ONLINE MS-WORD, INSTRUCTIONAL VIDEO FOR HELPING STUDENTS TURN-ON AND USE IMMEDIATE WRITING FEEDBACK: A LONGITUDINAL STUDY OF DEVELOPMENTAL WRITING PROGRESS AND SELF-EFFICACY

by

William J. Barry, B.A., M.A.

A dissertation submitted to the Graduate Council of
Texas State University in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy,
with a Major in Developmental Education
May 2018

Committee Members:

Taylor W. Acee, Chair

Deborah Balzhiser

Eric J. Paulson

Larry R. Price

Emily J. Summers

FAIR USE AND AUTHOR'S PERMISSION STATEMENT

Fair Use

Duplication Permission

ACKNOWLEDGEMENTS

I want to thank the members of my committee for their continuing attention, guidance, and support. Thank you for ushering me into our profession.

I am also indebted to the members of my cohort who offered thoughtful support for this work: Sydney Granger, Denise Guckert, Jodi Lampi, Mary-Helen Martinez, and Patsy Stelter. It was a privilege working with you all.

To my parents: Bill and Barbara, thank you both for raising the bar every time I believed I had done enough. In doing so, you have inculcated me with an inexhaustible curiosity and the confidence to follow that curiosity wherever it leads.

Finally, to my wife, Virginia, who unselfishly gave her support and editorial guidance for my writing along with so much more, and to our children: Max and Ally; I hope the effort spent to get here helped your lives more than it cost.

TABLE OF CONTENTS

Page

LIST OF TABLES

Table **Page**

LIST OF ABBREVIATIONS

Abbreviation	Description
DE	developmental education
LD	learning disabled
MS-Word	Microsoft Word
PCI	per capita income
QUAL	Qualitative
QUANT	Quantitative
RQ1	research question one
RQ2	research question two
RQ3	research question three
SE	self-efficacy
TSIA	Texas Success Initiative Assessment
WI	writing-intensive
WSE	writing self-efficacy

ABSTRACT

Given the percentages of first-year college students whom the system assesses as *not college ready* in writing, the current study looked to design and evaluate an intervention consisting of a brief online video intervention, which offered developmental writing students Microsoft Word (MS-Word) training on how to use non-default grammar and style feedback settings. Following anecdotal action research and pilot study data suggesting that similar in-class training improved first-year students' writing outcomes, the current study looked to influence developmental course outcomes as well as next semester enrollment and progress in writing-intensive (WI) courses, while measuring changes in writing self-efficacy (WSE). Participants (N=35) were developmental writing students ages 18-42 at a large multi-campus community college in Texas. Participants took a pre-intervention WSE survey and watched one of two brief (90 seconds) online video trainings, MS-Word (experimental), or a similarly formatted online video training for Google Scholar (comparison). Results suggested MS-Word training increased WSE, improved developmental writing course progress, and improved next semester enrollment and progress in WI courses. The scalability of online interventions such as the one studied here, and the observed changes in WSE, make a compelling case for large-scale replication.

I. INTRODUCTION

The current study began quite by accident, with a bit of action research during a summer course; and, by action research I mean what Hand and Rowe (2001) referred to as any research method, which "seeks out improvements through a process involving evidence gathering and reflection, [wherein] a practitioner ... is gathering evidence on his/her practice, and reflecting on that evidence with a view to making improvements" (p. 148). My process began as I was teaching an effective learning course for first-year students enrolled in a summer bridge program. The curriculum included only brief weekly writing assignments, but as a practitioner primarily of writing instruction, I felt inclined to treat those assignments as formative opportunities. I knew that even though MS-Word was (and still is) the most popular word processing software (Koers, 2011), and that "few writers draft using anything but" (Singh-Corcoran, 2011, p. 34), the popular misconception that students of traditional age, enrolled in their first year, and given their assumed status as digital natives, understand how to use technology for academic work (Kurt, Günüc, & Ersoy, 2013; Palfrey & Gasser, 2013) may have meant that they had received inadequate instruction on the specifics of such use (Brown & Czerniewicz, 2010). As such, the first rubrics I assigned simply asked students to adjust their MS-Word proofing settings to the most formal level and to write 250 words on the prompt, ensuring that they made *all the squiggly lines go away*. Doing so would have earned them full credit. My first thought was that such expectations would help me find the few students I imagined who might not understand how to use MS-Word in the way described, that I would address those concerns, and that we might all move on to more nuanced considerations as the semester progressed.

The first week, no one earned full credit. The second week, I saw the same errors again. Perplexed, I used the course management software to conduct an anonymous poll of all the students, and I gave them several options, including the idea that the points available just were not worth the effort. Overwhelmingly, the students chose *I do not know how to do what you are asking*. Thus enlightened, I shared my results with them, apologized for not checking sooner, and asked if they would be willing to spend some time outside of class to address the gap in their knowledge. About a dozen of them (~half the class) said they would show up, so I reserved a computer lab for an hour the following evening. I encouraged them to bring their own devices as well.

The next day, students showed up as promised, and I spent about 20 minutes showing them how to adjust the proofing settings in MS-Word, editing a Wikipedia entry for practice, and helping students configure their own devices. They seemed genuinely excited by their new tools. One student proclaimed loudly that she needed to go write, before leaving the room with a smiling 'thank you so much!' A few students also expressed frustration, and even anger, that no one had shared this information with them before, but as they trickled out, their mood seemed hopeful, and the following week, as I graded everyone's papers, something else happened. I noticed the students who had attended the training had written much more readable responses. Certainly, the errors and stylistic missteps were gone (evidence that they had used what they learned), but there was something more. It seemed to me at the time that they must have devoted more effort to other aspects of the process, perhaps because they believed something new about their potential to succeed, armed with new tools and a new sense of control. I enjoyed reading their work, not simply because it was more mechanically or stylistically in keeping with the expectations of the academy, but because it had more substance than before. Each of them seemed to be acquiring (and using) a new voice. In short, if, as Hazelton and Haigh (2010) suggest, the central aim of action research "...is to create change [and we measure success by] ...the degree to which change as desired eventuates" (p. 163), then the intervention seemed like a stunning success.

I knew, however, that judgments based on anecdotal data are subject to specific cognitive biases (Kahneman, Slovic, & Tversky, 1982; McFall, 1991), and I had plenty of reason to be biased, but I also knew that such data were not necessarily invalid and that they might make appropriate contributions to a knowledge base (Coady, 1992; Miller, 1998) from which I could ask relevant questions.

The next summer, I followed up with a pilot study (Barry, 2014), which included more participants and random assignment, as well as comparison and attention control groups. In the pilot, I tracked students' writing scores (in eight sections of the same course, with five instructors) until mid-term, before giving interventions and continuing to track writing scores until the end of the semester. Again, the intervention seemed to work, producing significantly higher writing scores and a large effect size.

After the promising pilot study results, it was time to move on to another study with a community college population, consisting completely of students enrolled in developmental writing courses, and the details of that study are below.

Problem Statement

Students in their first year, and especially those who place into developmental writing courses, struggle with spelling (Bennett-Kastor, 2005) and the conventional rules of written discourse. While some research suggests technology use, such as texting and the language conventions connected to the practice might be a contributing factor (Grabill, 1998; Stan, & Collins, 2002), counter examples also exist (Baron, 2010), and many of those same students who struggle with conventions prefer computer-assisted writing instruction (Fang, 2010; Wresch, 1984) to more traditional methods.

Complicating the matter is the popular notion that students of traditional age, enrolled in their first year, and given their assumed status as digital natives, understand how to use technology for academic work (Kurt, Günüc, & Ersoy, 2013; Palfrey & Gasser, 2013). As such, they often receive inadequate instruction on the specifics of such use (Brown & Czerniewicz, 2010). Even though the National Center for Education Statistics (2010) has suggested that 96% of public secondary schools have instructional computers in classrooms, 100% have instructional computers somewhere on campus, MS-Word is the most popular word processing software (Koers, 2011), and “few writers draft using anything but” (Singh-Corcoran, 2011, p. 34), during years of research and thousands of hours with students of all ages, I have never interviewed or met anyone who recalls learning how to adjust the formal grammar and style settings considered in the current study. “Technology is so embedded in composing, it seems invisible” (Singh-Corcoran, 2011, p. 34).

Study Purpose

The current study sought to answer three primary research questions: RQ1: Is there an effect of intervention type on post-intervention WSE?; RQ2: Is there an effect of intervention type on developmental writing course progress?; and RQ3: Among students who pass developmental writing, is there an effect of intervention type on later enrollment in WI courses? In answering these questions, the current study also sought to measure the effects of making MS-Word more *visible* by giving explicit instruction on its non-default features to developmental writers and tracking those writers through two semesters, while measuring changes in WSE and course progress, both in developmental courses and in college-level WI courses. Following a pilot study (Barry, 2014) in which first-year university students received in-class training on how to adjust and use the non-default style and grammar settings in MS-Word, the current study investigated a similar intervention with developmental writing students at a multi-campus community college system in Texas. In the pilot study, based on instructor-reported scores, participants who received the intervention training at mid-semester in a summer course, produced significantly better writing outcomes than did all other participants, when measured at end of course, despite similar scores at mid-term.

In the current study, participants received a link to a short (90 seconds) online video training, rather than the in-class version presented in the pilot. I made the change from in-class presentation, which took about 20 minutes, to an online version to promote easy and inexpensive scaling to larger populations. Further, the current study included a pre/post-assessment of WSE, which was missing from the pilot.

Like the pilot, the current study also measured the effects of MS-Word training on student writing performance, but added measurements of longitudinal outcomes, including later enrollment and success in college-level WI courses, specifically among students enrolled in developmental writing courses (the pilot included some students not enrolled in developmental writing courses).

In summary, I looked to design and test a brief online video intervention. The goal was to show students how to use non-default grammar and style feedback in MS-

Word. I also designed and tested an even briefer WSE scale. Given data (Barry, 2012, 2014), suggesting a similar in-class training improved first-year students' writing outcomes, it was fair to expect that the video could affect outcomes. Some research has suggested that students want technology for their private (but not their school) use (Corrin, Lockyer, & Bennett, 2010; Kennedy, Judd, Dalgarno, & Waycott, 2010). At the same time, other studies have suggested positive attitudes among students about the use of technology in the classroom (National Union of Students, 2010), and such attitudes appear when educators use technology for computer-assisted writing (Fang, 2010). As a doctoral student studying DE, I was particularly interested in the effects on students in DE writing courses. I believed the intervention could improve DE course outcomes and next semester enrollment and progress in WI courses by affecting students' WSE, including: activity choices, effort levels, and time on task (Bandura, 1977; Dwyer & Fuss, 2002; Klassen, 2002; Pajares & Johnson, 1994; Sanders-Reio, Alexander, Reio, & Newman, 2014). Further, I believed that changes in WSE over time would correlate with DE course outcomes and later enrollment in writing intensive courses (Bandura, 1977, 1986; Holt, 1933; Miller & Dollard, 1941) and that such findings would have both scholarship value and practical meaning for the field, given that most literature on word processor use is too old to be relevant, and considerable gaps in literature remain about students' use of such technologies and effects (both short-term and long-term) on WSE and other outcomes. Especially given the ties between self-efficacy (see, Bandura, 1977, 1986; Holt, 1933; Miller & Dollard, 1941) and students' behavior choices, effort levels, and time on task, all key variables in students' writing processes (Bandura, 1977; Dwyer & Fuss, 2002; Klassen, 2002; Pajares & Johnson, 1994; Sanders-Reio, Alexander, Reio,

& Newman, 2014), designing a computer intervention along with a WSE scale seemed a prudent approach.

II. LITERATURE REVIEW

For purposes of this study, self-efficacy, an essential element in Bandura's (1977, 1978, 1986) social cognitive theory, is a student's belief in his/her ability to perform a specific task (e.g., writing for college). Under the right conditions, self-efficacy builds over time as students develop complex skills through experience (Bandura, 1982). Bandura (1997) suggested that students exercise control over their lives, according to beliefs about their abilities, and as they gain experience, they also assess, consider, and integrate signals about those abilities, before regulating their choices and efforts (Bandura, Adams, Hardy, & Howells, 1980). Accordingly, self-efficacy mediates learning and achievement, particularly in academic settings (Luszczynska, Gutiérrez-Doña, & Schwarzer, 2005; Usher & Pajares, 2006), and it predicts students' levels of academic achievement, engagement, and motivation (Bandura, 1997; Klassen & Usher, 2010; Pajares & Kranzler, 1995; Pajares & Urdan, 2006; Shell, Colvin, & Bruning, 1995). As such, students with high self-efficacy embrace more challenging goals (Zimmerman, Bandura, & Martinez-Pons, 1992), undertake and persevere through difficult tasks (Pajares, 2006; Zimmerman, 2000), manage their time more efficiently (Zimmerman, 2000) and are better able to solve conceptual problems (Bandura, 1997, Zimmerman, 2000) compared to inefficacious students of similar intelligence and abilities.

Antecedents of Self-Efficacy

Bandura (1982, 1997) described four signals, which affect self-efficacy beliefs and suggested that any experience may work through one or more of the signals. In order of influence, the signals are: performance accomplishments, vicarious experience (modeling), verbal persuasion, and affective and physiological states. According to Bandura (1997), students' cognitive assessments and integration of these signals produce their self-efficacy beliefs, such that signals relevant to a student's judgments of his/her capabilities only become so through cognitive processing and reflective thought.

