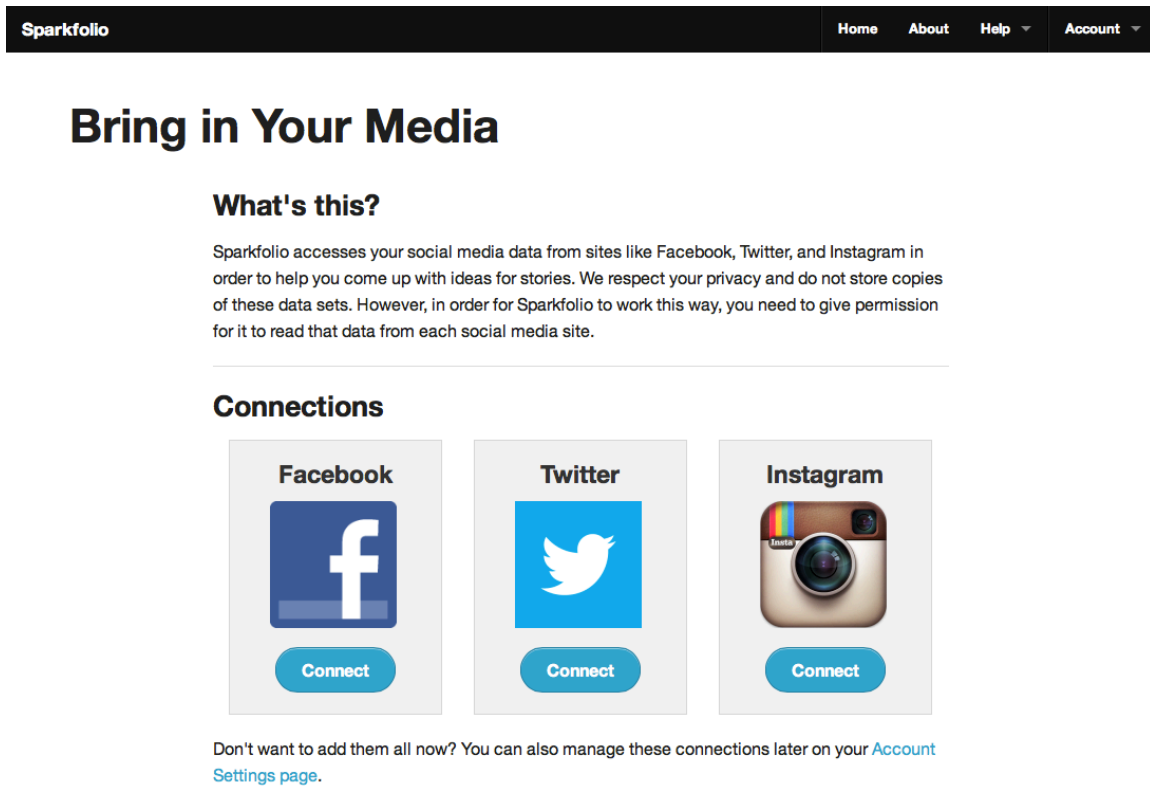


Figure 1. Account Authorization Mockup

Social media site authorization screen from the digital mockup used in participatory design focus groups with students.

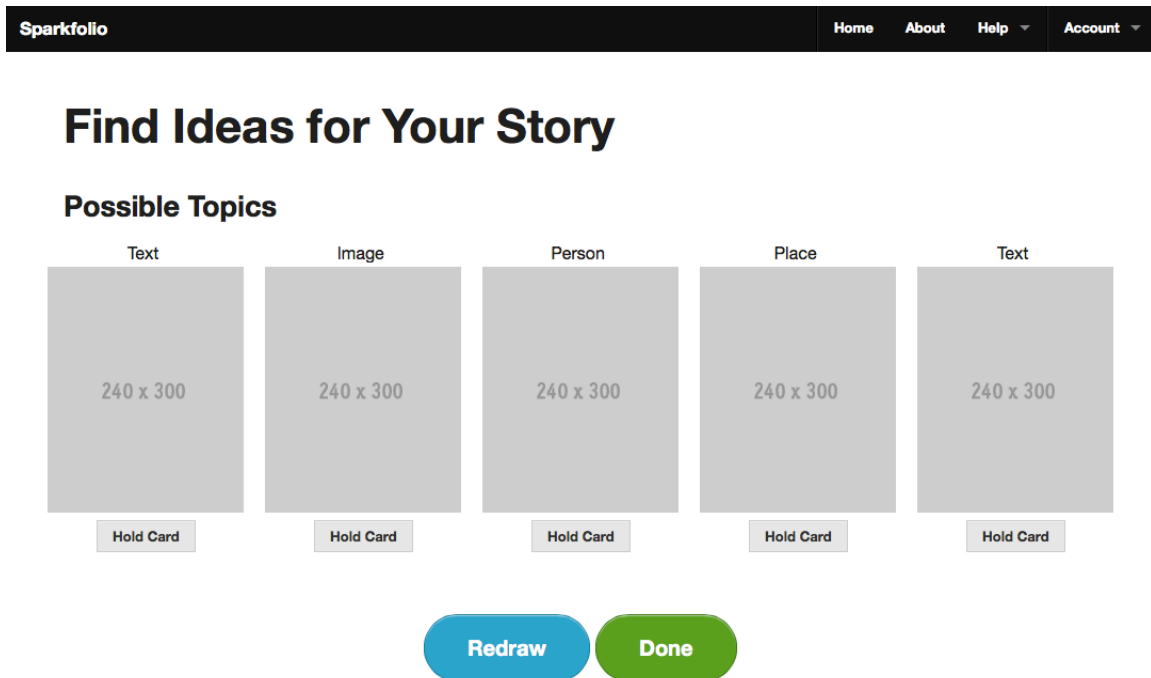


Figure 2. Idea Cards Mockup

The “idea cards” screen from the digital mockup of Sparkfolio.

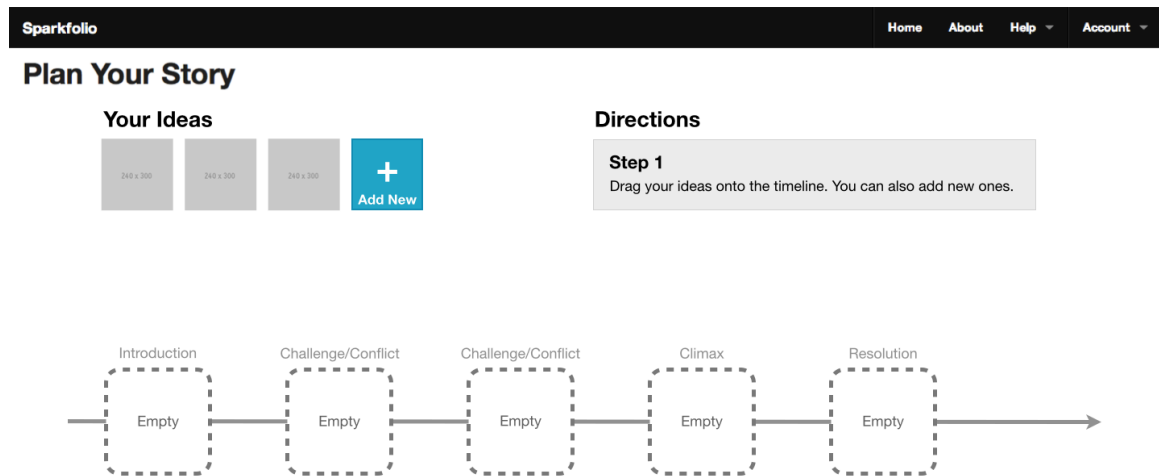


Figure 3. Planning Mockup – Start

The initial planning screen used in the digital mockup for Sparkfolio, with the user's chosen social media “idea cards” displayed at the top left.

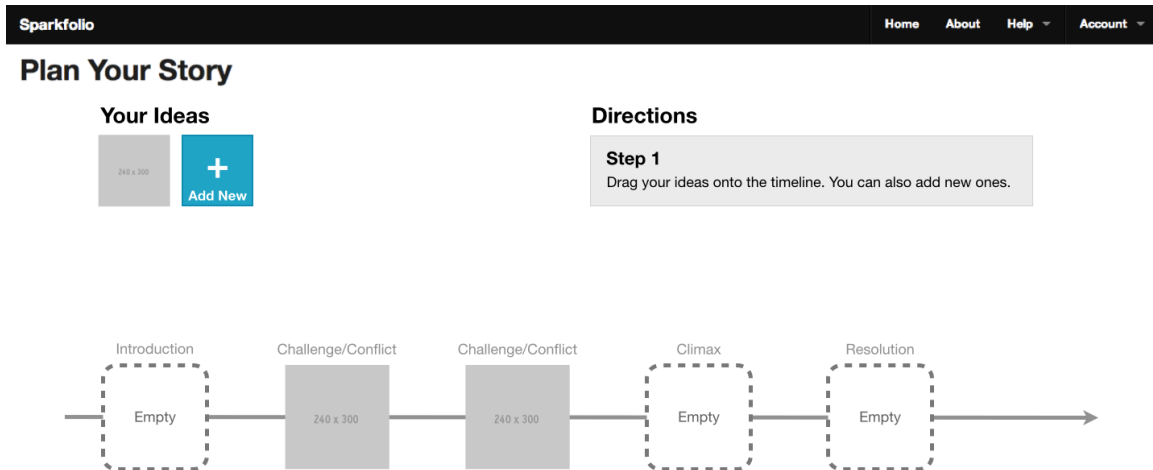


Figure 4. Planning Mockup – Placing Cards

A simulated story plan in progress from the digital mockup, in which the user begins to populate it with cards.

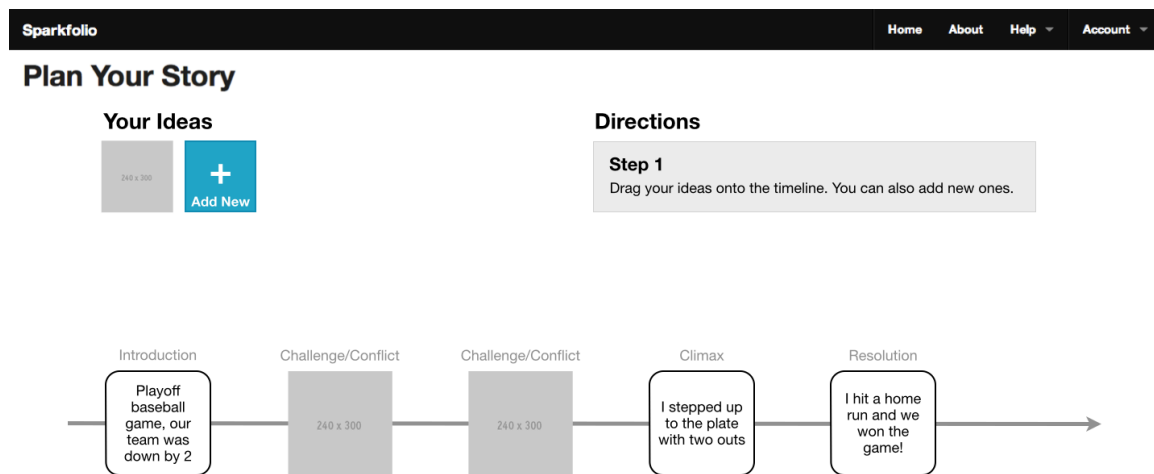


Figure 5. Planning Mockup – Adding Text

A simulation of adding text details to a plan from the digital mockup of Sparkfolio.

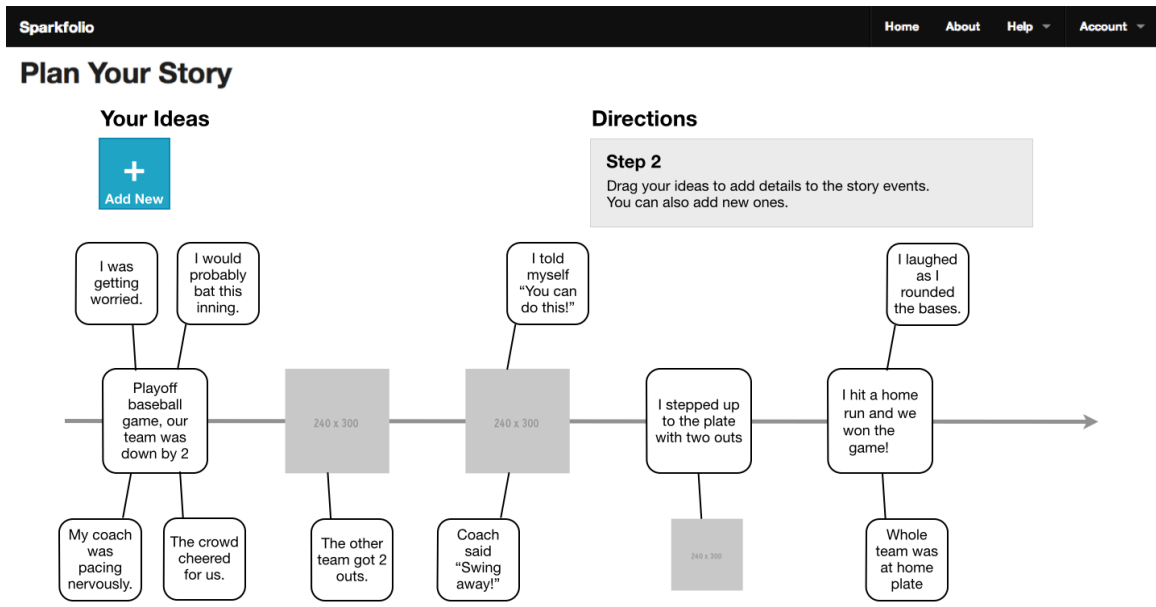
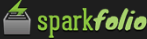


Figure 6. Planning Mockup – Complete

Example of a completed story plan, used in the digital mockup.

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Your privacy is important to us

Because Sparkfolio is part of research project, it keeps track of your activity to understand how you use it and to make improvements. Although Sparkfolio does access social media data from sites like Facebook, Twitter, and Instagram, it only reads the data and does not save it. Your privacy is important to us, and your data will always belong to you.

How it works

However, when you create a story based on one piece of data (for example, a Tweet or photo), Sparkfolio does save information about that specific piece of data to help you plan a story based on it (for example, the date it was posted, location, people who are tagged).

Confidentiality

As part of the Sparkfolio team's research, they may see these chosen story ideas as they try to understand how you use Sparkfolio, but your name and identity (as well as any other people mentioned or shown in your data) will be kept confidential. We may use your story ideas made with Sparkfolio as examples in research papers, reports, and presentations, but neither your name nor your friends' names will not be used, and any faces appearing in photos will be blurred.

Do you agree to these terms?

No - Cancel new account

Yes - Create new account

Figure 7. Terms of Service

Sparkfolio 1.0's Terms of Service page.

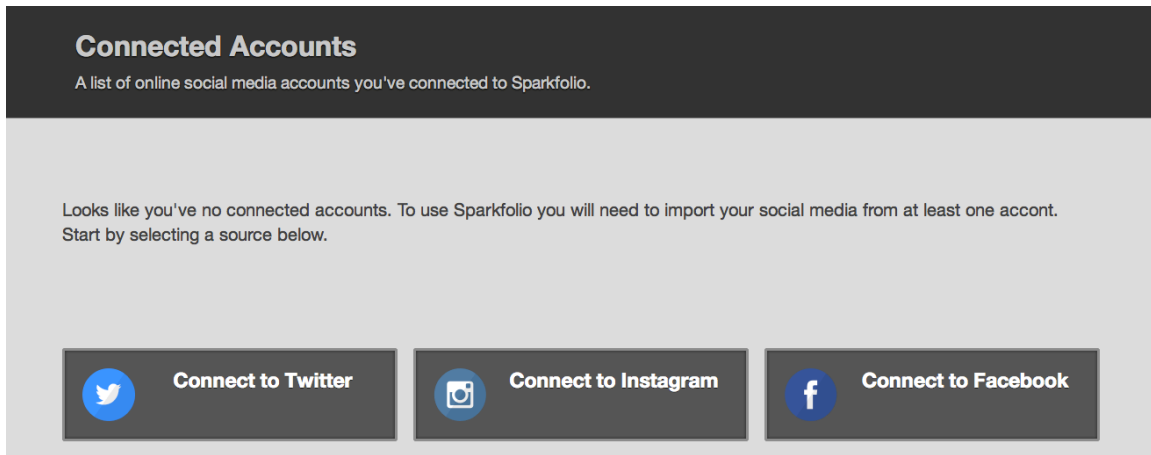


Figure 8. Authorization

Screenshot of Sparkfolio 1.0's social media account connection page.

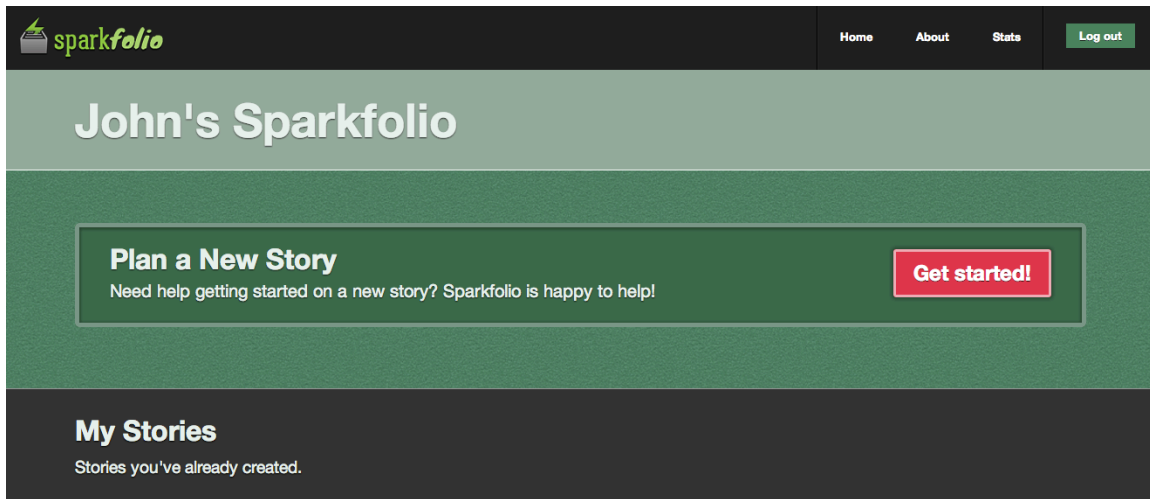


Figure 9. Home Screen

Sparkfolio’s “Home” screen. Clicking the red “Get started” button begins the planning process.