Consequences of Self-Efficacy

Performance accomplishments, in which students successfully practice a skill or behavior, improve self-efficacy more than the other signals (Bandura, 1977; 1982; Bandura, Adams, & Beyer, 1977). Bandura (1997) described this first and most influential of the four signals as the "experience of overcoming obstacles through perseverant effort" (p. 80). Students engage in activities, interpret the results of their behavior, and use their interpretations to develop beliefs about their capability to engage in later activities (Pajares, 2006). Such experience is subjective in that if a student interprets the outcome of some action as successful, self-efficacy increases, and the student tends to become resilient and to persevere in the face of difficulty. In this way, self-efficacy can build over time as students' experiences help them develop the skills, coping abilities, and relevant exposure necessary for effective task performance. In contrast, however, negative experiences (e.g., receiving a failing grade on a college paper) tend to undermine self-efficacy, especially if such experiences occur before the student has developed an adequate sense of competence (Pajares, 2006). So, although performance accomplishments are an influential pre-requisite to self-efficacy, some students, especially those who feel fearful or incapable, may choose to avoid such opportunities, based on their interpretations of early negative experiences.

Many studies have reported significant correlations between self-efficacy and task performance (Bandura, 1982; Bandura & Adams, 1977; Bandura, Adams, & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980; Feltz, 1982; Locke, Zubritzky, Lee, & Bobko, 1982). In studies in which researchers have altered efficacy beliefs by various treatments, the resulting efficacy beliefs still predict performance. Although performance accomplishments yield the greatest increases in self-efficacy, correlations between self-efficacy and performance persist for other variables such as modeling (Bandura, 1977). In fact, several studies have found self-efficacy to be a better predictor of performance than past behavior (Bandura, 1977; Bandura, 1982; Bandura & Adams, 1977; Bandura, Adams, & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980), and Bandura (1982) showed that self-efficacy can predict performance in a variety of domains, if the efficacy measure specifically addresses the assessed tasks.

In addition to performance accomplishments, students use signals about how they feel physically and emotionally to make self-efficacy judgments about behaviors or tasks (Bandura, 1997). Also known as emotional arousal, students evaluate their ability to perform by attending to their physiological and affective states (e.g., anxiety, excitement, stress, fatigue). Accordingly, self-efficacy increases when students experience positive states and decreases when they experience negative states (Bandura, 1997). As with performance accomplishments, the way students interpret their emotional arousal varies depending on their beliefs about the situation. Thus, "the problem is not arousal per se but one's interpretation of it" (Bandura, 1997, p. 109). For example, a student with high WSE will be likely to experience positive or neutral signals while writing a paper for class, while another student, under the same conditions, may feel stressed or frustrated, have sweaty palms or increased heart rate, and interpret such signals as cause to judge WSE as low. Thus, a student in an aroused state (e.g., high anxiety while writing a paper) may interpret their anxiety as incapacitating fear and feel overly susceptible to failure.

Consequences of Writing Self-efficacy

Some research has sought to connect self-efficacy and academic performance in specific domains broadly relevant to the current study (e.g., Botsas & Padeliadu, 2003, who suggested that students with reading difficulties seemed less mastery-oriented and more performance-avoidant than their peers without reading difficulties; such goal orientation broadly relates to self-efficacy as a motivational construct (see, Pajares & Cheong, 2003); and, Pajares and Valiante (1997) suggested that students' WSE directly affected their writing apprehension, beliefs about writing usefulness, and writing performance), but the majority of domain-specific research, relating self-efficacy beliefs to performance, shows up in mathematics. For instance, Skaalvik and Skaalvik (2004) suggested that first-year high school students' final grades in math predicted math self-efficacy beliefs. Similar studies less often show up in research on college writing, though the existing literature suggests WSE beliefs play a significant part in predicting writing achievement (e.g., Klassen, 2002; Pajares, 2003; Pajares & Valiante, 1997; White & Bruning, 2005), and in a study to confirm whether a training on WSE, intended to enhance Bandura's (1997) four sources of self-efficacy, could improve the productivity and quality of writing among students with learning disabilities, García and de Caso (2006) assessed 60 fifth- and sixth-grade students on a series of measures before and after administering a WSE training. Garcia and de Caso also measured students' writing processes, WSE beliefs, and other motivational constructs. They applied the training to 40 students, with the remaining 20 making up a comparison group, and their results suggested that, post-intervention, self-efficacy-trained students earned higher scores on most variables than their peers, suggesting the importance and possibility of modifying WSE and how such modifications might improve students' writing quality and productivity, while also affecting their writing processes by increasing the time spent thinking, writing, and checking.

Literature from the writing domain on whether (or how) word processor use, specifically, leads to increased performance accomplishments, a critical aspect of self-efficacy, is still unclear. Some early studies on the more general effects of word processor use drew samples from college undergraduate populations (e.g., Meier, McCarthy, & Schmeck, 1984; Shell, Murphy, & Bruning, 1989), but, to intervene sooner, most research later shifted focus to primary and secondary students (e.g., Graham & Harris, 1989; Graham, Schwartz, & MacArthur, 1993; Pajares & Valiante, 1997; Wong, Butler, Ficzere, & Kuperis, 1996).

Specifically, Collins, Engen-Wedin, Margolis, and Price (1987) found that, in a study of 72 participants, adding word processing technology to the classroom allowed learning disabled (LD) college students to "achieve at a level consistent with that of non-LD peers in mainstream writing courses" (p. 13) and that LD student attitudes toward writing also saw significant positive changes over the 20-week study. Collins, et al. (1987) echoed even earlier literature suggesting that, especially for LD students, word processor use may offer important benefits (e.g., Engen-Wedin & Collins, 1986; Engen-Wedin, Collins, & Lawson, 1986) by compensating for (or bypassing) certain deficiencies (see, Arkin & Gallagher, 1984) and enabling LD writers to improve the surface presentation of their written work, as well as their motivation and self-confidence, while also reducing writing apprehension (Hummel, 1985; Larson & Roberts, 1986; Kerchner & Kistinger, 1984; Kolich, 1985).

Studies with younger students have also offered clues about effects for college students. For instance, in a study of 31 eighth grade students, in which Joram, Woodruff, Bryson, and Lindsay (1992) hypothesized that the ease of frequent revision made possible with word processors might interfere with what they called "the constructive processes of composition" (p. 167), they found that, in general, papers written with word processors were not of a higher quality than those written by hand, results which others have suggested as well (e.g., Daiute, 1986; Hawisher, 1987; MacArthur & Cavalier, 2004). However, among the less-capable student writers in the Joram, et al. (1992) study (according to English class grades), word processor use produced more creative papers, suggesting that effects may be student dependent, and later research on testing accommodations from Hollenbeck, Linder, and Almond (2002) suggested that inconsistent effects may relate mostly to students' unfamiliarity with the technology.

More recent studies, with non-native speakers (e.g., Batianeh, 2014; Behjat, 2011) have reinforced those earlier results. For instance, in a study of 60 university sophomores, who were non-native speakers, Behjat (2011) found that, compared to a teacher-corrected group, students using only the proofing feedback provided by a word processor to improve paragraph writing performed significantly better, based on pre-intervention assessments. In line with some older research in the field (e.g., Meskill &

Higgins, 1990), Behjat suggested that the “more patient” correction of the computer may be superior to the “red pen” (p. 1433), especially for non-native speakers.

While the current study collected no data on student participants’ native/non-native language designations, U.S. census data for 2015 suggested that in the metro area where the study took place, residents spoke 145 languages in their homes (Kriel, 2015). And, in a study, which drew samples from five countries, Luszczynska, Gutierrez-Doña, and Schwarzer (2005) distinguished *general* self-efficacy (e.g., students’ beliefs about their abilities to complete new tasks and to cope with difficulty across a range of demanding conditions) from *specific* self-efficacy (constrained to a specific task; e.g., writing for college) and showed that general self-efficacy tended to correlate with self-esteem and academic performance, and that the correlation persisted across cultures and samples, suggesting the universality of self-efficacy as a construct.

Writing Process Literature

Defining writing is difficult given its varied uses, practitioners, and contexts (Weigle, 2002). It is a complex and demanding cognitive task, which demands distinct skills (Jalaluddin, Yunus, & Yamat, 2011) as well as thinking at multiple levels, including, but not limited to: grammar, sentence, paragraph, and theme (Lavelle, Smith, & O’Ryan, 2002). For purposes of the current study, however, a definition that reflects the literature and focuses attention on expository writing for academic purposes was enough. Further, the work here considered the specific realities of the activity colleges, universities, and their clients *call* writing, regardless of the varied definitions available. As such, I began with the assumption that the writing process (Fraser & Mavrogiannis, 2017) integrates and coordinates information through iterative planning, production, and editing (Jusun & Yunus, 2017). Throughout the process, feedback has the potential to encourage and/or derail student efforts (see, Keh, 1990; Paulus, 1999) in ways, which are relevant to self-efficacy.

Writing Feedback

Especially in an academic setting, research suggests that students improve their writing skill when they engage in extended practice and receive individualized feedback (Kellogg & Raulerson, 2007). In a mixed methods study, which investigated the writing feedback perceptions of middle and high school students ($N = 598$), Zumbrunn, Marrs, and Mewborn (2015) examined the predictive and mediational roles of WSE and perceptions of writing feedback on student writing self-regulation and found that students' perceptions of the feedback they received partially mediated the relationship between their WSE and writing self-regulation aptitude, which suggests that feedback, but also how students perceive (or receive) that feedback, may play an important role in their motivation and self-regulation beliefs.

Immediate computer-delivered feedback. In the wake of cheaper and faster hardware developments over the past three decades, computer-based systems for feedback and instruction have become more viable (Shermis & Burstein, 2003, 2013), and these systems vary in purpose, from formative feedback and explicit knowledge and strategy instruction to automated essay scoring (Dikli, 2010; Graesser & McNamara, 2012; Roscoe, Allen, Weston, Crossley, & McNamara, 2014; Weigle, 2013; Xi, 2010). Research on the effects of systems which give students feedback, rather than simple scoring, are of relevance to the current study.

In one such recent study, which investigated students' essay revising in the context of an artificially intelligent computer tutoring system called Writing Pal, Roscoe, Snow, and McNamara (2013) found that high school students, who received computer-delivered feedback, "were more likely to make substantive revisions that implemented specific recommendations," suggesting a potentially vital role for such feedback.

In contrast to simple scoring systems, some systems, including MS-Word (when configured according to the recommendations in the current study) provide students with feedback/suggestions on their writing. The benefits of such systems include that they give students extended opportunities to receive feedback and to practice their writing without the input of an instructor. Such extended practice time (Ericsson, Krampe, & Tesch-Römer, 1993), especially, is necessary for them to develop effective writing skills (Johnstone, Ashbaugh, & Warfield, 2002; Kellogg & Raulerson, 2007).

Relationships Between Feedback and Self-Efficacy

Given the importance of feedback and the self-efficacy focus of the current study, an examination of relationships between feedback and self-efficacy suggested in the literature is relevant.

Writing Feedback and Self-Efficacy

Although very little research is available on how students *feel* about feedback, in a study of elementary students' (N = 287), further suggesting self-efficacy as a positive predictor of writing performance, Zumbrunn, Bruning, Kauffman, and Hayes (2010) found that students' SE beliefs mediated the effects of their attitudes toward feedback. In other words, students with higher WSE were less likely to experience lower writing performance measures, as related to feedback attitudes, and their feelings about their feedback (regardless of the feedback itself) may play a key role in how they view their writing experiences.

Computer-delivered feedback and writing self-efficacy. The literature on how such factors relate when considering computer-delivered feedback differs even more from the focus of the current study, and most related research comes from English language learner populations (e.g., Poverjuc, 2011). Although, there are some results, which suggest relevant corollaries. For instance, in a recent meta-analysis, comparing face-to-face interventions to computer-delivered alternatives for college students who received alcohol abuse counseling, the groups showed mixed results (Carey, Scott-Sheldon, Elliott, Garey, & Carey, 2012). However, in another study, designed to improve obesity metrics among middle school students and working from a transtheoretical model, which included aspects of self-efficacy improvement, Frenn, et al. (2005) showed participants several video interventions, and those who viewed at least half of the videos significantly improved their rates of exercise and other positive behaviors, as compared to controls. As suggested above, however, studies addressing the specific effects of computer-delivered writing feedback on writing self-efficacy are lacking, and that gap offered much of the impetus for the current study.

If however, as the literature suggests, students prefer computer-assisted writing instruction (Fang, 2010; Wresch, 1984) to more traditional methods, and that preference leads to successful and extended practice (performance accomplishment) (Bandura, 1977; 1982; Bandura, Adams, & Beyer, 1977), such that students' WSE builds as they develop complex skills through experience (Bandura, 1982), and they thereby begin to exercise control over their lives, according to beliefs about their abilities (Bandura, 1997), assessing, considering, and integrating signals about those abilities, before regulating their choices and efforts (Bandura, Adams, Hardy, & Howells, 1980), then the idea that providing those students with access to enhanced feedback in a word processor environment as a way to increase WSE and writing outcomes seems reasonable.

Gaps in the Literature

Despite the reasonableness of the proposal above, however, research specifically addressing the effects of word processor integration and self-efficacy is still incomplete – a gap the current study tried to address by measuring the effect of an MS-Word training intervention on WSE (RQ1) and on developmental writing course progress (RQ2). Early findings from research related to word processor use and self-efficacy (see, RQ1) suggested that writers enjoyed composing with a word processor more than with paper and pencil/pen (e.g., Daiute, 1985; Gould, 1981; Haas & Hayes, 1986; Snyder, 1993) and that the increased speed improved attitudes toward writing (Palmquist, 1998; Montague, 1990) and revising (Owston, Murphy, & Wideman, 1991; Wresch, 1987; Sommers, 1985). Further, without mentioning Bandura, Curtis (1988) nonetheless explained such improvements as a new sense of performance accomplishment, suggesting that whether "we are better writers on the machine, we feel we are more 'masterful' producers of writing" (p. 337), and in studies of teachers who used computers in the writing classroom, results suggested that students who felt more masterful had better attitudes, more confidence (Palmquist, 1998), and took more risks (Gerrard, 1987) – all results, which informed the research questions, theoretical framework, and purpose of the current study.