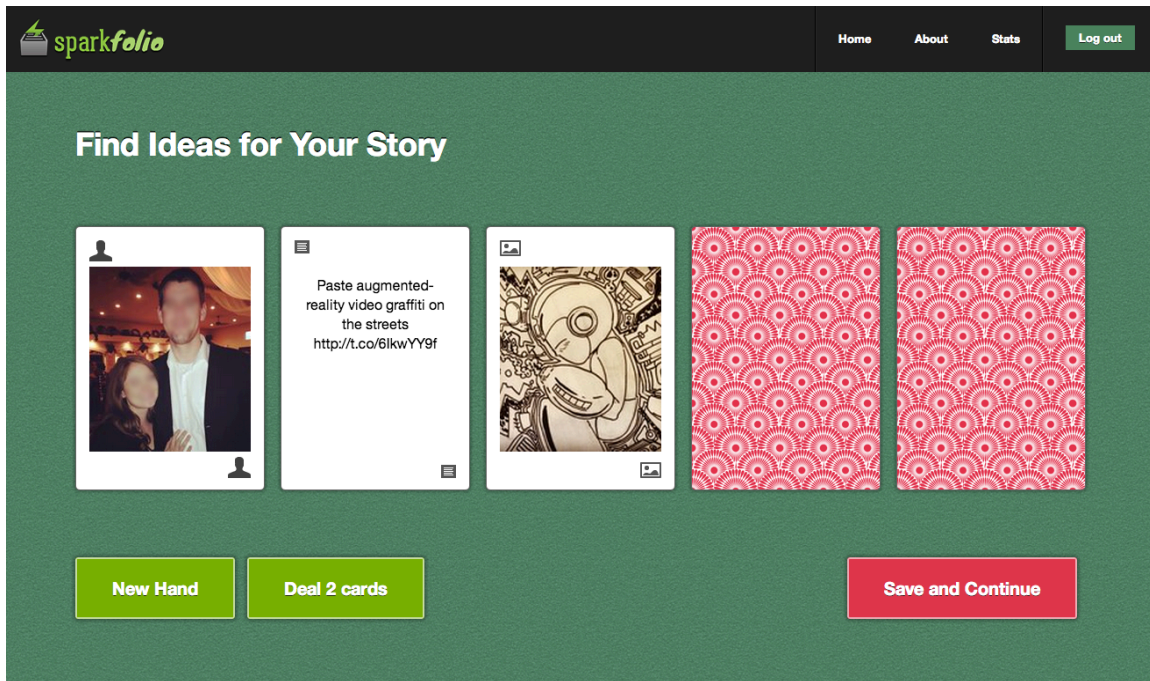


Figure 10. Idea Cards

Sparkfolio 1.0's "idea card" interface.

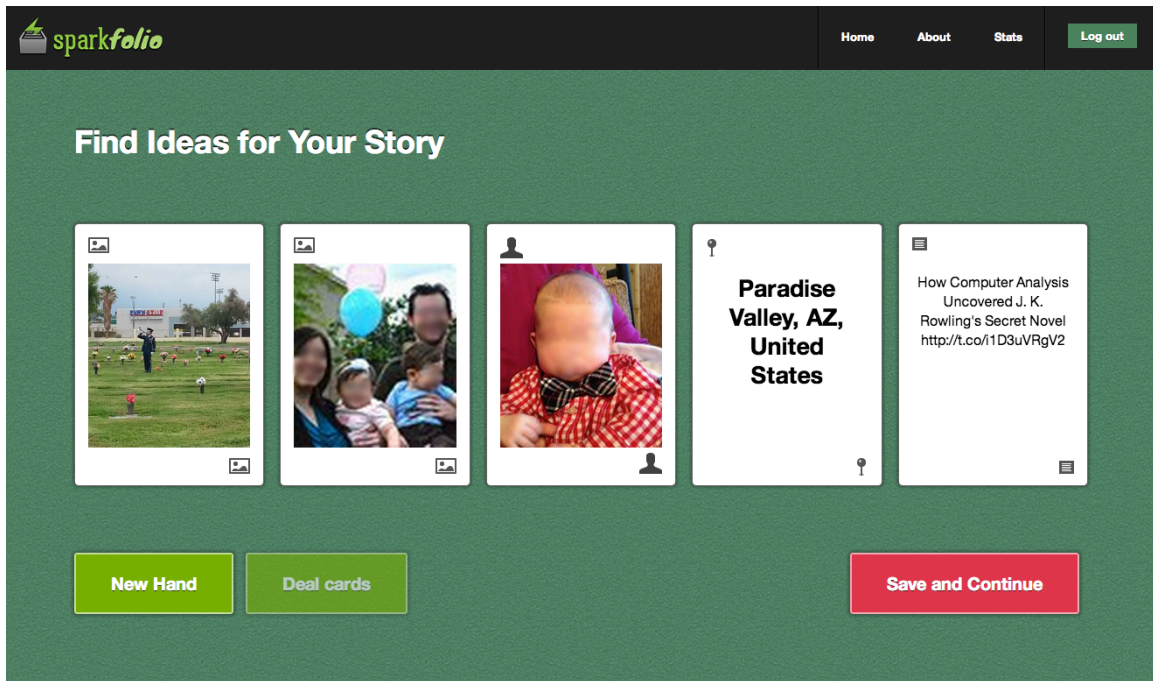


Figure 11. Suits

Example of the four suits and their icons. From left to right: two images, a person, a location, and a text card.

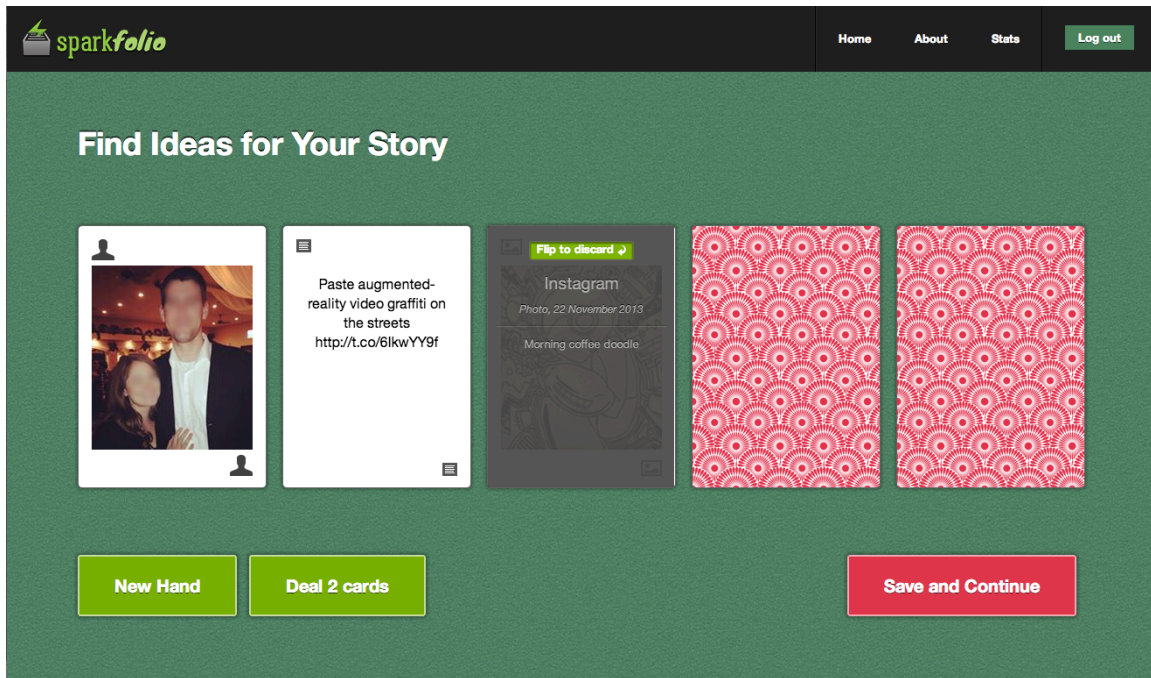


Figure 12. Hovering

Hovering over a card reveals additional details (see third card).