So, while the literature on word processors and writing outcomes may stretch back for decades, and researchers such as García and de Caso (2006) produced findings, which may suggest a vital role for word processor training in the developmental writing classroom, in terms of technology, 2006 was a long time ago. The time alone suggests important gaps in the literature that suggest the sorts of questions posed by the current study. Namely, might a technology intervention such as the one proposed here produce an effect on post-intervention WSE (RQ1), which lends support to earlier findings. Will such an effect correlate with changes in developmental writing course progress (RQ2). Finally, might all those effects also correlate with changes in later enrollment in WI courses (RQ3)? The findings of studies conducted over a decade ago, suggest the answer may be yes to all the above. However, in terms of generalizability, it is hard to make the case that fifth- and sixth-grade students share much in common with adult students in college, and much of the research on word processing technology may be too old to be relevant at all. A full eight years before Garcia and de Caso (2006), Palmquist (1998) reported that since 1990, the percentage of students entering college with word processing skills knowledge increased by 85% and that "... more students learn to type and use a mouse in elementary school" (p. 210). Three years later, Dorman (2001) reported that in the 10 years prior to the study, the ratio of students to computers had gone from 1:26.7, to 1:5.7. How such increases in basic technology literacy confirm or call into question older findings is still largely unknown. Addressing the through line of research findings in an age of technology acceleration suggested an important rationale for the current study.

Here, I am suggesting that it may be prudent to revisit the word processor as a tool, to ask how teaching it explicitly might affect WSE (RQ1), to reconsider how writing instructors in the developmental classroom approach the teaching of that tool, and to study how teaching it in a new way might affect outcomes for students in those classrooms (RQ2) as well as their educational trajectories in general (RQ3).

Theoretical Framework

Based on action research (Barry, 2012), pilot study (Barry, 2014) experience, and an understanding of relevant literature (see García & de Caso, 2006; Pajares, 2003), the current study sought to influence WSE and writing performance, within a college writing context, based on Bandura's (1982, 1997) general self-efficacy theory. Bandura (1977) proposed the concept of self-efficacy as central to a unifying theory of behavior change. He used the term efficacy expectation to define a student's belief that he/she ". . . can successfully execute the behavior required to produce the outcome" (p. 193). Bandura believed knowledge of students' efficacy views was central to effective predictions of behavior initiation, coping effort, and persistence through adversity.

The current study aimed to influence WSE in developmental writing students using a brief but adaptive intervention (encouraging and showing students how to use the formal grammar and style proofing feedback in MS-Word), with the expectation that such influence, coupled with the adaptive nature of the intervention, would affect students' writing outcome expectations, both directly and via WSE. In other words, the intervention aimed at increasing or delivering student writing task success, relevant models for writing task completion, verbal encouragement, and lower levels of negative affect (Bandura, 1982, 1997) within a developmental writing context to help students develop stronger WSE and more positive writing course outcome expectations.

The development of Bandura's self-efficacy construct depended on the idea that successful performance takes more than knowledge, skills, and competence (Bandura, 1986, 1993). Bandura suggested that students need to develop a keen sense of efficacy before they put such skills into practice (Evans, 1989; Pajares, 1996) and that a student's belief in his/her ability to act mediates such action as well as the requisite knowledge and skills (Bandura, 1977, 1986). Self-efficacy beliefs affect outcome expectations (Bandura, 2006; Costa, 2008), and outcome expectations affect emotional reactions, motivation (Pajares, 2003), and thought patterns (Bandura , 1977), as well as goal choices (Pajares & Valiante, 1997; Pajares, Miller, & Johnson, 1999) behaviors (Lent, Brown, & Hackett, 1994), and outcomes (Klassen, 2002; Pajares, 2003). As such, the theoretical framework from which I worked for the current study suggested that students who received an intervention, which increased WSE, would be more motivated to write, have more positive thoughts about writing, better manage the emotional challenges of a developmental writing course, and consequently be more likely to set and attain the goal of passing such a course.

Finally, I used the model to theorize possible mediators between the intervention and academic performance, such as: motivation, goal choices, thought patterns, etc., and to theorize how such interactions might facilitate a dynamic in which passing developmental writing, coupled with the cumulative experience of relevant model exposure offered by the intervention and the low levels of negative affect afforded by the personalized just-in-time feedback (Ertmer & Newby, 2008) mechanisms therein, would activate a sufficient WSE feedback loop (see, Estrada, Woodcock, Hernandez, & Schultz, 2011; Schunk, 1991), such that students who received the experimental intervention would also be more likely to enroll in WI courses in subsequent semesters. However, the only effects I specifically investigated in the current study were those of the intervention on WSE and writing course progress and later enrollment.

III. METHODS

As suggested above, the current study sought to answer three primary research questions:

RQ1: Is there an effect of intervention type on post-intervention WSE?

H_0: There is no statistically significant difference between the intervention and comparison groups on median post-intervention WSE scores.

H_1: There is a statistically significant difference between the intervention and comparison groups on median post-intervention WSE scores.

RQ2: Is there an effect of intervention type on developmental writing course progress?

H_0: There is no statistically significant difference between intervention and comparison groups on the frequency of developmental writing course progress.

H_1: There is no statistically significant difference between intervention and comparison groups on the frequency of developmental writing course progress.

RQ3: Among students who pass developmental writing, is there an effect of intervention type on later enrollment in WI courses?

H_0: Among all students who pass developmental writing, there is no statistically significant effect of intervention type on the frequency of later enrollment in WI courses.

H_1: Among all students who pass developmental writing, there is a statistically significant effect of intervention type on the frequency of later enrollment in WI courses.

The sampling method I used resulted in fewer participants than expected. Following census day (12th class day), I forwarded an email request (see Appendix A) to the Dean of College Preparatory, who had earlier agreed to send my request to all faculty teaching a developmental writing course for the fall semester. The Dean then sent my request to all faculty members (copying me) along with instructions to send to all students enrolled in a developmental writing course. Two weeks later, because of many fewer than expected responses, I sent a follow-up request directly to all developmental writing faculty members, by replying all to the earlier request. Two weeks later, I closed the online survey to further participants. The final sample, after removing students who did not complete the entire survey, who did not correctly answer a check-for-understanding question, and/or who took part more than once (and gave different answers each time) was 35. Despite random assignment, using an embedded function in the Qualtrics survey platform, the groups were uneven after purging the cases listed above, leaving 15 in the experimental group and 20 in the comparison group.

Texas Success Initiative Assessment (TSIA)

The TSIA, better known as the TSI test, is a program, which colleges and universities in Texas use to find the right level of college course work for incoming students. The TSI consists of three separate exams: writing, reading, and math, and although several criteria exempt students from the program, colleges and universities insist that many incoming students take the assessment. Besides the essay part, the exam questions are multiple choice and computer adaptive (i.e., questions increase or decrease in difficulty based on answers provided). Successful scoring on the TSI suggests student readiness for college-level course work. Whereas, unsuccessful scoring suggests the need for developmental course work.

Although TSI writing and reading score data were not available for all participants, 10 of 15 experimental participants did have writing data on file. See Table 1 below. Scores ranged from 337-357, with an average score of 348.8, and 12 of 15 participants had reading data on file (scores ranged from 328-349, with an average score of 340.4). For comparison participants, 16 of 20 had writing score data on file, and scores ranged from 334-362, with an average score of 350.8, and 18 of 20 had reading score data on file, with scores ranging from 316-367 and an average score of 339.8.

Table 1

Mean Available TSIA Scores

	Writing	Reading
Experimental Participants with TSIA Scores	348.8 (6.9) [n = 10]	340.4 (6.1) [n = 12]
Comparison Participants with TSIA Scores	350.75 (7.8) [n = 16]	339.83 (10.8) [n = 18]

Note. Standard deviations appear in parentheses below means.

The study took place in a large community college system in Texas, including three main campuses and 12 extension centers, with a student enrollment exceeding 60,000. All participants shared the common condition of enrollment in a developmental writing course. Developmental writing courses in the system under investigation were courses students needed to pass prior to enrolling in WI courses. Placement into the developmental writing course happened following placement testing (TSIA), guided by state education policy. Class sizes were small (~20 students).

A cohort of students (*N*=35) received an online WSE survey and intervention video stimulus via email. Following consent, I used Qualtrics' random assignment feature (Qualtrics uses a Mersenne Twister (MT) random number generator algorithm; see Matsumoto & Nishimura, 1998), which allows random assignment to different conditions, such that each participant saw a different video stimulus (comparison condition - Google Scholar) and/or (experimental condition – MS-Word). See Table 2 below.

Table 2

Participant Data

Characteristic	Comparison (*n* = 20)	Experimental (*n* = 15)
Gender		
Female	11 (55%)	12 (80%)
Male	9 (45%)	3 (20%)
Ethnicity		
Hispanic	10 (50%)	11 (73%)
White	5 (25%)	3 (20%)
Black	3 (15%)	1 (7%)
Asian	2 (5%)	0 (0%)

Videos

To minimize intervention bias, each video began the same way. The first 30 seconds of both videos were identical and included the following audio.

> Hello, my name is Belle. It is a pleasure to meet you. You probably know, you will have to write around six papers every semester while you are in college. That might seem like a lot, but with the right help, I know you can do it. I want to share some of that help with you today. You might want to take some notes (Barry, 2016a; 2016b).

Belle is a robot I created to serve as narrator and instructor for both videos. I chose a robot, because I knew I would be using text-to-speech software for the audio of both videos, and the results of such software sound robotic.

At the 30-second mark, the video contents differentiate. The experimental video included the following audio.

> Next time you're in Microsoft Word, click the File tab. When the screen changes, look for the Options button, and click it next. Then, find the Proofing option, and select it. When the dialog box appears, change Grammar Only to Grammar & Style, and then click the Setting button. When the Settings box pops up, activate as many options as you like. More options mean more help with your writing. Click OK when you're done. Finally, click the Recheck Document button to see your results. Now, Microsoft Word will help you to make all your writing more effective, so you earn higher grades. As you learn to take advice from the program, your writing will improve just the way need it to (Barry, 2016a).

The comparison video included the following audio.

> Next time you're on Google, search the word scholar. Then, go to Google Scholar and search for the topic of your paper. Today, I'll use American literature. When your results appear, pay attention to articles that have been cited many times by other writers. Click the 'Cited by' note to see all the articles written by other writers who cited the original. When you find an available document, open it, and perform a keyword search for the original author, using Ctrl-f. When you do this, you will be able to see what other smart writers have already said about the original document. This information can be very useful in figuring out how to write about it yourself (Barry, 2016b).

In each case, Belle is an animated instructor on screen. I used a combination of static graphics and screenshots from the representative user interfaces, animated in PowerPoint to produce similar effects in both videos. (See Appendix G for examples.)

Again, to minimize bias between interventions, both videos ended identically with the following audio. "That's all I have for you today. I hope you try my little trick. Good luck, and have a great semester" (Barry, 2016a; 2016b).

Research Design

I used an experimental between-groups design, with random assignment. The primary independent variable was the type of online intervention students received (MS-Word or Google Scholar). The dependent variables included developmental course progress (i.e., did the student pass or fail the developmental writing course he/she was taking at the time of the intervention?), later enrollment in WI course(s) (yes/no), and progress in WI course(s) (pass/fail), where applicable. I also measured WSE (pre/post) as a possible explanatory variable and compared changes in WSE, though limited samples size prevented complex analysis, especially about moderating effects.

Procedures

For an overview of the study procedures, refer to Figure 1 below.

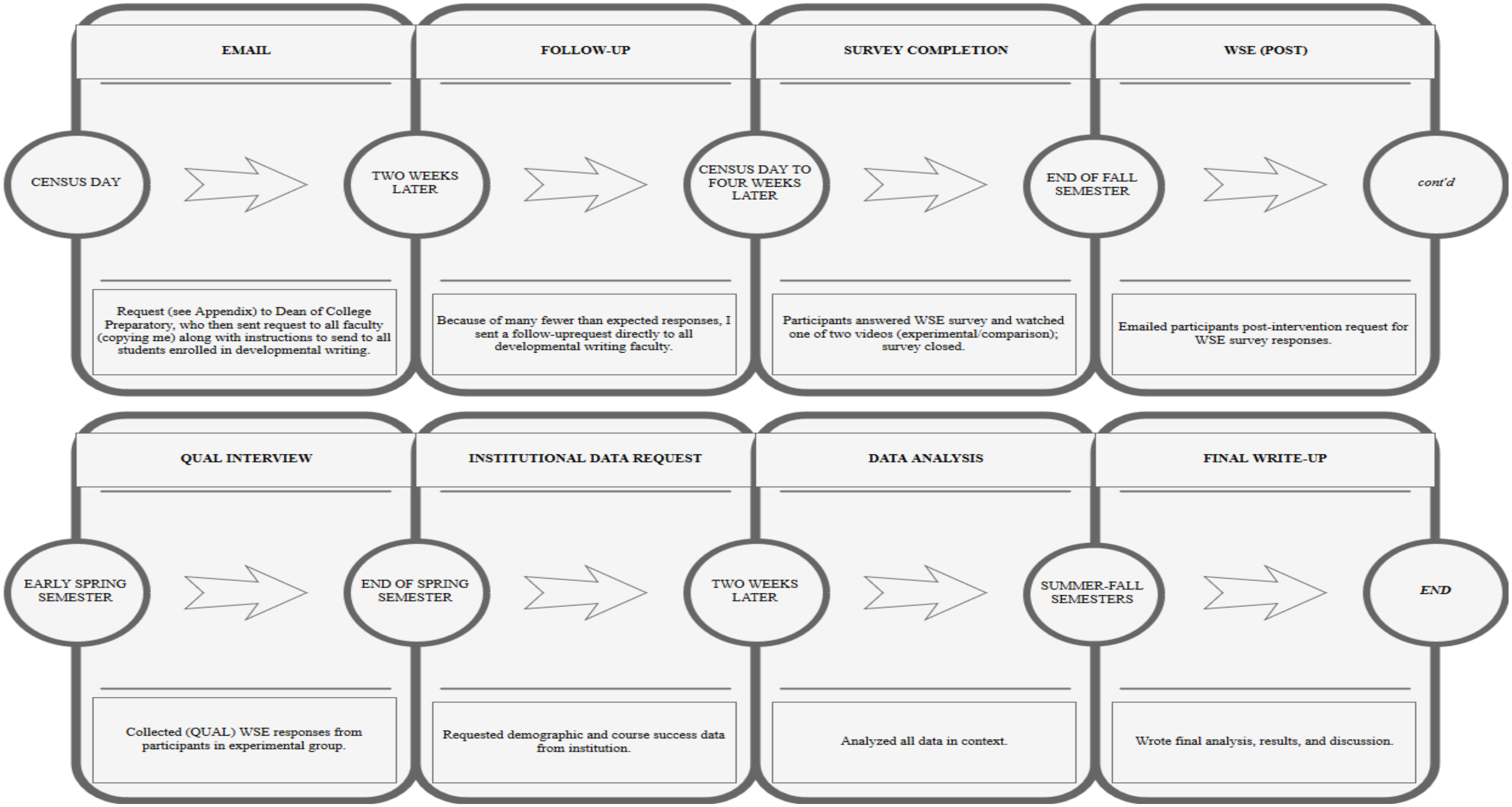

Figure 1. Study overview

In exchange for entry into a series of drawings ($20 gift cards given away following intervention, again at end-of-semester, and once during the next semester), each participant received an email (see Appendix A) including consent documentation and a link to an online questionnaire and intervention. Two weeks later, because of many fewer than expected responses, I sent a follow-up request directly to all developmental writing faculty members, by replying all to the earlier request. Two weeks later, I closed the online survey to further participants.

When designing the study, I conceptualized consent as a process with four elements: informing, assessment of comprehension, assessment of autonomy, and consent (see Yale, 2006).

The first element in the consent process involved the presentation of information in the consent form. The second element in the consent process was assessment of comprehension. I kept the language at an eighth-grade level or below as much as possible and included a check for comprehension after the intervention. The third element of consent was assessment of autonomy. I tried to remove obvious impediments to prospective participants' autonomy during the consent process by beginning with a clear invitation to take part and making it as clear as possible that each was free to decline or withdraw from the study at any time without negative academic or other repercussions.

All potential participants who opened the email invitation received the choice to opt out at once. For students who chose to continue with the consent process, I entered their names into a series of drawings ($20 gift cards). Though there existed some risk the potential inducement of these rewards would influence some potential participants, I decided (in conjunction with my thesis committee and the Institutional Review Board) that the value was small enough to minimize the risk of ethical complication to an acceptable level. The fourth and final element was obtaining agreement to take part from each potential participant.

Following consent, Qualtrics survey software randomly assigned (using a Mersenne Twister (MT) random number generator algorithm; see Matsumoto & Nishimura, 1998) each participant into comparison and experimental groups by showing one of two online videos (comparison – Google Scholar video, N=20) and (experimental – MS-Word video, N=15).

The online survey for both groups included questions from a WSE scale (see Appendix B). Following the WSE scale, comparison group participants watched a video about how to use features of Google Scholar during research and confirmed participation and comprehension by answering a check-for-understanding question (see Appendix C) about the video content. Following the WSE scale, experimental group participants watched an MS-Word video about how to use the non-default style and grammar settings to receive added feedback and suggestions for editing during the writing process and confirmed participation and comprehension by answering the same check-for-understanding question as the comparison group. I chose to drop participants who did not answer the question correctly, as such responses suggested one or more of the following conditions (although, I also concede that it was possible to guess correctly):

1. Participant did not watch the video
2. Participant did not understand the video content

3. Participant did not understand the check-for-understanding question, suggesting an inadequate command of English

Any of the above conditions would call into question evidence for the internal validity of study data from such participants.

To simulate conditions experienced by participants in the experimental group and minimize between-group bias, comparison group participants also watched a video during intervention. I developed a (comparison) stimulus outlining a research strategy applicable to Google Scholar, followed by an encouragement to use the strategy for all future research-writing assignments. I also developed a suitable video version of the MS-Word (experimental) stimulus used in the pilot study (Barry, 2012). Content of the video included a brief explanation of the utility of MS-Word for college writing in general. Content also included a systematic explanation of how to change feedback options from the default to spelling *and* grammar and how to adjust those settings to formal, followed by an encouragement to use the new feedback for all future writing assignments.

I produced both full-color intervention videos, using open source images in PowerPoint. The lead character in each was *Belle*, a female robot who offered help to students as they began their semester. I used a free online text-to-speech converter (http://www.fromtexttospeech.com/) to convert the written dialogue to audio. I selected the default character (US English – Alice) at medium speed for both, so that the videos would be as like each other as reasonable. Each video ran 90 seconds.

At the end of the fall semester, I sent a follow-up email with the WSE scale to all participants and called experimental group participants to collect qualitative interview response data (see Appendix E for interview questions) for later summative content analysis (see, Hsieh & Shannon, 2005), validity checked using extended engagement, triangulation, and referential adequacy (Lincoln & Guba, 1982; Manning, 1997).

At the end of the spring semester, I requested institutional data on all participants for writing course success (pass/fail), SES/demographic data, and spring semester enrollment (WI courses – e.g., Comp I), as well as course success data on all participants who enrolled in a WI course (pass/fail).

Measures

I collected and measured data both through survey and interview interaction with individual participants and from institutional sources.

Survey and interview measurements included the following.

WSE scale. Based on the self-efficacy construct proposed by Bandura (1977) and drawing on the work of McCarthy et al. (1985) and Shell et al. (1989), I defined WSE as the participant's belief in his/her ability to satisfactorily complete academic writing tasks at the college level.

Research has suggested that acceptable score validity and reliability is possible using a three-to-five item self-report scale (see, Hinkin & Schriesheim, 1989; Hobart & Thompson, 2001; Juniper, Guyatt, Streiner, & King, 1997). Thus, building on the work of Kaplan, Lichtinger, and Gorodetsky (2009), Pajares, Miller, and Johnson (1999), and Prat-Sala and Redford (2010), I developed a three-item scale to measure participants' self-efficacy beliefs about punctuation, grammar, and general writing skill. (See Appendix B) I did not conduct a validation study prior to using the scale. However, post hoc analysis suggested adequate score validity and reliability for the scale.

Following consent, but before the intervention and again at the end of the first semester, I measured WSE (measured ordinally as a self-reported three-item variable), using three questions scored on a five-point Likert scale (1 = Completely Disagree to 5 = Completely Agree).

Intervention. I measured intervention type as a dichotomous, nominal, randomly assigned variable, Google Scholar intervention (comparison), or MS-Word intervention (experimental).

Check for understanding. Following intervention, participants answered an attention check question about the video content. I collected those responses as a single-item dichotomous variable (0 = correct; 1 = not correct).

Use likelihood. Following intervention, participants answered a use likelihood question (see Figure 3 in Appendix D) about how likely they were to use the information provided in the video. I collected those responses as an ordinal self-reported variable (1-5); 1 = extremely unlikely; 5 = extremely likely.

WSE quantified interview data. Following intervention, I collected qualitative interview data from experimental group participants about their experiences with MS-Word and quantified those responses as ordinal data (1-6), correlated with changes in WSE scale scores referenced above.

Institutional source measurements included the following.

Age. I measured age as a single ratio self-report item from each participant. The range was 18 to 42.

Sex. I recorded biological sex as a dichotomous nominal self-reported single item – female or male. Though I made no sex-based inclusion/exclusion decisions, given longstanding evidence in the literature about relationships between sex and writing (e.g., Cleary, 1996; Francis, Robson, & Read, 2001; Lee, 2013), I chose to collect self-reported sex data from participants during consent.

TSIA writing scores. Using institutional data, I recorded TSIA scores as an interval item for each participant (pre-intervention) for whom such data were available.

Ethnicity. Using institutional data, I recorded ethnic identity as a single item in which participants reported their ethnic identity as one of four categories: Hispanic, White, Black, or Asian.

Zip code and per capita income (PCI). Relying on institutional student zip code data, in conjunction with Internal Revenue Service (2015) data on per capita income by zip code, I estimated the income of participants (Cowan, et al., 2012).

Developmental course progress. I used institutional data to measure developmental course progress as a dichotomous item (fail/pass) for all participants.

Subsequent enrollment in a college-level WI course. I used institutional data to measure later enrollment in a college-level WI course as a 3-category polytomous item (yes/no/not applicable) for all participants.

Progress in college-level WI course. I used institutional data to measure progress in college-level course as a 3-category polytomous item (fail/pass/not applicable) for all participants who enrolled in a college-level WI course during the spring semester after the intervention. (For a complete list of variables, see Table 3 below.)

Table 3

Complete List of Variables

Variable	Coding	Type of Data
Socio-Demographic Variables		
Age	18-42	Ratio
Sex	0=female 1=male	Nominal
Texas Success Initiative Assessment (TSIA) Writing Scores, Pre-Intervention	334-362	Interval
Ethnicity	1=Hispanic 2=White 3=Black 4=Asian	Nominal
Participant Zip Code	XXXXX	Nominal
Per Capita Income (PCI) for Participants' Zip Code	13108-41111	Interval
Independent Variables		
Intervention Type	0=experimental 1=comparison	Nominal
Dependent Variables		
DE Writing Course Progress	0=drop 1=fail 2=pass	Nominal
Enrollment in WI course	0=yes 1=no	Nominal
Progress in WI course	0=pass 1=fail	Nominal
WSE Scale Score (pre/post)	3-15	Ordinal
WSE Quantified Interview Data	0-6	Ordinal
Explanatory Variables		
Use Likelihood	1-5	Ordinal
Check for Understanding	0=correct 1=incorrect	Dichotomous

Data Analysis

First, preliminary analyses were conducted to examine the similarity of the intervention and comparison groups at baseline, violations of assumptions of the statistical tests conducted, and evaluation of score reliability of the WSE. Afterwards, primary analyses were conducted to answer each research question.

Research question 1 (RQ1) examined if the MS-Word intervention significantly promoted the WSE of participants in the experimental group as compared to the control group. To answer this question, differences in median scores for the experimental and control groups were tested using the Mann-Whitney U test. There are two primary assumptions of Mann-Whitney. First, all scores for both groups are independent. Second, the data are ordinal or continuous level and non-normal. Further, De Winter (2013) showed that when sample sizes are very small, Mann-Whitney U is more conservative than a t-test. Further, the t-test assumes normality. As such, applying a t-test to non-normal data runs the risk of the test not performing as it should (i.e., if the null hypothesis is true, the t-test will falsely reject the null 5% of the time. Although the risk decreases as sample size increases, the sample sizes in the current study were too small to allow for such effects.

Since the data of the current study met the assumptions of Mann-Whitney U and had small sample size, Mann-Whitney was a defensible analytic choice to answer RQ1.

In addition, I used Pearson correlation analysis to examine convergence between the quantitative and qualitative data obtained on WSE; specifically, a correlation was computed between the quantitative WSE measure and the qualitative WSE measure, this was possible because the qualitative measure was quantized (this process is described in the results section).

For RQ2 and RQ3, chi-square analysis was used because the outcomes under investigation were dichotomous; DE progress was either pass or fail, and WI enrollment was either enrolled or did not enroll. All results regarding the preliminary and primary analyses are reported in the results section below.

IV. RESULTS

Following data collection, I found and dropped respondents (n=3) who gave incorrect answers to the check-for-understanding question and/or those respondents (n=3) who took part more than once and gave different answers each time.

Randomization Check

I performed a check to ensure random assignment of participants to groups yielded comparable groups with similar baseline scores and demographics. The following variables were examined: age, PCI, sex, and pre-intervention WSE.

Shapiro-Wilk results, confirmed by *Q-Q* plots (see figures in Appendix F), suggested age was non-normally distributed in both the experimental ($W = 0.55$; $p = 0.000$) and comparison ($W = 0.87$; $p = 0.012$) groups. Because both samples thus violated normality assumptions of the t-test, I chose instead to use Mann-Whitney *U*, the non-parametric alternative, to compare sample age distributions. Median ages in both the experimental and comparison groups were 20, and the distributions in the two groups did not differ significantly (Mann–Whitney $U = 130.5$, $n_1 = 15$, $n_2 = 20$, $p < 0.05$ two-tailed, $r = .21$), with a small-medium effect size (Cohen, 1988).

Shapiro-Wilk results, confirmed by *Q-Q* plots (see figures in Appendix F), suggested PCI was non-normally distributed in the experimental group ($W = 0.70$; $p = 0.000$), but normally distributed in the comparison group ($W = 0.95$; $p = 0.304$). Because the experimental sample violated normality assumptions of the t-test, I again chose to use Mann-Whitney *U*, to compare sample PCI distributions. Median PCI in the experimental group was $17,747/year and the comparison group was $26,294/year. The distributions in the two groups did not differ significantly (Mann–Whitney $U = 90.5$, $n_1 = 15$, $n_2 = 20$, $p < 0.05$ two-tailed, $r = .30$), with a medium effect size (Cohen, 1988).