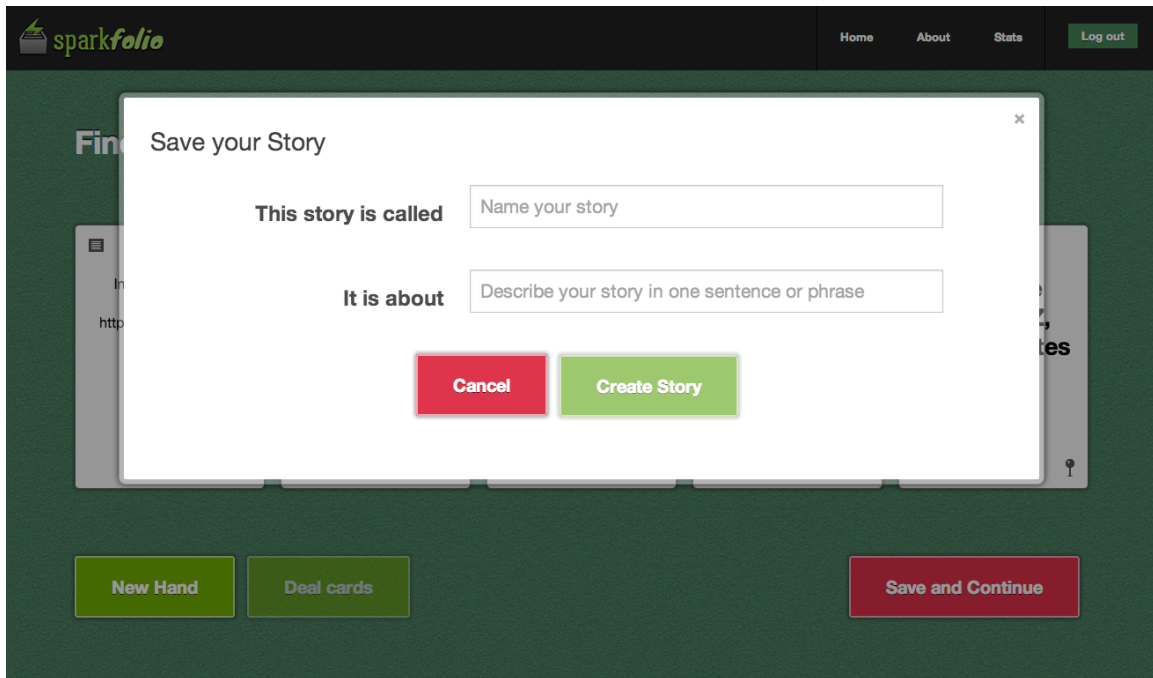


Figure 13. Naming a Story Plan

After clicking “Save and Continue” the user can title the story plan and provide a short description.

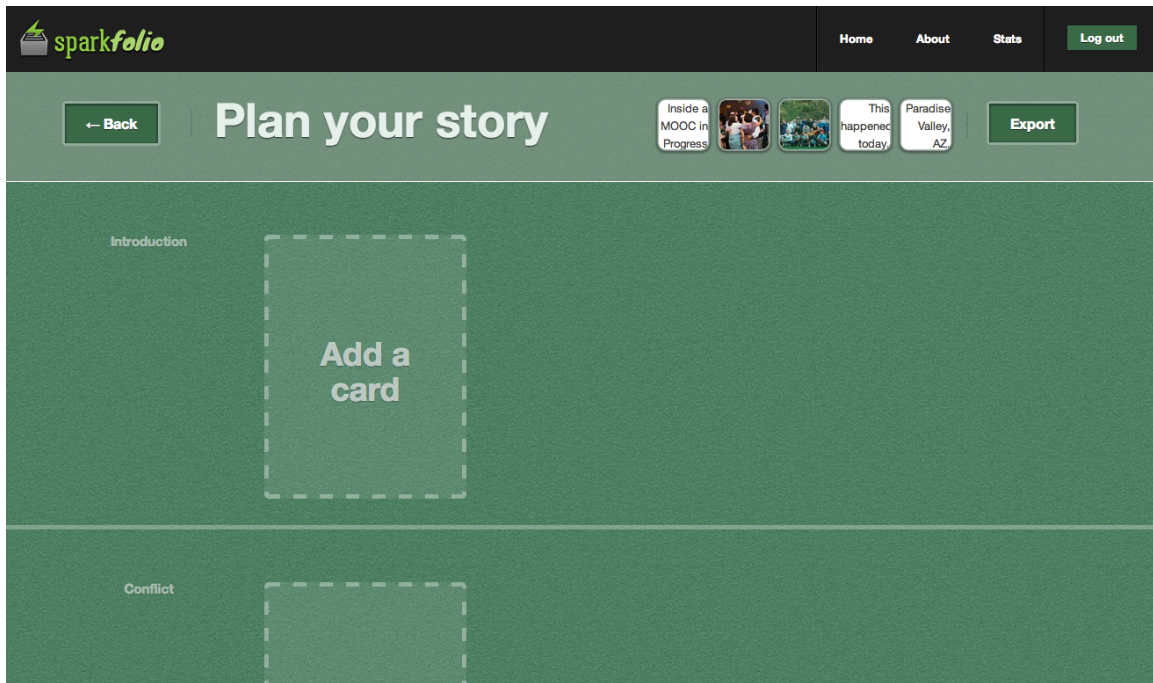


Figure 14. Planning

Sparkfolio 1.0's story planning interface.

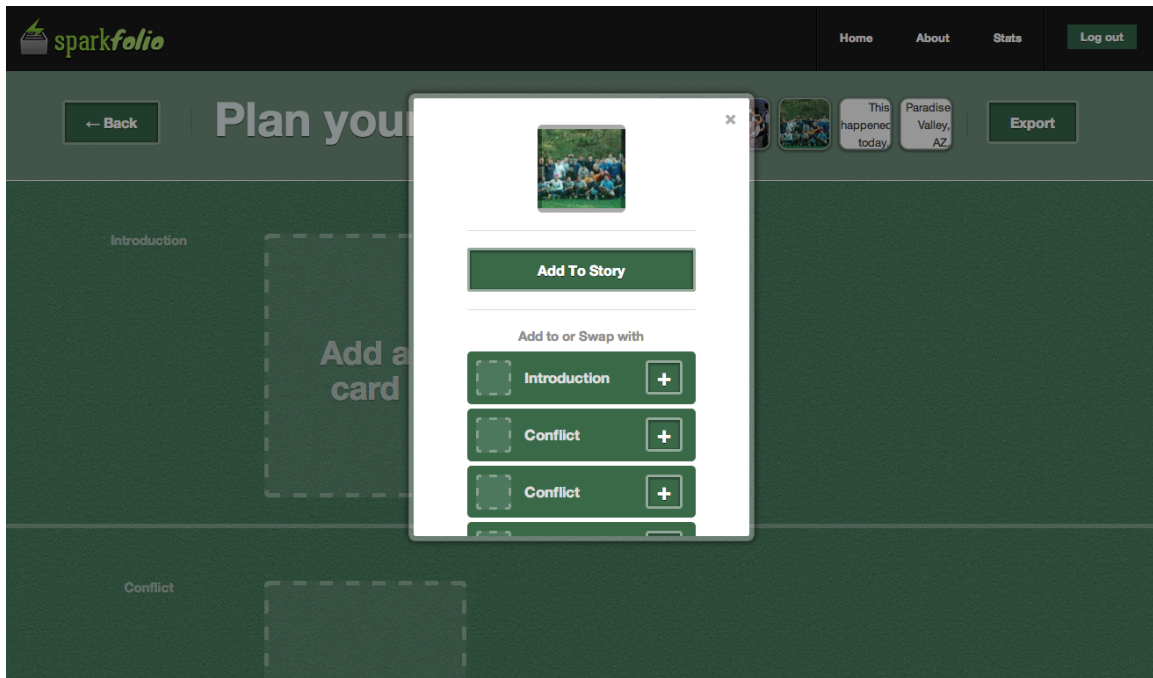


Figure 15. Placing Cards

The user can place idea cards in organizational rows within the story plan.

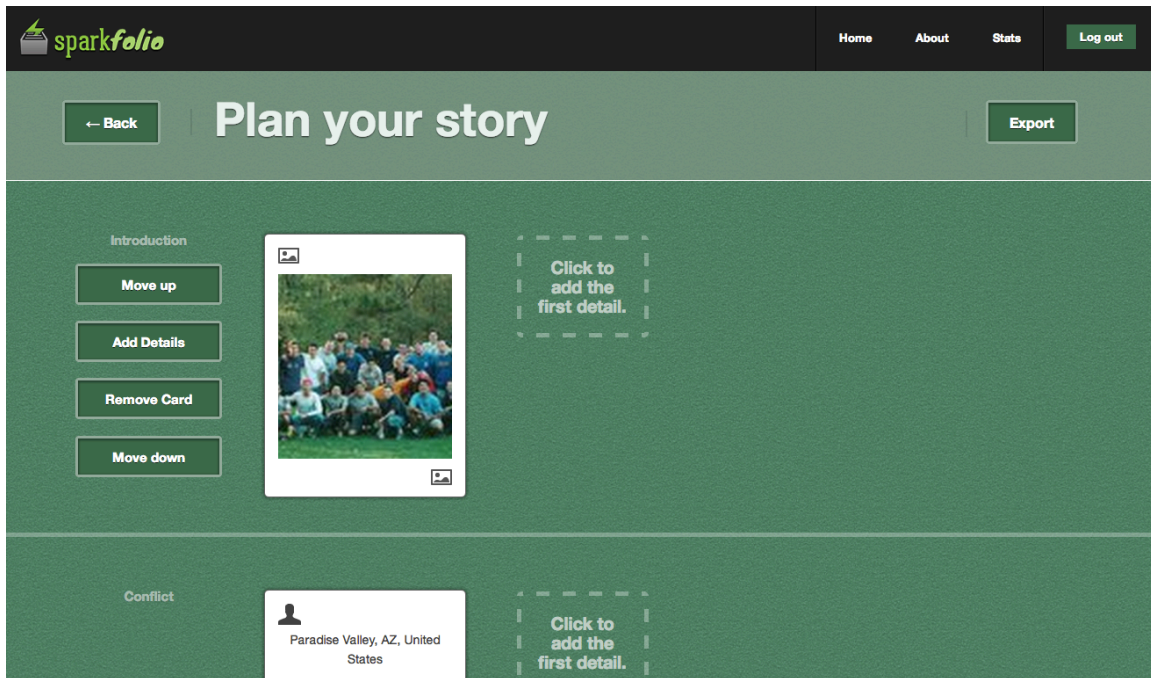


Figure 16. Adding Text

The user can add details to each organizational row by clicking the “Add Details” box on the left side of the screen or the “Click to add the first detail” box with a dotted outline.