Finally, Shapiro-Wilk results suggested pre-intervention WSE scores were non-normally distributed in the experimental group ($W = 0.87$; $p = 0.034$), but normally distributed in the comparison group ($W = 0.94$; $p = 0.213$). The experimental sample violated normality assumptions of the t-test, and Mann-Whitney U results showed the distributions in the two groups did not differ significantly (Mann–Whitney $U = 134$, $n_1 = 15$, $n_2 = 20$, $p < 0.05$ two-tailed, $r = .02$), with a very small effect size (Cohen, 1988). Median WSE in the experimental group was 12 and the comparison group was 11.

Reliability Analysis for Scales

Next, I calculated bivariate Pearson's correlation coefficients and mean inter-item correlation for each WSE scale item. Because it can be difficult to achieve scale reliability with so few items, mean inter-item correlation serves as an adequate indicator of internal consistency (Briggs & Cheek, 1986). Typically, items below 0.15 have poor inter-item correlations, suggesting they are not well-related to each other and may not be suitable for measuring a single construct. However, items that are above .50 tend to be very similar to each other, to the point that they are redundant. For this reason, it is reasonable to aim for an inter-item correlation between .15 and .50.

a. moderate positive correlation $r(34) = .59$, $p < .01$ between Items 1 and 2,
b. weak positive correlation $r(34) = .41$, $p < .05$ between Items 1 and 3,
c. weak positive correlation $r(34) = .38$, $p < .05$ between Items 2 and 3, and

d. an acceptable mean inter-item correlation of .46, according to Clark and Watson (1995), who have recommended a mean inter-item correlation between 0.40 and 0.50 for narrow constructs

Next, I conducted Cronbach's alpha analysis (α = .71) for the WSE scale, which showed marginally acceptable scale score reliability (Bland & Altman, 1997; Ercan, Yazici, Zigirli, Ediz, & Kan, 2007). (For pre-intervention WSE score means and standard deviations, see Table 4 below.)

Table 4

Pre-Intervention WSE Means

	Pre-WSE-1*	Pre-WSE-2**	Pre-WSE-3***	Pre-WSE-Total
Experimental	3.40	3.33	4.00	10.73
(n=15)	(.99)	(.98)	(1.20)	(2.63)
Comparison (n=20)	3.35	3.60	4.20	11.15
	(.93)	(.99)	(1.06)	(2.30)
TOTAL (N=35)	3.37	3.49	4.11	10.97
	(.94)	(.98)	(1.11)	(2.42)

Note. * I can write a grammatically correct paper for college (1-5). ** I can correctly use college-level punctuation, like commas, periods, semicolons, etc. (1-5) *** I can do what it takes to pass my college writing assignments (1-5). Standard Deviations appear in parentheses below means.

Content Analysis and Quantification of WSE

Following post-intervention surveys, experimental participants answered interview questions (see Qualitative WSE Interview Questions in Appendix E) about their experiences learning to use MS-Word and about how those experiences affected their WSE. Single item analysis of post-intervention QUANT survey responses showed experimental participants' scores: did not change, increased by one point, or increased by two points. Content analysis of QUAL data suggested participant responses also fell into three categories, including those who noted no change in confidence, those who noted a positive change, and those who used amplifying modifiers to suggest increased positive change. See Table 5 for examples.

Table 5

Interview Response Coding Examples

	NO CHANGE	POSITIVE CHANGE	MORE POSITIVE CHANGE
Experimental (n=15)	"still the same confidence"	"slightly improved my confidence"	"much more confident"
	"I still struggled"	"it does help	"improved greatly"
	"I need to practice"	"takes away some stress"	"it has helped a lot"

I quantized the above results as follows (NO CHANGE = 0; POSITIVE CHANGE = 1; and MORE POSITIVE CHANGE = 2) for later convergent analysis (see below).

Primary Analyses

Following preliminary analyses, including checks of assumptions for Mann-Whitney, I proceeded with primary analyses (i.e., those considering the primary research questions of the study).

Assumptions

In anticipation of conducting A Mann-Whitney on WSE data, I checked that the data met assumptions. Specifically, I checked that all scores for both groups were independent and that the data were ordinal or continuous. In this case, both variables were interval measurements, as they were the result of Likert-scale responses averaged across items on the WSE scale, and my independent variable (group association: experimental or comparison) consisted of two or more categorical, independent groups.

Then, I confirmed that the methods employed in this study did not violate independence of observations assumptions; participants completed interventions independently, they were randomly assigned to groups, there were no nesting factors confounded with random assignment to groups, and there were no opportunities provided for students to discuss the interventions after they completed the interventions.

WSE [RQ1: Is there an effect of intervention type on post-intervention WSE?]

However, in support of my hypothesis, results from Mann-Whitney analysis suggested there was a statistically significant difference between experimental (*Mdn* = 14) and comparison (*Mdn* = 9.5) groups on post-intervention WSE, $U = 40$, $p = .00026$, $r = .62$, suggesting a large effect size (Cohen, 1988).

Table 6

Change in WSE (QUANT) and Quantized QUAL Comparison

	QUANT Δ	QUAL (quantized)
Experimental (n=15)	2.20	3.47
	(1.37)	(1.73)

Note. Standard Deviations appear in parentheses below means. Refer to Content Analysis and Quantification of WSE above for definitions.

DE Literacy Success [RQ2: Is there an effect of intervention type on developmental writing course progress?]

As hypothesized, chi-square test results revealed that students in the intervention group were significantly more likely to pass their developmental writing course compared to those in the comparison condition (χ^2 (1, N = 35) = 5.43, p = 0.02, ϕ = 0.44), suggesting a large effect size (Cohen, 1988).

Because significant differences are less meaningful with small sample sizes, such as in the case of the current study, measurements of effect size were necessary to understand if the observed differences were meaningful. Here, effect size revealed meaningful differences in the data – regardless of sample size – and suggested measurements of the effect that intervention type may have had on DE literacy success (Murphy, Myors, & Wolach, 2014). Specifically, the large effect size suggested that the MS-Word intervention had a meaningful effect on DE literacy success. (See Table 7 below for frequency and percent information.)

Table 7

DE Course Success

	Pass	Fail
Experimental	15 (100%)	0 (0%)
Comparison	14 (70%)	6 (30%)

After adjusting the sample by removing the six participants who did not pass their DE writing course, Chi-square test results again supported my hypothesis by revealing that students in the intervention group were significantly more likely than those in the comparison group to enroll in a WI course in the spring (χ^2 (1, N = 29) = 16.54, p = 0.00, ϕ = 0.76), a large effect size (Cohen, 1988).

Here again, effect size revealed meaningful differences in the data – regardless of sample size – and suggested measurements of the effect that intervention type may have had on WI course enrollment. Specifically, the large effect size suggested that the MS-Word intervention had a meaningful effect on students' literacy course (WI) enrollment. (See Table 8 below for frequency and percent information.)

Table 8

WI Course Enrollment

	Enrolled	Did Not Enroll
Experimental	11 (73%)	4 (28%)
Comparison	0 (0%)	14 (100%)

Subsequent Literacy Course Success

I could not run data analyses on WI course success, because there were no students from the comparison group who enrolled in a WI course, and all participants from the experimental group who enrolled in a WI course in the spring semester passed that course.

Exploratory Analyses

In addition to the primary analysis addressing the research questions, I also conducted exploratory analysis. The primary purpose of the exploratory analysis was to figure out if the participants found both videos equally useful. A significant difference might have suggested that the primary results were reflective of video quality differences not under investigation.

Usefulness of Intervention

According to Mann-Whitney analysis of data collected following intervention, there was no statistically significant difference between experimental (*Mdn* = 4) and comparison (*Mdn* = 4) groups' estimations of how likely they were to use the information provided, $U = 124$, $p = .40$, $r = .07$, suggesting a very small effect size (Cohen, 1988).

V. DISCUSSION

In the study above, I sought to design and evaluate a brief online video intervention, meant to offer students of developmental writing MS-Word training in how to use non-default grammar and style feedback settings, as well as an even briefer WSE scale. Given anecdotal action research (Barry, 2012) and pilot study data (Barry, 2014), which suggested a similar in-class intervention improved first-year students' writing outcomes, it was reasonable to expect from the outset that such an intervention could affect first-year student writing outcomes. Further, designing a computer intervention, along with a WSE scale to measure changes in WSE due to the intervention, seemed a prudent approach.

While some researchers have suggested that students want technology for their *personal* but not their *academic* use (e.g., Corrin, Lockyer, & Bennett, 2010; Kennedy, Judd, Dalgarno, & Waycott, 2010), at the same time, other studies suggest positive perceptions among students regarding the use of technology in the classroom (National Union of Students, 2010), especially when used for computer-assisted writing instruction (Fang, 2010). The results of this study support the latter.

Given that students in this study who received the MS-Word intervention passed their DE courses at higher rates, scored higher on post-test assessments of WSE, and enrolled in WI courses more often than students who did not receive the intervention, the findings provide support for existing self-efficacy literature self-(see, Bandura, 1977, 1986; Holt, 1933; Miller & Dollard, 1941) and suggest ties to and future research about students' activity choices, effort levels, and time on task, all important variables in students' writing processes (Bandura, 1977; Dwyer & Fuss, 2002; Klassen, 2002; Pajares & Johnson, 1994; Sanders-Reio, Alexander, Reio, & Newman, 2014).

As a doctoral student studying developmental education, I was particularly interested in the effects on students in developmental writing courses. Specifically, I hypothesized that the intervention could improve students' WSE (RQ1), developmental writing course progress (RQ2), and decisions to enroll in a WI course in the following semester (RQ3) by affecting students' activity choices, effort levels, and time on task (RQ1) (Bandura, 1977; Dwyer & Fuss, 2002; Klassen, 2002; Pajares & Johnson, 1994; Sanders-Reio, Alexander, Reio, & Newman, 2014). Further, I thought that measurements of WSE over time, among students who received the intervention, would correlate with their improvements in developmental course outcomes and later enrollment in writing intensive courses (Bandura, 1977, 1986; Holt, 1933; Miller & Dollard, 1941) and that such findings would have both scholarly significance and practical implications for the field.

The results reported here support these hypotheses. However, given small sample sizes, I mostly had to guess about how the intervention may have worked. For example, why would the intervention improve students course pass rates? One explanation is that it increased their skill levels, because the MS-word training could have improved their mechanics. However, that skill is not the only reasonable explanation for this effect, because the intervention appears also to have increased WSE. Boosting efficacy could have produced motivational effects (e.g., activity choices, effort levels, and time on task, as Bandura (1977, 1986) suggested), which affected their pass rates. Indeed, WSE seemed to improve among students who received the intervention, those same students seemed to experience significantly better outcomes (pass/fail) in their developmental writing courses than their comparison counterparts, and they went on to enroll in WI college-level courses in significantly higher numbers as well. In fact, zero students in the comparison group enrolled in WI courses in the spring semester, while 73% of students in the experimental group did so. All of which suggests some practical and scholarly relevance, especially given the existing literature which indicates that students' self-efficacy beliefs influence their activity choices and outcomes (Bandura, 1977; Dwyer & Fuss, 2002; Klassen, 2002; Pajares & Johnson, 1994; Sanders-Reio, Alexander, Reio, & Newman, 2014), and that well-integrated technology can increase students' interest and improve outcomes (see, Benbunan-Fich, Hiltz, & Turoff, 2003; Gauci, Dantas, Williams, & Kemm, 2009; Lockyer, Patterson, & Harper, 2001), perhaps by assuming some cognitive load and enabling them to work at higher-levels (Saloman, 1988).

Further, the writing intensive enrollment results follow from the literature on self-efficacy in expected ways. Because self-efficacy arises from the cognitive appraisal of one's capabilities, and Bandura (1982) showed how self-efficacy affects students' choice of settings and activities, skill acquisition, effort expenditure, and the initiation and persistence of coping efforts in the face of obstacles. The theory suggests that students with moderate to high self-efficacy tend to engage more often in task-related activities and persist longer in coping efforts, which leads to more performance accomplishments and enhanced self-efficacy. In other words, students who persist tend to gain the corrective experiences they need to enhance their self-efficacy, while students who quit prematurely do not. The intervention examined in the current study seemed to give students enough impetus to jumpstart the feedback loop of efficacy and performance accomplishments suggested by Bandura, and such findings are interesting. That said, the mediational role of self-efficacy was not the focus of this study, nor did I have the power to examine mediation. Nevertheless, the findings all converge, in the sense that I saw positive effects on WSE, rates of DE course success, and enrollment in WI courses, all of which align with SE research which suggests influencing SE can result in effects on performance and choices.

Bandura (1977) suggested that efficacy expectations influence choice of environment. For example, if all other factors are constant, a student with high WSE might choose to enroll in a WI course that offers more challenge and opportunity for growth (as was the case in this study), while a student with low WSE might choose to avoid such a course. The results presented here suggest the experimental intervention deployed may have both been the impetus to jumpstart an efficacy feedback loop and been persistent enough to sufficiently alter students' WSE in ways which influenced their choices about which writing environments to enter in later semesters.

In practical terms, these findings – and existing research – suggest that instructors of developmental writing courses might better serve their students by aligning technology strategies with pedagogical goals, and that such alignment may enhance student participation (Baglione & Nastanski, 2007), particularly through interactive self-assessment, which would enable students to receive frequent feedback about their learning, a support and reinforcement resource they value (Gunn & Pitt, 2003; Hejmadi, 2007), and one which promotes active learning (Hoffman & Goodwin, 2006; Sinha, Khreisat, & Sharma, 2009).

Finally, the WSE scale designed for this study had an acceptable mean inter-item correlation of .46 (Clark & Watson, 1995), Cronbach's alpha analysis ($\alpha = .71$) showed marginally acceptable scale score reliability (Bland & Altman, 1997; Ercan, Yazici, Zigirli, Ediz, & Kan, 2007), and QUANT/QUAL correlation analysis results showed students' self-beliefs about how learning to use MS-Word in a new way correlated with changes in their WSE scale scores pre-post, suggesting that the scale could prove a useful and valid tool for measuring student WSE. Given the scale's brevity and ease of use, it may also offer an effective data-gathering tool for practitioners and researchers alike.

Limitations

The number of participants was much lower than expected, because of several factors. I am aware from my own teaching experience that some students do not check email regularly. Students may have perceived the incentive to take part as too lacking to justify the time commitment. Faculty members may have failed to send requests. Whatever the reason, smaller than expected sample sizes called into question the results above and demanded a closer look at effect sizes and the practical significance of these findings. Further, existing literature suggests that some observable differences between groups may have played a meaningful role in the outcomes of the current study.

For instance, participants in the experimental group were slightly older than those in the comparison, and some research suggests that older students perform as well as, if not better than, traditional-age students (Choy & Premo, 1995; Graham & Gisi, 2000; Kasworm, 1980, 1994; Metzner & Bean, 1987), and that older students are more likely intrinsically motivated (Puccio, 1995; Wolfgang & Dowling, 1981). Given the literature suggesting that intrinsic motivation can lead to a higher quality learning experience

(Ryan & Deci, 2000), more sustained interest (Malone & Lepper, 1987), flexibility, and open-mindedness (Pullins, 2001), the age of the experimental group could have been a contributing factor, which pre-disposed them to better outcomes (regardless of intervention), or which led to rates of adoption and persistence with the intervention that may not generalize to all students. However, according to Cohen's (1988) conventional interpretations of effect size, the observed age differences were only small-to-medium (r = .21), though it is worth noting that Cohen himself suggested the use of such interpretations were "fraught with many dangers" (p. 12), and that Baguley (2009) suggested researchers avoid using such "canned effect sizes" (p. 613) in favor of interpretations of practical significance, considering factors such as study quality, estimate uncertainties, and results from previous work in the field.

Further, WSE is a complex construct and develops in response to several variables. While the experimental intervention may have given students more control over certain superficial aspects of the writing process, such control did not necessarily engage them at a deeper level where some of those variables lie. Therefore, while scale analysis suggested acceptable reliability and validity, results of its use do not likely give a complete picture of WSE.

Another potentially meaningful difference between groups was sex distribution. Because earlier research with younger students showed that females tended to have higher WSE than males (Pajares & Valiante, 1997, 1999), at least when accounting for the tendency of females and males to use different metrics when giving confidence judgments (Pajares, Miller, & Johnson, 1999; Pajares & Valiante, 1999), I also measured and examined sex differences. The experimental group was more female than was the comparison, and other research also suggests that female students tend to make better use of learning strategies than their male counterparts (Niemivirta,1997; Pokay & Blumenfeld, 1990; Zimermann & Martinez-Pons; 1990; Wolters, 1999). Further, while male students are more interested in *how* technology works, female students tend to focus on how they can *use* the technology (Silver, 2001), so they may find a technology strategy – such as the one presented in the current study – more attractive if presented as providing an easier or better way to do something they want or need to do (Women's Action Alliance 2001; Silver, 2001). However, there were so few students in my sample that it is still questionable whether previously reported gender differences in the research would have been relevant.

In addition, at least among high school students, Latina females report higher aspirations, spend more hours doing homework, have a more positive rating of school climate and perceive more social support than do Latino male students (López, Ehly, & García-Vásquez, 2002; Matute-Bianchi, 1991). Given the participant demographics in the current study, the compound effects of sex (see also, Jones & Myhill, 2007; Pajares, 2003; Pajares, Valiante, & Cheong, 2007) and ethnicity (see also, Lu & Horner, 2000; Rivard, 1994; White & Lowenthal, 2011), may have skewed results in ways which do not generalize well to other populations with different demographic characteristics.

The question phrasing in the WSE interview (i.e., each question began with the phrase: "*How has learning to use Microsoft Word* ***changed your confidence****…;"* emphasis added; see Appendix E for complete question text) assumed a change and suggested that change should have been in confidence. Given possible priming and/or framing effects (see, Zaller & Feldman, 1992), such wording may have caused respondents to focus more on changes in confidence and/or over-estimate how much change had taken place, calling into question the correlation results present here.

Finally, while some students may have transferred out of the community college system into a university program, or stopped out for personal reasons, some students, from whom I received no response to follow-up requests, or for whom no institutional data existed beyond the first semester, may have dropped out (at least partly), because they struggled with writing. As such, the results above may reflect outcomes and changes only for those students who had both the skills and the WSE traits they needed to persevere, and the intervention may have dissimilar effects on different populations.

Future Research

In addition to studies which address the limitations listed above, I would like to see future research follow students who transfer out of the community college system into a university program, as writing expectations are often different at four-year institutions, and data on similar longitudinal effects for transfer students would help answer important questions for developmental writing students who choose such a path.

Finally, while scale analysis and qualitative correlation data suggested the WSE scale developed for this study may be a useful tool for measuring students WSE and changes in that self-efficacy over time, further research using the tool would help continue to confirm and understand its use. Finally, an area to address in future research would be the mediational role of self-efficacy. Much of my theorizing and speculation in the current study centered on the idea that increasing WSE with MS-Word training would influence motivation (e.g., effort, choice, time on task, persistence), which in turn would influence performance. Given small sample sizes, I was unable to examine this causal chain (i.e., intervention to WSE to motivation to performance). However, such an inquiry may yield interesting findings, while further explaining the results found here.

Conclusion

This study gives tentative support for the idea that a brief online video tutorial on how to turn on and use the non-default grammar and style feedback in Microsoft Word (i.e., MS-Word Intervention) can help students to improve their writing self-efficacy, developmental course achievement, and decisions to enroll in future writing intensive courses. These findings corroborate earlier research I conducted on MS-Word training, which also suggested that a similar MS-Word intervention could improve students' writing self-efficacy and course performance. Despite the convergence of these results with my prior work, and the fact that the intervention in the current study had statistically significant effects and medium to large effect sizes on all three of outcomes under investigation, more research with larger sample sizes is necessary to determine the effectiveness of the intervention and its scalability.

The findings of this study suggest that an important mechanism of improvement (other than the superficial corrections made possible by the software) may be significant changes in WSE. The practical implications of such results may then also suggest that writing pedagogy, especially at the developmental level, should include specific instruction in how to use the primary expected tool of writing production (i.e., Microsoft Word), and that such inclusion alone might yield significant changes in self-efficacy. Finally, the findings and the practical implications of this study are significant to the scholarly community in that they suggest new avenues of inquiry, related to technology in the developmental writing classroom, while building on earlier work related to self-efficacy, writing instruction, and persistence.

APPENDIX A

Email Request for Participation

Hello, and thank you for taking the time to read this email.

Because of your enrollment in writing class, you are one of the students selected to for a study that seeks to understand how technology training affects writing success for college students. The purpose of this research is to examine if technology training, has a positive effect on college writing success. If you choose to participate, please click the link below to watch this video and complete a short survey, which should take approximately 5-10 minutes. Responses are valuable and contribute to the growing body of knowledge on writing and technology. [LINK]

If you choose to participate, I will also enter you into a series of three drawings to receive a $20 gift card to the store of your choice. I will hold three drawings throughout the study and announce winners each time.

You may discontinue participation at any time without consequence. The Texas State and Austin Community College IRB approves this project, protocol numbers XXXXXXXXXXXXXX and XXXXXXXXXXXX. Please direct pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to the IRB chair, Dr. Jon Lasser (512-245-3413 – lasser@txstate.edu) and to Becky Northcut, Director, Research Integrity & Compliance (512-245-2314 – bnorthcut@txstate.edu).

If you discover any technical questions or need assistance completing this survey, or if you have any questions about the content of the survey or uses of the data, please contact William Barry at (512)915-8707 – bill.barry@txstate.edu.

Thank you for your consideration of this research project!

Email Follow-up for Non-response

Dear Student – Hello again and thank you for taking time to read this quickly.

You received a previous invitation to participate in a study that seeks to understand the relationship between technology training and writing success.

The purpose of this research is to examine if technology training has a positive effect on college writing success. You can help, while having some fun and maybe even winning some money.

Please watch this short video and complete a brief survey, which should take approximately 5-10 minutes. Responses are valuable and contribute to the growing body of knowledge on writing and technology. [LINK]

If you choose to participate, I will also enter you into a series of three drawings to receive a $20 gift card to the store of your choice. I will hold three drawings throughout the study and announce winners each time.

You may discontinue participation at any time without consequence. The Texas State and Austin Community College IRB approves this project, protocol number XXXXXXXXXXXXXXX.

Please direct pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to the IRB chair, Dr. Jon Lasser (512-245-3413 – lasser@txstate.edu) and to Becky Northcut, Director, Research Integrity & Compliance (512-245-2314 – bnorthcut@txstate.edu).

If you discover any technical questions or need assistance completing this survey, or if you have any questions about the content of the survey or uses of the data, please contact William Barry at (512)915-8707 – bill.barry@txstate.edu.

Thank you for your consideration of this research project!

APPENDIX B

WSE Scale

Instructions: For each of the three items below, please select the number that best describes your beliefs about writing.

1. I can write a grammatically correct paper for college.

Completely Disagree	Mostly Disagree	Uncertain	Mostly Agree	Completely Agree
1	**2**	**3**	**4**	**5**

2. I can correctly use college-level punctuation, like commas, periods, semicolons, etc.

Completely Disagree	Mostly Disagree	Uncertain	Mostly Agree	Completely Agree
1	**2**	**3**	**4**	**5**

3. I can do what it takes to pass my college writing assignments.

Completely Disagree	Mostly Disagree	Uncertain	Mostly Agree	Completely Agree
1	**2**	**3**	**4**	**5**

APPENDIX C

Check-for-understanding question

Following completion of the WSE scale, participants in both groups watched a video and confirmed participation and comprehension by answering a check-for-understanding question about the video content. (See Figure 2 below.)

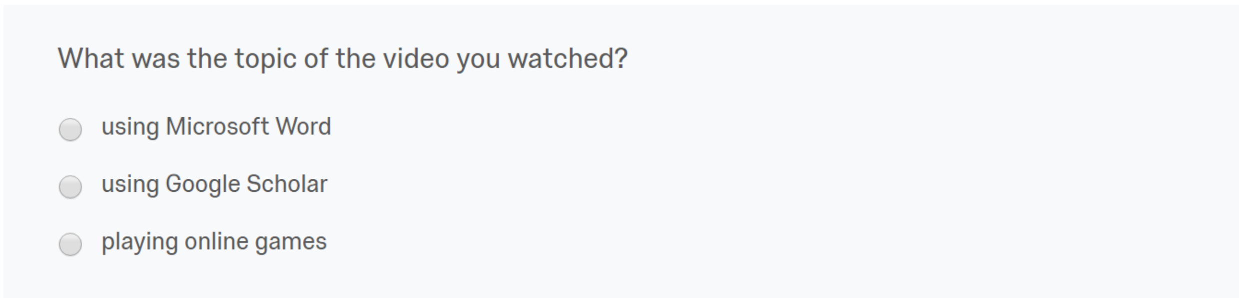

Figure 2. Check-for-understanding question

APPENDIX D

Use likelihood question

How likely do you think it is that you'll use the information in the video this semester?

- Extremely likely
- Somewhat likely
- Uncertain
- Somewhat unlikely
- Extremely unlikely

Figure 3. Use likelihood question

APPENDIX E

Qualitative WSE interview questions

1. How has learning to use Microsoft Word changed your confidence about your ability to write a grammatically correct paper for college?
2. How has learning to use Microsoft Word changed your confidence about your ability to use college-level punctuation like commas, periods, semicolons, etc.?
3. How has learning to use Microsoft Word changed your confidence about your ability to do what it takes to pass your college writing assignments?