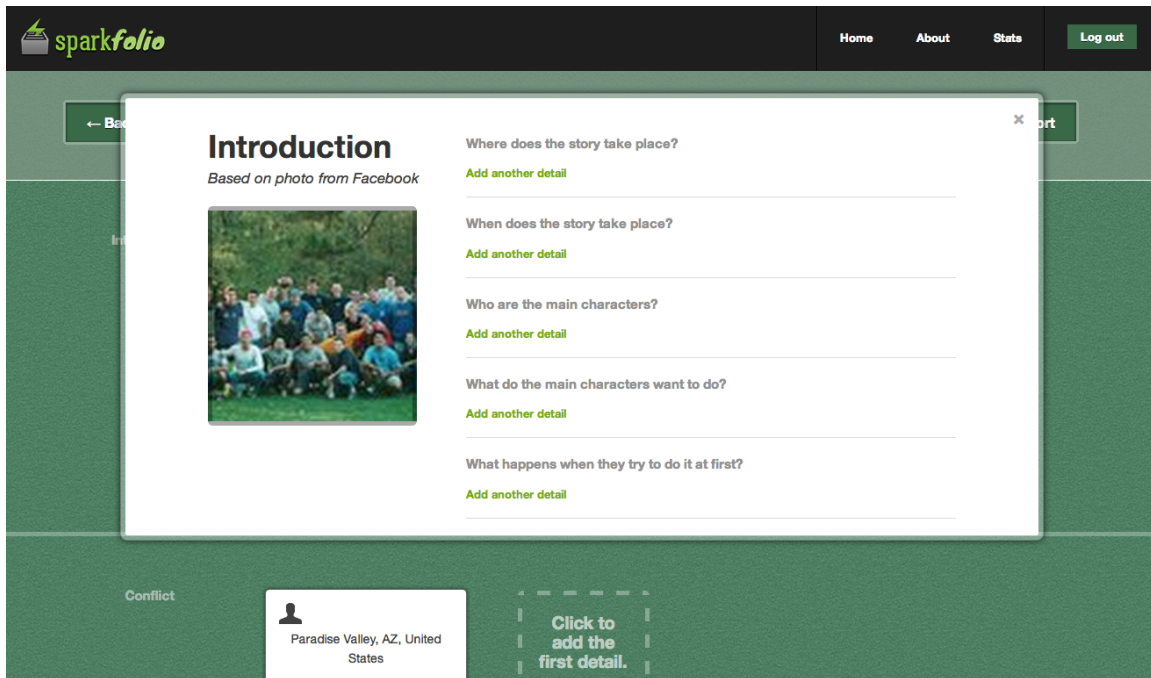


Figure 17. Story Grammar Questions

When adding details, the user is presented with questions based on the “WWW/What = 2/How =2” strategy (Danoff et al., 1993).

[Home](#)
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Plan your story

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Introduction

Where does the story take place?

The story takes place when my cousin, [redacted] was in a Thanksgiving play! It all started at the theatre where we sat down as a family and ate food while watching [redacted]'s play.

When does the story take place?

I was in elementary school.

Who are the main characters?

My Dad, my Grandpa, [redacted] and I were all of the main characters.

What do the main characters want to do?

We went to [redacted]'s play as a family and then needed to eat Thanksgiving dinner.

What happens when they try to do it at first?

We ate an early dinner and came back to my dad and I's house.

Conflict

What happens when they try to do it?

We tried to cook some potatoes but we all wanted more to eat than potatoes.

What do the main characters want to do next?

After we all played board games, we got hungry again.

Conflict

What happens when they try to do it next?

My grandpa, my Dad and I are all the type of people to take charge. So the way us three took charge that Thanksgiving is we all piled in the car and searched for food for our whole family. It was a really good day and no one could really blame our family for being hungry.

What do the main characters want to do next?

Unfortunately, my dad and I had nothing to eat in the house, especially nothing to eat for a large family.

Climax

What is the most exciting part of the story, when we find out whether the characters do what they want to do?

As we piled into the car and started to drive around the realization hit that no good food places are open on Thanksgiving. Not even grocery stores are open on Thanksgiving. As we ventured even farther away from my dad and I's house we came across one place that was open, What-A-Burger. We got over 30 burgers for everyone in our family.

Resolution

How do the main characters feel?

Overall, despite having an unprepared Thanksgiving it was a pretty great day that I will never ever forget.

How does the story end?

We sped home and ate and played more board games with the family.

Figure 18. Sample Story Plan – My Media

Sample story plan from a My Media participant, outlining a memory of eating

“Whataburger” food on Thanksgiving.



Figure 19. Sample Story Plan – Network Media

A story plan created by a Network Media participant about moving to a new school in pursuit of a better lacrosse program, which ultimately led to a college lacrosse scholarship.

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APPENDIX A

MODIFIED FACEBOOK INTENSITY SCALE (FBI)

Original FBI Scale	Modified FBI Scale
Five-Point Scaled Items (<i>Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree</i>) - Facebook is part of my everyday activity. - I am proud to tell people I'm on Facebook. - Facebook has become part of my daily routine. - I feel out of touch when I haven't logged onto Facebook for a while. - I feel I am part of the Facebook community. - I would be sorry if Facebook shut down. Selected Response - Approximately how many TOTAL Facebook friends do you have? (<i>10 or less; 11–50; 51–100; 101–150; 151–200; 201–250; 251–300; 301–400; more than 400</i>) - In the past week, on average, approximately how much time PER DAY have you spent actively using Facebook? (<i>Less than 10 minutes; 10–30 minutes, 31–60 minutes; 1–2 hours; 2–3 hours; 3–4 hours; 5–6 hours; more than 6 hours</i>)	Demographics - Year in School (<i>Freshman, Sophomore, Junior, Senior</i>) - Gender (<i>Male, Female</i>) - Age (<i>13; 14; 15; 16; 17; 18; 19</i>) Social Media Sites - Which of the following social media sites do you currently use? Please select all that apply. (<i>Facebook, Twitter, Instagram, LinkedIn, Pinterest, Google+, StumbleUpon, Tumblr, MySpace, Flickr, Foursquare, Other--PLEASE SPECIFY</i>) Five-Point Scaled FACEBOOK Items – visible only if user selected Facebook in #4 (<i>Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree</i>) - Facebook is part of my everyday activity. - I am proud to tell people I'm on Facebook. - Facebook has become part of my daily routine. - I feel out of touch when I haven't logged onto Facebook for a while. - I feel I am part of the Facebook community. - I would be sorry if Facebook shut down. Selected Response FACEBOOK Items – visible only if Facebook is selected in #4 - Approximately how many TOTAL Facebook friends do you have? (<i>10 or less; 11–50; 51–100; 101–150; 151–200; 201–250; 251–300; 301–400; more than 400</i>) - In the past week, on average, approximately how much time PER DAY have you spent actively using Facebook? (<i>Less than 10 minutes; 10–30 minutes, 31–60 minutes; 1–2 hours; 2–3 hours; 3–4 hours; 5–6 hours; more than 6 hours</i>) Five-Point Scaled TWITTER Items – visible only if Twitter is selected in #4 (<i>Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree</i>) - Twitter is part of my everyday activity. - I am proud to tell people I'm on Twitter. - Twitter has become part of my daily routine. - I feel out of touch when I haven't logged onto Twitter for a while. - I feel I am part of the Twitter community. - I would be sorry if Twitter shut down. Selected Response TWITTER Items – visible only if Twitter is selected in #4 - Approximately how many TOTAL Twitter followers do you have? (<i>10 or less; 11–50; 51–100; 101–150; 151–200; 201–250; 251–300; 301–400; more than 400</i>) - In the past week, on average, approximately how much time PER DAY have you spent actively using Twitter? (<i>Less than 10 minutes; 10–30 minutes, 31–60 minutes; 1–2 hours; 2–3 hours; 3–4 hours; 5–6 hours; more than 6 hours</i>) Five-Point Scaled INSTAGRAM Items – visible only if Instagram is selected in #4 (<i>Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree</i>) - Instagram is part of my everyday activity. - I am proud to tell people I'm on Instagram. - Instagram has become part of my daily routine. - I feel out of touch when I haven't logged onto Instagram for a while. - I feel I am part of the Instagram community. - I would be sorry if Instagram shut down. Selected Response INSTAGRAM Items – visible only if Instagram is selected in #4 - Approximately how many TOTAL Instagram followers do you have? (<i>10 or less; 11–50; 51–100; 101–150; 151–200; 201–250; 251–300; 301–400; more than 400</i>) - In the past week, on average, approximately how much time PER DAY have you spent actively using Instagram? (<i>Less than 10 minutes; 10–30 minutes, 31–60 minutes; 1–2 hours; 2–3 hours; 3–4 hours; 5–6 hours; more than 6 hours</i>)