APPENDIX F

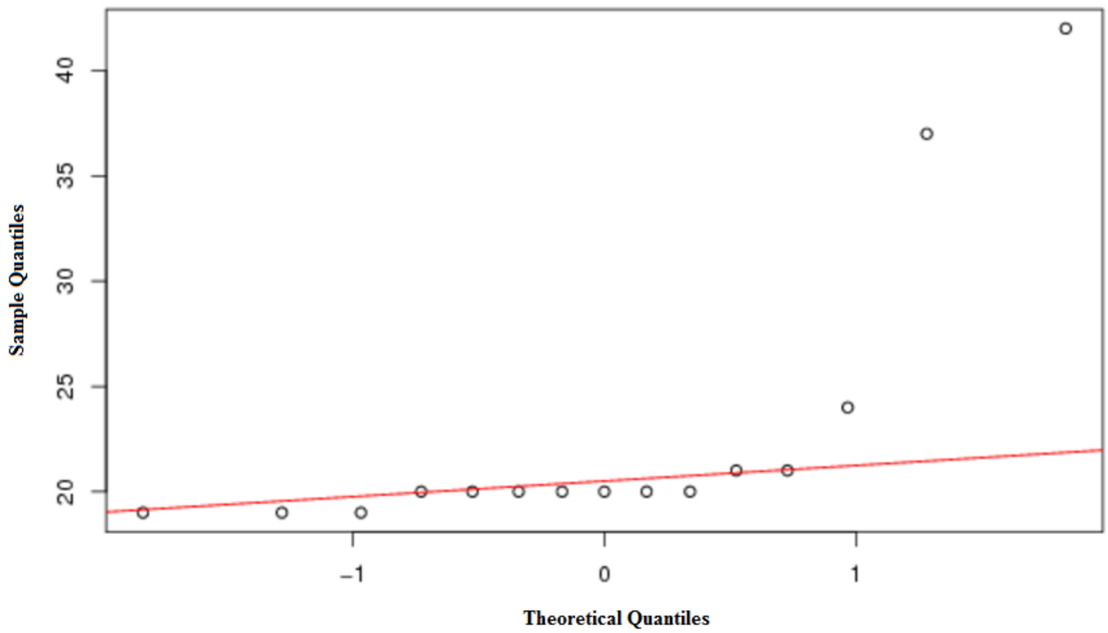

Figure 4. Q-Q plot for age in experimental group

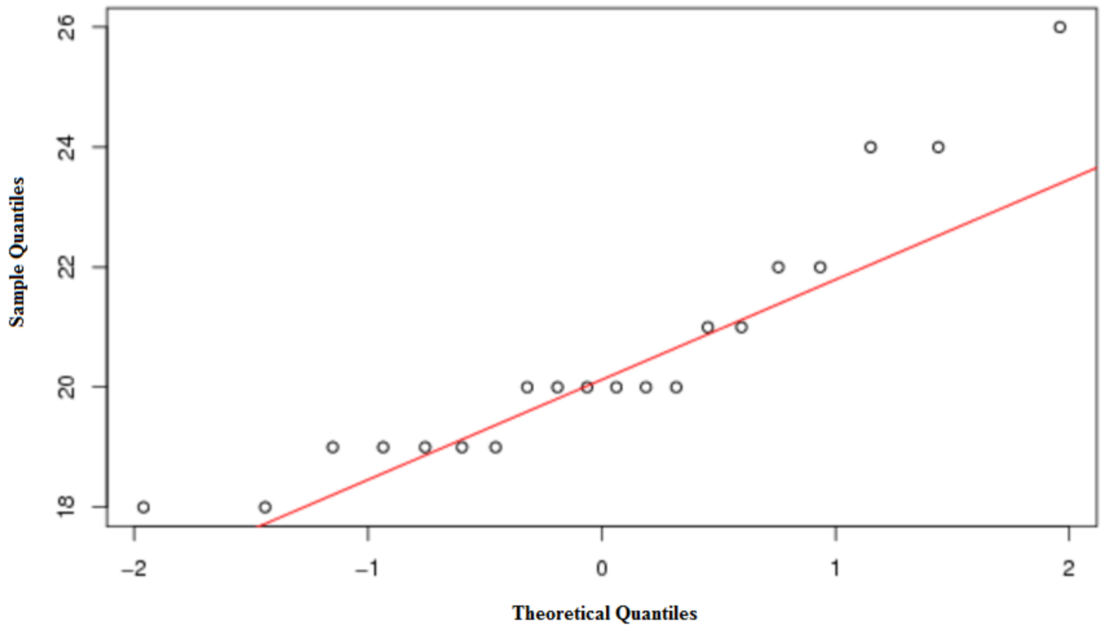

Figure 5. Q-Q plot for age in comparison group

APPENDIX G

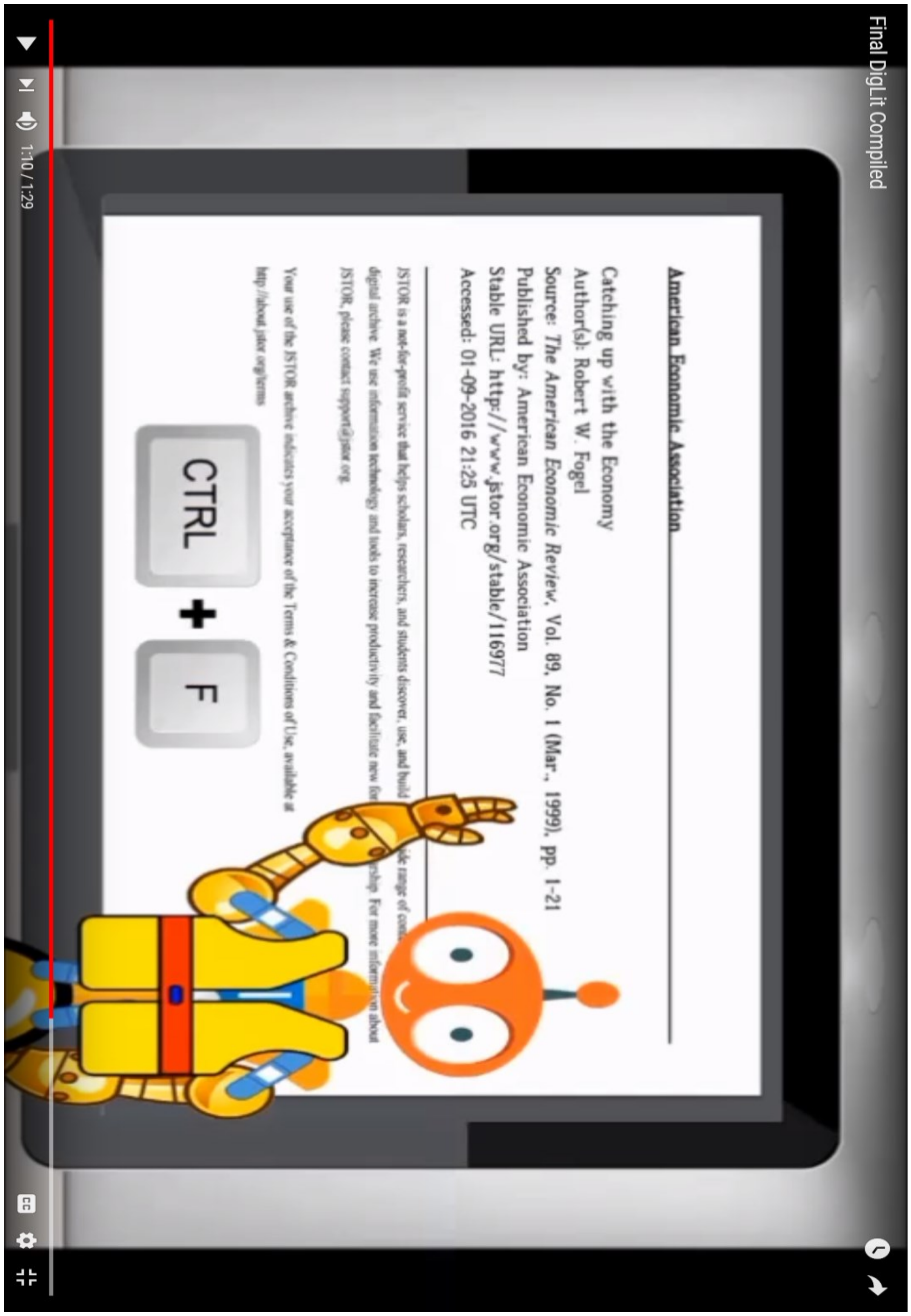

Figure 6. Comparison video representative screen grab

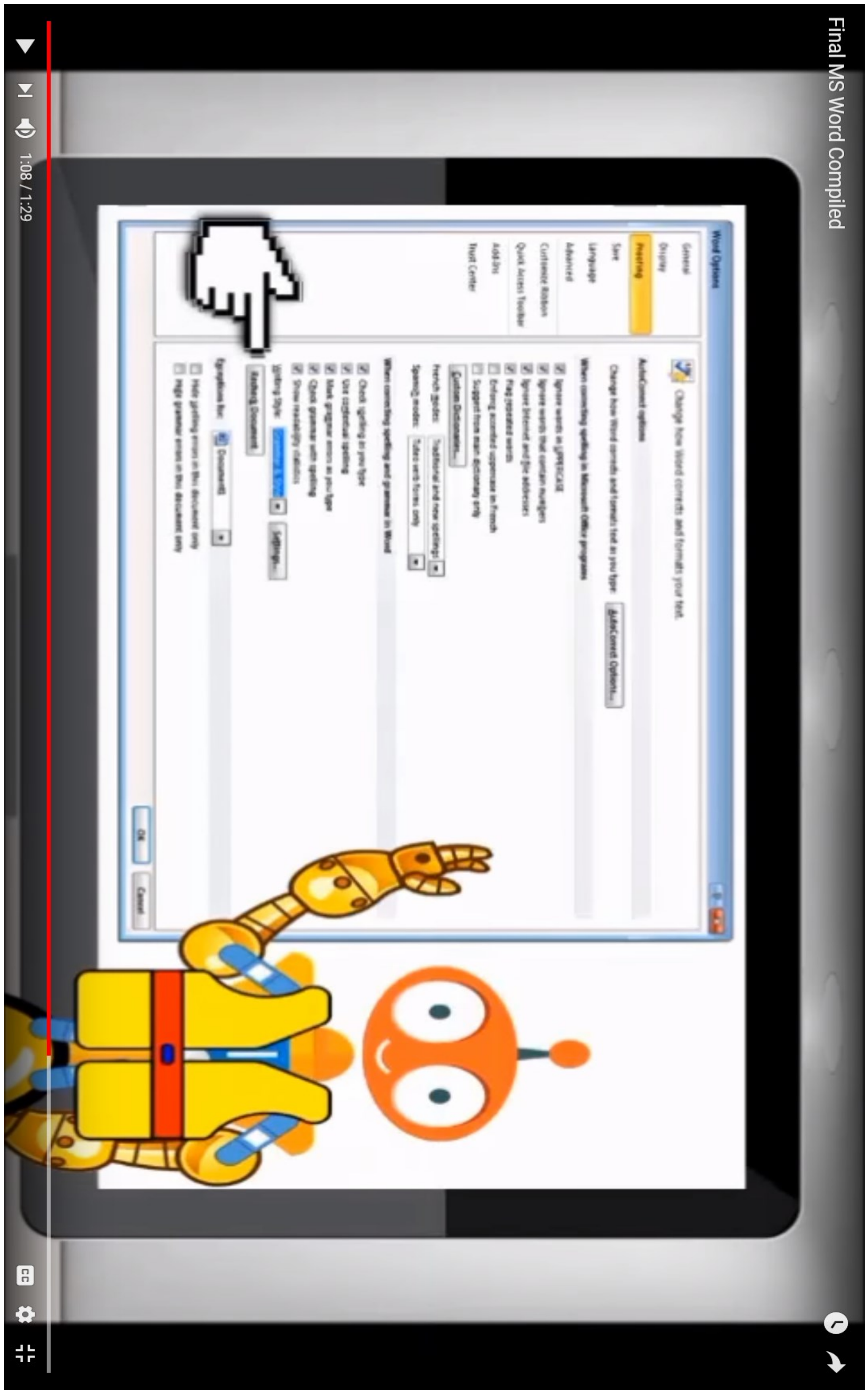

Figure 7. Experimental video representative screen grab

REFERENCES

Anderson, R. B. (1995). Cognitive appraisal of performance capability in the prevention of drunken driving: A test of self-efficacy theory. *Journal of Public Relations Research, 7*(3), 205–229. doi:10.1207/s1532754xjprr0703_03

Arkin, M. & Gallagher, B. (1984). Word processing and the basic writer. *Connecticut English Journal, 15*(2), 60-66.

Baglione, S. L. & Nastanski, M. (2007). The superiority of online discussion: Faculty perceptions. In *Quarterly Review of Distance Education* (2^{nd} ed., Vol. 8, pp. 139-150). Charlotte, NC: IAP.

Baguley, T. (2009). Standardized or simple effect size: What should be reported? *British Journal of Psychology, 100*(3), 603–617. doi:10.1348/000712608x377117

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191-215. Retrieved from https://www.uky.edu/~eushe2/Bandura/Bandura1977PR.pdf

Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist, 33*(4), 344–358. doi:10.1037/0003-066x.33.4.344

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122–147. doi:10.1037/0003-066x.37.2.122

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. London: Prentice-Hall.

Bandura, A. (1990). Perceived self-efficacy in the exercise of personal agency. *Journal of Applied Sport Psychology*, *2*(2), 128-163.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117–148. doi:10.1207/s15326985ep2802_3

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. In S. T. Fiske (Ed.), *Annual Review of Psychology* (Vol. 52, pp. 1–26). Palo Alto: Annual Reviews, Inc.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307-337). Greenwich, CT: Information Age Publishing.

Bandura, A. & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research, 1*(4), 287–310. doi:10.1007/bf01663995

Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. *Journal of Personality and Social Psychology, 35*(3), 125–139. doi:10.1037/0022-3514.35.3.125

Bandura, A., Adams, N. E., Hardy, A. B., & Howells, G. N. (1980). Tests of the generality of self-efficacy theory. *Cognitive Therapy and Research, 4*(1), 39–66. doi:10.1007/bf01173354

Baron, N. S. (2010). *Always on: Language in an online and mobile world*. Oxford University Press.

Barry, W.J. (2012). [Anecdotal observations following unplanned MS-Word training for effective learning students]. Unpublished raw data.

Barry, W.J. (2014). *Writing and technology: The effects of experimental instruction in first-year college courses*. Unpublished manuscript, Department of Curriculum and Instruction, Texas State University, San Marcos, Texas.

Barry, W. J. (2016a). *Final MS Word compiled* [Video File]. Retrieved from https://www.youtube.com/watch?v=ocZfCqnUdzA

Barry, W. J. (2016b). *Final diglit compiled* [Video File]. Retrieved from https://www.youtube.com/watch?v=UqHYdGEayZk

Batianeh, A. M. (2014). The effect of text chat assisted with word processors on Saudi English major students' writing accuracy and productivity of authentic texts. *International Journal of Emerging Technologies in Learning (iJET)*, *9*(9), 32-40.