Source: Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The Benefits of Facebook “Friends:” Social Capital and College Students’ Use of Online Social Network Sites. *Journal of Computer-Mediated Communication*, 12(4), 1143–1168. doi:10.1111/j.1083-6101.2007.00367.x

APPENDIX B

MODIFIED WWW/WHAT=2/HOW=2 STORY GRAMMAR QUESTIONS

Original “WWW/What = 2/How = 2” Story Grammar Questions	Modified Story Grammar Questions Implemented in Sparkfolio
<i>Who</i> is the main character; who else is in the story? <i>When</i> does the story take place? <i>Where</i> does the story take place? <i>What</i> does the main character want to do? <i>What</i> happens when the main character tries to do it? <i>How</i> does the story end? <i>How</i> does the main character feel?	<u>Introduction</u> <i>Who</i> are the main characters? <i>When</i> does the story take place? <i>Where</i> does the story take place? <i>What</i> do the main characters want to do? <i>What</i> happens when they try to do it at first? <u>Conflict 1</u> What do the main characters want to do next? What happens when they try to do it? <u>Conflict 2</u> What do the main characters want to do next? What happens when they try to do it? <u>Climax</u> What is the most exciting part of the story, when we find out whether the characters do what they want to do? <u>Resolution</u> <i>How</i> does the story end? <i>How</i> do the main characters feel?

Source: Danoff, B., Harris, K., & Graham, S. (1993). Incorporating strategy instruction within the writing process in the regular classroom: Effects on the writing of students with and without learning disabilities. *Journal of Literacy Research*, 25(3), 295–322. doi:10.1080/10862969009547819

APPENDIX C

HOLISTIC SIX TRAITS RUBRIC

HOLISTIC RUBRIC BASED ON 6 TRAITS OF WRITING

SCORE POINT 6 Response is sophisticated and skillful in written communication, demonstrated by - exceptional clarity, focus, and control in topic development and organization that often show insight. - in-depth and/or creative exploration of the topic using rich, relevant, and credible details. - a strong, perhaps creative, beginning and a satisfying conclusion. - specifically and carefully chosen words that are skillfully crafted into phrases and sentences that enhance meaning. - intentional and committed interaction between the writer and the reader. - effective and/or creative use of a wide range of conventions with few errors.	SCORE POINT 5 Response is excellent and skillful in written communication, demonstrated by - clarity, focus, and control in topic development and organization. - a balanced and thorough exploration of the topic using relevant details. - an inviting beginning and a satisfying sense of closure. - a broad range of carefully chosen words crafted into phrases and varied sentences that sound natural. - awareness of the reader and commitment to the audience and topic. - effective use of a wide range of conventions with few errors.	SCORE POINT 4 Response is appropriate and acceptable in written communication, demonstrated by - ideas adequately developed with a clear and coherent presentation of ideas with order and structure that can be formulaic. - relevant details that are sometimes general or limited; organization that is clear, but sometimes predictable. - a recognizable beginning and ending, although one or both may be somewhat weak. - effective word choice that is functional and, at times, shows interaction between writer and audience. - somewhat varied sentence structure with good control of simple constructions; a natural sound. - control of standard conventions although a wide range is not used; errors that do not impede readability.
SCORE POINT 3 Response is inadequate in written communication, demonstrated by - broad or simplistic ideas that are understood but often ineffective. - attempts at organizing that are inconsistent or ineffective; beginnings and endings that are underdeveloped; repetitive transitional devices. - developmental details that are uneven, somewhat predictable, or leave information gaps; details not always placed effectively in the writing. - reliance on clichés and overused words that do not connect with the reader; limited audience awareness. - monotonous and sometimes misused words; sentences may sound mechanical, although simple constructions are usually correct. - limited control of standard conventions with significant errors.	SCORE POINT 2 Response is poor in written communication, demonstrated by - overly simplistic and sometimes unclear ideas that have insufficiently developed details. - sequencing of ideas that is often just a list; missing or ineffective details that require reader inference to comprehend and follow. - missing beginning and/or ending. - repetitive, monotonous, and often misused words awkwardly strung into sentences that are difficult to read because they are either choppy or rambling; many sentences that begin with repetitive noun + verb pattern. - lack of audience awareness. - little control of basic conventions resulting in errors impeding readability.	SCORE POINT 1 Response is inferior in written communication, demonstrated by - lack of purpose or ideas and sequencing. - organization that obscures the main point. - an attempt that is too short to offer coherent development of an idea, if it is stated. - extremely limited vocabulary that shows no commitment to communicating a message. - sentences with confusing word order that may not permit oral reading. - severe and frequent errors in conventions.

HOLISTIC RUBRIC BASED ON SIX TRAITS OF WRITING

Score Point 1: The writing skill in a Score Point 1 response is inferior. A paper receiving a SP 1 can be long or short. Length alone is not sufficient reason to score the response a SP 1. One or more bullets in the SP 1 rubric will describe this paper. It may also satisfy a bullet from a higher SP, but the majority of the response attributes are SP 1.

Score Point 2: The writing skill in a Score Point 2 response is poor. Ideas are presented but are not clear or organized. The reader must often reread and infer meaning because of the poor quality of writing. As with the SP 1, this paper may satisfy a bullet from a higher SP, but it fits into the SP 2 rubric more clearly than another.

Score Point 3: The writing in a Score Point 3 response is less than adequate. Ideas are simple; organization is inconsistent; development is uneven. While this paper may meet one or two bullets in a higher score, the majority of the attributes fall in the SP 3 rubric.

Score Point 4: The writing skill in a Score Point 4 response is appropriate and acceptable, demonstrating competent written communication. Clear ideas are organized coherently, although the paper is often formulaic. The message is presented so that most readers can easily understand it. The attributes from higher score points may emerge in some papers, but unless the paper satisfies a majority of bullets above the SP 4, it will earn a SP 4.

Score Point 5: The writing skill in a Score Point 5 response is excellent and shows skill above acceptable. This paper presents ideas clearly, organizes them with care, and uses vocabulary and sentences that demonstrate thoughtful choice and craftsmanship. A SP 5 paper may satisfy a bullet or two in SP 6, but it still does not meet a majority of the criteria in the SP 6. The majority of the SP 5 bullets will be represented.

Score Point 6: The writing skill in a Score Point 6 response is exemplary. The exceptional and sophisticated craftsmanship shows a thoughtful and exacting writer who strives to communicate clearly and creatively. While the paper may not fit every bullet in the SP 6 rubric, it will meet the majority of them. A SP 6 paper is not perfect. Errors may be noticed, but they do not detract from the message.

Condition codes for non-scored papers: BL = Blank; IL = illegible; NE = non-English; and OT = off-topic.

Always score papers by recognizing what the student has done well before looking for errors. Remember that the student is writing to a cold prompt with no assistance from a teacher. Score for the skills demonstrated. An error that is repeated still only counts as one error. For instance, if a student misspells "beautiful" four times, it is evident that he/she cannot spell "beautiful;" it is one error. Or if a student doesn't put a comma after introductory clauses throughout the paper, it is evident that he/she does not apply this comma rule; it is one error. If a student misuses the word "except" for "accept," the same applies whether it is done one time or five times. Strive to assign the score that is best represented by the bullets in a score point.

Source: Official Scoring Guide: Arizona's Instrument to Measure Standards - Holistic Rubric Based on 6 Traits of Writing. (2010). *Arizona Department of Education*. Retrieved October 03, 2012, from <http://www.azed.gov/wp-content/uploads/PDF/HOLISTICRUBRICBASEDON6TRAITS.pdf>

APPENDIX D

INDIVIDUAL SIX TRAITS RUBRICS

AIMS Six Trait Analytic Writing Rubric – Official Scoring Guide

IDEAS and CONTENT

6 The writing is exceptionally clear, focused and interesting. It holds the reader's attention throughout. Main ideas stand out and are developed by strong support and rich details suitable to audience and purpose. The writing is characterized by • clarity, focus, and control. • main idea(s) that stand out. • supporting, relevant, carefully selected details; when appropriate, use of resources provides strong, accurate, credible support • a thorough, balanced, in-depth explanation/ exploration of the topic; the writing makes connections and shares insights. • content and selected details that are well suited to audience and purpose.	5 The writing is clear, focused and interesting. It holds the reader's attention. Main ideas stand out and are developed by supporting details suitable to audience and purpose. The writing is characterized by • clarity, focus, and control. • main idea(s) that stand out. • supporting, relevant, carefully selected details; when appropriate, use of resources provides strong, accurate, credible support. • a thorough, balanced explanation/exploration of the topic; the writing makes connections and shares insights. • content and selected details that are well-suited to audience and purpose.	4 The writing is clear and focused. The reader can easily understand the main ideas. Support is present, although it may be limited or rather general. The writing is characterized by • an easily identifiable purpose. • clear main idea(s) • supporting details that are relevant, but may be overly general or limited in places; when appropriate, resources are used to provide accurate support. • a topic that is explored/explained, although developmental details may occasionally be out of balance with the main idea(s); some connections and insights may be present. • content and selected details that are relevant, but perhaps not consistently well chosen for audience and purpose.
3 The reader can understand the main ideas, although they may be overly broad or simplistic, and the results may not be effective. Supporting detail is often limited, insubstantial, overly general, or occasionally slightly off-topic. The writing is characterized by • an easily identifiable purpose and main idea(s). • predictable or overly-obvious main ideas or plot; conclusions or main points seem to echo observations heard elsewhere. • support that is attempted; but developmental details that are often limited in scope, uneven, somewhat off-topic, predictable, or overly general. • details that may not be well-grounded in credible resources; they may be based on clichés, stereotypes or questionable sources of information. • difficulties when moving from general observations to specifics.	2 Main ideas and purpose are somewhat unclear or development is attempted but minimal. The writing is characterized by • a purpose and main idea(s) that may require extensive inferences by the reader. • minimal development; insufficient details. • irrelevant details that clutter the text. • extensive repetition of detail.	1 The writing lacks a central idea or purpose. The writing is characterized by • ideas that are extremely limited or simply unclear. • attempts at development that are minimal or non-existent; the paper is too short to demonstrate the development of an idea.

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ORGANIZATION

6 The organization enhances the central idea(s) and its development. The order and structure are compelling and move the reader through the text easily. The writing is characterized by • effective, perhaps creative, sequencing; the organizational structure fits the topic, and the writing is easy to follow. • a strong, inviting beginning that draws the reader in and a strong satisfying sense of resolution or closure. • smooth, effective transitions among all elements (sentences, paragraphs, and ideas). • details that fit where placed.	5 The organization enhances the central idea(s) and its development. The order and structure are strong and move the reader through the text. The writing is characterized by. • effective sequencing; the organizational structure fits the topic, and the writing is easy to follow. • an inviting beginning that draws the reader in and a satisfying sense of resolution or closure. • smooth, effective transitions among all elements (sentences, paragraphs, and ideas). • details that fit where placed.	4 Organization is clear and coherent. Order and structure are present, but may seem formulaic. The writing is characterized by • clear sequencing. • an organization that may be predictable. • a recognizable, developed beginning that may not be particularly inviting; a developed conclusion that may lack subtlety. • a body that is easy to follow with details that fit where placed. • transitions that may be stilted or formulaic. • organization which helps the reader, despite some weaknesses.
3 An attempt has been made to organize the writing; however, the overall structure is inconsistent or skeletal. The writing is characterized by • attempts at sequencing, but the order or the relationship among ideas may occasionally be unclear. • a beginning and an ending which, although present, are either undeveloped or too obvious (e.g. "My topic is...", "These are all the reasons that...") • transitions that sometimes work. The same few transitional devices (e.g., coordinating conjunctions, numbering, etc.) may be overused. • a structure that is skeletal or too rigid. • placement of details that may not always be effective. • organization which lapses in some places, but helps the reader in others.	2 The writing lacks a clear organizational structure. An occasional organizational device is discernible; however, the writing is either difficult to follow and the reader has to reread substantial portions, or the piece is simply too short to demonstrate organizational skills. The writing is characterized by • some attempts at sequencing, but the order or the relationship among ideas is frequently unclear. • a missing or extremely undeveloped beginning, body, and/or ending. • a lack of transitions, or when present, ineffective or overused. • a lack of an effective organizational structure. • details that seem to be randomly placed, leaving the reader frequently confused.	1 The writing lacks coherence; organization seems haphazard and disjointed. Even after rereading, the reader remains confused. The writing is characterized by • a lack of effective sequencing. • a failure to provide an identifiable beginning, body and/or ending. • a lack of transitions. • pacing that is consistently awkward; the reader feels either mired down in trivia or rushed along too rapidly. • a lack of organization which ultimately obscures or distorts the main point.

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VOICE

6 The writer has chosen a voice appropriate for the topic, purpose and audience. The writer seems deeply committed to the topic, and there is an exceptional sense of "writing to be read." The writing is expressive, engaging, or sincere. The writing is characterized by • an effective level of closeness to or distance from the audience (e.g., a narrative should have a strong personal voice, while an expository piece may require extensive use of outside resources and a more academic voice; nevertheless, both should be engaging, lively, or interesting. Technical writing may require greater distance.); • an exceptionally strong sense of audience; the writer seems to be aware of the reader and of how to communicate the message most effectively. The reader may discern the writer behind the words and feel a sense of interaction. • a sense that the topic has come to life; when appropriate, the writing may show originality, liveliness, honesty, conviction, excitement, humor, or suspense.	5 The writer has chosen a voice appropriate for the topic, purpose, and audience. The writer seems committed to the topic, and there is a sense of "writing to be read." The writing is expressive, engaging or sincere. The writing is characterized by • an appropriate level of closeness to or distance from the audience (e.g., a narrative should have a strong personal voice while an expository piece may require extensive use of outside resources and a more academic voice; nevertheless, both should be engaging, lively or interesting. Technical writing may require greater distance.); • a strong sense of audience; the writer seems to be aware of the reader and of how to communicate the message most effectively. The reader may discern the writer behind the words and feel a sense of interaction. • a sense that the topic has come to life; when appropriate, the writing may show originality, liveliness, honesty, conviction, excitement, humor, or suspense.	4 A voice is present. The writer demonstrates commitment to the topic, and there may be a sense of "writing to be read." In places, the writing is expressive, engaging, or sincere. The writing is characterized by • a questionable or inconsistent level of closeness to or distance from the audience. • a sense of audience; the writer seems to be aware of the reader but has not consistently employed an appropriate voice. The reader may glimpse the writer behind the words and feel a sense of interaction in places. • liveliness, sincerity, or humor when appropriate; however, at times the writing may be either inappropriately casual or personal, or inappropriately formal and stiff.
3 The writer's commitment to the topic seems inconsistent. A sense of the writer may emerge at times; however, the voice is either inappropriately personal or inappropriately impersonal. The writing is characterized by • a limited sense of audience; the writer's awareness of the reader is unclear. • an occasional sense of the writer behind the words; however, the voice may shift or disappear a line or two later and the writing become somewhat mechanical. • a limited ability to shift to a more objective voice when necessary.	2 The writing provides little sense of involvement or commitment. There is no evidence that the writer has chosen a suitable voice. The writing is characterized by • little engagement of the writer; the writing tends to be largely flat, lifeless, stiff, or mechanical. • a voice that is likely to be overly informal and personal. • a lack of audience awareness; there is little sense of "writing to be read." • little or no hint of the writer behind the words. There is rarely a sense of interaction between reader and writer.	1 The writing seems to lack a sense of involvement or commitment. The writing is characterized by • no engagement of the writer; the writing is flat and lifeless. • a lack of audience awareness; there is no sense of "writing to be read." • no hint of the writer behind the words. There is no sense of interaction between writer and reader; the writing does not involve or engage the reader.

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AIMS Six Trait Analytic Writing Rubric – Official Scoring Guide

WORD CHOICE

6 Words convey the intended message in an exceptionally interesting, precise, and natural way appropriate to audience and purpose. The writer employs a rich, broad range of words, which have been carefully chosen and thoughtfully placed for impact. The writing is characterized by • accurate, strong, specific words; powerful words energize the writing. • fresh, original expression; slang, if used, seems purposeful and is effective. • vocabulary that is striking and varied, but that is natural and not overdone. • ordinary words used in an unusual way. • words that evoke strong images; figurative language may be used.	5 Words convey the intended message in an interesting, precise, and natural way appropriate to audience and purpose. The writer employs a broad range of words which have been carefully chosen and thoughtfully placed for impact. The writing is characterized by • accurate, specific words; word choices energize the writing. • fresh, vivid expression; slang, if used, seems purposeful and is effective. • vocabulary that may be striking and varied, but that is natural and not overdone. • ordinary words used in an unusual way. • words that evoke clear images; figurative language may be used.	4 Words effectively convey the intended message. The writer employs a variety of words that are functional and appropriate to audience and purpose. The writing is characterized by • words that work but do not particularly energize the writing. • expression that is functional; however, slang, if used, does not seem purposeful and is not particularly effective. • attempts at colorful language that may occasionally seem overdone. • occasional overuse of technical language or jargon. • rare experiments with language; however, the writing may have some fine moments and generally avoids clichés.
3 Language is quite ordinary, lacking interest, precision and variety, or may be inappropriate to audience and purpose in places. The writer does not employ a variety of words, producing a sort of “generic” paper filled with familiar words and phrases. The writing is characterized by • words that work, but that rarely capture the reader’s interest. • expression that seems mundane and general; slang, if used, does not seem purposeful and is not effective. • attempts at colorful language that seem overdone or forced. • words that are accurate for the most part, although misused words may occasionally appear, technical language or jargon may be overused or inappropriately used. • reliance on clichés and overused expressions.	2 Language is monotonous and/or misused, detracting from the meaning and impact. The writing is characterized by • words that are colorless, flat or imprecise. • monotonous repetition or overwhelming reliance on worn expressions that repeatedly distract from the message. • images that are fuzzy or absent altogether.	1 The writing shows an extremely limited vocabulary or is so filled with misuses of words that the meaning is obscured. Only the most general kind of message is communicated because of vague or imprecise language. The writing is characterized by • general, vague words that fail to communicate. • an extremely limited range of words. • words that simply do not fit the text; they seem imprecise, inadequate, or just plain wrong.

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SENTENCE FLUENCY

6 The writing has an effective flow and rhythm. Sentences show a high degree of craftsmanship, with consistently strong and varied structure that makes expressive oral reading easy and enjoyable. The writing is characterized by • a natural, fluent sound; it glides along with one sentence flowing effortlessly into the next. • extensive variation in sentence structure, length, and beginnings that add interest to the text. • sentence structure that enhances meaning by drawing attention to key ideas or reinforcing relationships among ideas. • varied sentence patterns that create an effective combination of power and grace. • strong control over sentence structure; fragments, if used at all, work well. • stylistic control; dialogue, if used, sounds natural.	5 The writing has an easy flow and rhythm. Sentences are carefully crafted, with strong and varied structure that makes expressive oral reading easy and enjoyable. The writing is characterized by • a natural, fluent sound; it glides along with one sentence flowing into the next. • variation in sentence structure, length, and beginnings that add interest to the text. • sentence structure that enhances meaning. • control over sentence structure; fragments, if used at all, work well. • stylistic control; dialogue, if used sounds natural.	4 The writing flows; however, connections between phrases or sentences may be less than fluid. Sentence patterns are somewhat varied, contributing to ease in oral reading. The writing is characterized by • a natural sound; the reader can move easily through the piece, although it may lack a certain rhythm and grace. • some repeated patterns of sentence structure, length, and beginnings that may detract somewhat from overall impact. • strong control over simple sentence structures, but variable control over more complex sentences; fragments, if present, are usually effective. • occasional lapses in stylistic control; dialogue, if used, sounds natural for the most part, but may at times sound stilted or unnatural.
3 The writing tends to be mechanical rather than fluid. Occasional awkward constructions may force the reader to slow down or reread. The writing is characterized by • some passages that invite fluid oral reading; however, others do not. • some variety in sentences structure, length, and beginnings, although the writer falls into repetitive sentence patterns. • good control over simple sentence structures, but little control over more complex sentences; fragments, if present, may not be effective. • sentences which, although functional, lack energy. • lapses in stylistic control; dialogue, if used, may sound stilted or unnatural.	2 The writing tends to be either choppy or rambling. Awkward constructions often force the reader to slow down or reread. The writing is characterized by • significant portions of the text that are difficult to follow or read aloud. • sentence patterns that are monotonous (e.g., subject-verb or subject-verb-object). • a significant number of awkward, choppy, or rambling constructions.	1 The writing is difficult to follow or to read aloud. Sentences tend to be incomplete, rambling, or very awkward. The writing is characterized by • text that does not invite—and may not even permit—smooth oral reading. • confusing word order that is often jarring and irregular. • sentence structure that frequently obscures meaning. • sentences that are disjointed, confusing, or rambling.

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CONVENTIONS

6 The writing demonstrates exceptionally strong control of standard writing conventions (e.g., punctuation, spelling, capitalization, paragraph breaks, grammar and usage) and uses them effectively to enhance communication. Errors are so few and so minor that the reader can easily skim right over them unless specifically searching for them. The writing is characterized by • strong control of conventions; manipulation of conventions may occur for stylistic effect. • strong, effective use of punctuation that guides the reader through the text. • correct spelling, even of more difficult words. • paragraph breaks that reinforce the organizational structure. • correct grammar and usage that contribute to clarity and style. • skill in using a wide range of conventions in a sufficiently long and complex piece. • little or no need for editing.	5 The writing demonstrates strong control of standard writing conventions (e.g., punctuation, spelling, capitalization, paragraph breaks, grammar and usage) and uses them effectively to enhance communication. Errors are so few and so minor that they do not impede readability. The writing is characterized by • strong control of conventions. • effective use of punctuation that guides the reader through the text. • correct spelling, even of more difficult words. • paragraph breaks that reinforce the organizational structure. • correct capitalization; errors, if any, are minor. • correct grammar and usage that contribute to clarity and style. • skill in using a wide range of conventions in a sufficiently long and complex piece. • little need for editing.	4 The writing demonstrates control of standard writing conventions (e.g., punctuation, spelling, capitalization, paragraph breaks, grammar and usage). Minor errors, while perhaps noticeable, do not impede readability. The writing is characterized by • control over conventions used, although a wide range is not demonstrated. • correct end-of-sentence punctuation, internal punctuation may sometimes be incorrect. • spelling that is usually correct, especially on common words. • basically sound paragraph breaks that reinforce the organizational structure. • correct capitalization; errors, if any, are minor. • occasional lapses in correct grammar and usage; problems are not severe enough to distort meaning or confuse the reader. • moderate need for editing.
3 The writing demonstrates limited control of standard writing conventions (e.g., punctuation, spelling, capitalization, paragraph breaks, grammar and usage). Errors begin to impede readability. The writing is characterized by • some control over basic conventions; the text may be too simple to reveal mastery. • end-of-sentence punctuation that is usually correct; however, internal punctuation contains frequent errors. • spelling errors that distract the reader; misspelling of common words occurs. • paragraphs that sometimes run together or begin at ineffective places. • capitalization errors. • errors in grammar and usage that do not block meaning but do distract the reader. • significant need for editing.	2 The writing demonstrates little control of standard writing conventions. Frequent, significant errors impede readability. The writing is characterized by • little control over basic conventions. • many end-of-sentence punctuation errors; internal punctuation contains frequent errors. • spelling errors that frequently distract the reader; misspelling of common words often occurs. • paragraphs that often run together or begin in ineffective places. • capitalization that is inconsistent or often incorrect. • errors in grammar and usage that interfere with readability and meaning. • substantial need for editing.	1 Numerous errors in usage, spelling, capitalization, and punctuation repeatedly distract the reader and make the text difficult to read. In fact, the severity and frequency of errors are so overwhelming that the reader finds it difficult to focus on the message and must reread for meaning. The writing is characterized by • very limited skill in using conventions. • basic punctuation (including end-of-sentence punctuation) that tends to be omitted, haphazard, or incorrect. • frequent spelling errors that significantly impair readability. • paragraph breaks that may be highly irregular or so frequent (every sentence) that they bear no relation to the organization of the text. • capitalization that appears to be random. • a need for extensive editing.

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Source: Six Trait Analytic Writing Rubric. (2014). Retrieved May 15, 2014, from <http://www.azed.gov/standards-development-assessment/six-traits/>

APPENDIX E

WRITING DISPOSITIONS SCALE (WDS)

Final Writing Dispositions Scale Questions

Item ID	Items
C14	My written work is among the best in class.
PA12	Writing is fun for me.
P18	I take time to try different possibilities in my writing.
P30	I would like to write more in school.
C19	I am not a good writer.
PA2	Writing is my favorite subject in school.
P22	I am willing to spend time on long papers.
PA16	If I have choices during free time, I usually select writing.
PA25	I always look forward to writing class.
P27	I take time to solve problems in my writing.
C28	Writing is easy for me.

Note. C = confidence; P = persistence; PA = passion.

Source: Piazza, C. L., & Siebert, C. F. (2008). Development and Validation of a Writing Dispositions Scale for Elementary and Middle School Students. *The Journal of Educational Research*, 101(5), 275–286. Retrieved from <http://dx.doi.org/10.3200/JOER.101.5.275-286>

APPENDIX F

MODIFIED SYSTEM USABILITY SCALE (SUS)

Original SUS Questions	Modified SUS Questions for this Study (Changes indicated in bold print)
1. I think that I would like to use this system frequently. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 2. I found the system unnecessarily complex. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 3. I thought the system was easy to use. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 4. I think that I would need the support of a technical person to be able to use this system. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 5. I found the various functions in this system were well-integrated. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 6. I thought there was too much inconsistency in this system. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 7. I would imagine that most people would learn to use this system very quickly. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 8. I found the system very cumbersome to use. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 9. I felt very confident use using the system. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 10. I needed to learn a lot of things before I could get going with this system. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree)	1. I think that I would like to use this system frequently. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 2. I found the system unnecessarily complex. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 3. I thought the system was easy to use. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 4. I think that I would need the support of a technical person to be able to use this system. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 5. I found that the features in this system were put together well. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 6. I thought the way this system worked was unpredictable. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 7. I would imagine that most people would learn to use this system very quickly. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 8. I thought using the system was difficult. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 9. I felt very confident use using the system. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 10. I needed to learn a lot of things before I could get going with this system. (Strongly disagree, Disagree, Neutral, Agree, Strongly Agree) 11. How useful was the “cards” part of Sparkfolio for coming up with writing topics? (open ended) 12. How useful was the story planner in Sparkfolio for planning and organizing your writing? (open-ended) 13. What did you like about the system? (open ended) 14. What did you dislike about the system? (open ended) 15. What did you find confusing or difficult to use? (open ended) 16. What improvements would you suggest? (open ended)

Source: Brooke, J. (1996). SUS: A “Quick and Dirty” Usability Scale. In P. W. Jordan, B. Thomas, B. A. Weerdmeester, & I. L. McClelland (Eds.), Usability Evaluation in Industry (pp. 189–194). Bristol, PA, USA: Taylor & Francis. Retrieved from <http://hell.meiert.org/core/pdf/sus.pdf>