Behjat, F. (2011). Teacher correction or word processors: Which is a better option for the improvement of EFL students' writing skill? *Journal of Language Teaching & Research*, *2*(6), 1430-1434. doi:10.4304/jltr.2.6.1430-1434

Benbunan-Fich, R., Hiltz, S. R., & Turoff, M. (2003). A comparative content analysis of face-to-face vs. asynchronous group decision making. *Decision Support Systems, 34*(4), 457-469. doi:10.1016/S0167-9236(02)00072-6

Bennett-Kastor, T. (2005). Spelling abilities of university students in developmental writing classes. *Journal of College Reading and Learning*, *35*(1), 67-82. Retrieved from http://files.eric.ed.gov/fulltext/EJ690843.pdf

Bland, J. M. & Altman, D. G. (1997). Statistics notes: Cronbach's alpha. *BMJ, 314*(7080), 572. doi:10.1136/bmj.314.7080.572

Botsas, G. & Padeliadu, S. (2003). Goal orientation and reading comprehension strategy use among students with and without reading difficulties. *International Journal of Educational Research, 39*(4-5), 477–495. doi:10.1016/j.ijer.2004.06.010

Bradford, A. N. (1983). Cognitive immaturity and remedial college writers. In J.N. Hays et al. (Eds.) *The writer's mind: Writing as a mode of thinking*, (pp. 15-24). Urbana, IL: NCTE.

Briggs, S. R. & Cheek, J. M. (1986). The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality, 54*(1), 106–148. doi:10.1111/j.1467-6494.1986.tb00391.x

Brown, C. & Czerniewicz, L. (2010). Debunking the 'digital native': Beyond digital apartheid, towards digital democracy. *Journal of Computer Assisted Learning*, *26*(5), 357-369. doi:10.1111/j.1365-2729.2010.00369.x

Brown, I. & Inouye, D. K. (1978). Learned helplessness through modeling: The role of perceived similarity in competence. *Journal of Personality and Social Psychology, 36*(8), 900–908. doi:10.1037/0022-3514.36.8.900

Cabrera, A. F. & La Nasa, S. M. (2001). On the path to college: Three critical tasks facing America's disadvantaged. *Research in Higher Education*, *42*(2), 119-149. Retrieved from http://www.jstor.org/stable/40196425

Carey, K. B., Scott-Sheldon, L. A. J., Elliott, J. C., Garey, L., & Carey, M. P. (2012). Face-to-face versus computer-delivered alcohol interventions for college drinkers: A meta-analytic review, 1998 to 2010. *Clinical Psychology Review, 32*(8), 690–703. doi:10.1016/j.cpr.2012.08.001

Carroll, L. A. (2002). *Rehearsing new roles: How college students develop as writers*. Carbondale, IL: Southern Illinois University Press.

Casteel, C. P., Isom, B. A., & Jordan, K. F. (2000). Creating confident and competent readers. *Intervention in School and Clinic, 36*(2), 67–74. doi:10.1177/105345120003600201

Censer, J. R., Olson, D. R., Martin, H.-J., & Cochrane, L. G. (1996). The world on paper: The conceptual and cognitive implications of writing and reading. *History of Education Quarterly, 36*(2), 183. doi:10.2307/369504

Chalk, J. C., Hagan-Burke, S., & Burke, M. D. (2005). The effects of self-regulated strategy development on the writing process for high school students with learning disabilities. *Learning Disability Quarterly, 28*(1), 75. doi:10.2307/4126974

Chapelle, C. & Mizuno, S. (1989). Student's strategies with learner-controlled CALL. *CALICO Journal, 7*(2), 25-47. Retrieved from http://www.jstor.org/stable/24147858

Choy, S. P. & Premo, M. D. (1995). Profile of older undergraduates: 1989-90 (NCES 95-167). Washington, DC: National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs95/95167.pdf

Clark, L. A. & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, *7*(3), 309–319. doi:10.1037//1040-3590.7.3.309

Cleary, L. M. (1996). "I think I know what my teachers want now": Gender and writing motivation. *English Journal, 85*(1) 50-57. Retrieved from http://www.jstor.org/stable/821123

Clements, D. H. (1987). Computers and literacy. In Vacca, J. L., Vacca, R. T., and Gove, M. (Eds.), *Reading and learning to read*, (pp. 338-372), Boston: Little, Brown.

Coady, C. A. J. (1992). *Testimony. A philosophical study*. New York, Oxford University Press.

Cohen, J. (1988), *Statistical power analysis for the behavioral sciences, 2nd ed.* Hillsdale: Lawrence Erlbaum.

Collins, T., Engen-Wedin, N., Margolis, W., & Price, L. (1987). Learning Disabled Writers and Word Processing: Performance and Attitude Gains. *Research and Teaching in Developmental Education, 4*(1), 13-20. Retrieved from downeshttp://www.jstor.org/stable/42801712

Corrin, L., Lockyer, L., & Bennett, S. (2010). Technological diversity: An investigation of students' technology use in everyday life and academic study. *Learning, Media and Technology, 35*(4), 387–401. doi:10.1080/17439884.2010.531024

Costa, A. L. (2008). *The school as a home for the mind* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Curtis, M. S. (1988). Windows on composing: Teaching revision on word processors. *College Composition and Communication*, *39*(3), 337-344. doi:10.2307/357471

Dailey, S. R. (2004). Linking technology to pedagogy in an online writing center. *Journal of the Legal Writing Institute*, *10*, 181-209. Retrieved from http://www.journallegalwritinginstitute.org/archives/2004/dai.pdf

Daiute, C. (1985). *Writing and computers*. Reading, PA. Addison-Wesley

Daiute, C. (1986). Physical and cognitive factors in revising: Insights from studies with computers. *Research in the Teaching of English 20*, 141-159.

De La Paz, S. & Graham, S. (1997). Effects of dictation and advanced planning instruction on the composing of students with writing and learning problems. *Journal of Educational Psychology, 89*, 203-222. doi:10.1037/0022-0663.89.2.203

De Winter, J. C. (2013). Using the Student's t-test with extremely small sample sizes. *Practical Assessment, Research & Evaluation*, *18*(10), 1-12.

Dickinson, E. R. & Adelson, J. L. (2014). Exploring the limitations of measures of students' socioeconomic status (SES). *Practical Assessment, Research, & Evaluation*, *19*(1), 1-14. Retrieved from http://pareonline.net/getvn.asp?v=19&n=1

Dikli, S. (2010). The nature of automated essay scoring feedback. *CALICO Journal, 28*(1), 99–134. doi:10.11139/cj.28.1.99-134

Dunn, M. W. (2011). Writing-skills instruction: Teachers' perspectives about effective practices. *Journal of Reading Education, 37*(1), 18-25.

Dwyer, K. K. & Fuss, D. A. (2002). Perceptions of communication competence, self-efficacy, and trait communication apprehension: Is there an impact on basic course success? *Communication Research Reports, 19*(1), 29–37. doi:10.1080/08824090209384829

Edman, J. L. & Brazil, B. (2009). Perceptions of campus climate, academic efficacy, and academic success among community college students: An ethnic comparison. *Social Psychology of Education*, *12*(3), 371-383. doi:10.1007/s11218-008-9082-y

Engen-Wedin, N. & Collins, T. (1986). Composition, word processing, and the learning-disabled college writer: An annotated bibliography. Retrieved from https://files.eric.ed.gov/fulltext/ED267410.pdf

Engen-Wedin, N., Lawson, J. A., & Collins, T. G. (1986). *Supplement# 1 to composition, word processing, and the learning-disabled college writer: An annotated bibliography*. University of Minnesota, General College.

Ercan, I., Yazici, B., Zigirli, D., Ediz, B., & Kan, I. (2007). Examining Cronbach alpha, theta, omega reliability coefficients according to sample size. *Journal of Modern Applied Statistical Methods*, *6*(1), 291–303. Retrieved from http://digitalcommons.wayne.edu/cgi/viewcontent.cgi?article=1144&context=jmasm

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*(3), 363–406. doi:10.1037/0033-295x.100.3.363

Ertmer, P. A. & Newby, T. J. (2008). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly, 6*(4), 50–72. doi:10.1111/j.1937-8327.1993.tb00605.x

Estrada, M., Woodcock, A., Hernandez, P. R., & Schultz, P. W. (2011). Toward a model of social influence that explains minority student integration into the scientific community. *Journal of Educational Psychology, 103*(1), 206–222. doi:10.1037/a0020743

Evans, R. I. (1989). *Albert Bandura: The man and his ideas—a dialogue*. New York: Praeger Publishers.

Fang, Y. (2010). Perceptions of the computer-assisted writing program among EFL college learners. *Journal of Educational Technology & Society*, *13*(3), 246-256. doi:10.1.1.174.1176

Farrell, T. J. (1983). IQ and Standard English. *College Composition and Communication, 34*(4), 470-484. doi:10.2307/357902

Feltz, D. L. (1982). Path analysis of the causal elements in Bandura's theory of self-efficacy and an anxiety-based model of avoidance behavior. *Journal of Personality and Social Psychology, 42*(4), 764-781. http://dx.doi.org/10.1037/0022-3514.42.4.764

Flower, L. & Hayes, J. R. (1981). A cognitive process theory of writing. *College Composition and Communication, 32*(4), 365. doi:10.2307/356600

Flower, L. & Hayes, J. R. (1980). The cognition of discovery: Defining a rhetorical problem. *College Composition and Communication, 31*(1), 21-32. doi:10.2307/356630

Foster, H. M. (2002). *Crossing over: Teaching meaning-centered secondary English language arts*. Mahwah, NJ: L. Erlbaum Associates.

Francis, B., Robson, J., & Read, B. (2001). An analysis of undergraduate writing styles in the context of gender and achievement. *Studies in Higher Education*, *26*(3), 313-326. doi:10.1080/03075070120076282

Frenn, M., Malin, S., Brown, R. L., Greer, Y., Fox, J., Greer, J., & Smyczek, S. (2005). Changing the tide: An Internet/video exercise and low-fat diet intervention with middle-school students. *Applied Nursing Research, 18*(1), 13–21. doi:10.1016/j.apnr.2004.04.003

García, J. N. & de Caso, A. M. (2006). Changes in writing self-efficacy and writing products and processes through specific training in the self-efficacy beliefs of students with learning disabilities. *Learning Disabilities: A Contemporary Journal*, *4*(2), 1-27.

Gauci, S.A., Dantas, A.M., Williams, D.A., & Kemm, R.E. (2009). Promoting student-centered active learning in lectures with a personal response system. *Advances in Physiology Education, 33*(1), 60-71. doi:10.1152/advan.00109.2007

Gerrard, L. (1987). *Writing at century's end: Essays on computer-assisted composition*. Manchester, MO: McGraw-Hill Publishing.

Goldberg, A., Russell, M., & Cook, A. (2003). The effect of computers on student writing: A meta-analysis of studies from 1992 to 2002. *The Journal of Technology, Learning, and Assessment 2*. Retrieved from http://escholarship.bc.edu/jtla/vol2/1/

Gore, P. A. (2006). Academic self-Efficacy as a predictor of college outcomes: Two incremental validity studies. *Journal of Career Assessment, 14*(1), 92–115. doi:10.1177/1069072705281367

Gould, J. D. (1981). Composing letters with computer-based text editors. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 23*(5), 593–606. doi:10.1177/001872088102300509

Grabill, J. T. (1998). Technology, basic writing, and change. *Journal of Basic Writing*, *17*(2), 91-105. Retrieved from https://wac.colostate.edu/jbw/v17n2/grabill.pdf

Graesser, A. C. & McNamara, D. S. (2012). Reading instruction: Technology-based supports for classroom instruction. In C. Dede & J. Richards (Eds.), *Digital teaching platforms: Customizing classroom learning for each student* (pp. 71–87). New York: Teachers College Press.

Graham, S. (1994). Motivation in African Americans. *Review of Educational Research*, *64*(1), 55-117. doi:10.3102/00346543064001055

Graham, S. (2008). *The power of word processing*. Wisconsin Rapids, WI: Renaissance Learning

Graham, S. W. & Gisi, S. L. (2001). Adult undergraduate students: What role does college involvement play. Journal of Student Affairs Research and Practice, 38(1), 99-121.

Graham, S. & Harris, K. R. (1989). Components analysis of cognitive strategy instruction: Effects on learning disabled students' compositions and self-efficacy. *Journal of Educational Psychology, 81*(3), 353-361. doi:10.1037//0022-0663.81.3.353

Graham, S., Harris, K. R., & MacArthur, C. (2004). Writing instruction. In B. Wong (Ed.), *Learning about learning disabilities* (3rd ed., pp. 281–313). Orlando, FL: Academic Press.

Graham, S. & Perrin, D. (2007a). *Writing next: Effective strategies to improve writing of adolescents in middle and high schools— A report to Carnegie Corporation of New York*. Washington, DC: Alliance for Excellence in Education.

Graham, S. & Perrin, D. (2007b). A meta-analysis of writing instruction for adolescent students. *Journal of Educational Psychology, 99*, 445–476.

Graham, S., Schwartz, S. S., & MacArthur, C. A. (1993). Knowledge of writing and the composing process, attitude toward writing, and self-efficacy for students with and without learning disabilities. *Journal of Learning Disabilities*, *26*(4), 237-249. doi:10.1177/002221949302600404

Gunn A. & Pitt S. J. (2003). The effectiveness of computer-based teaching packages in supporting student learning of parasitology. *Bioscience Education e-Journal, 1*, 1-15. doi:10.3108/beej.2003.01010007

Haas, C. & Hayes, J. R. (1986). What did I just say? Reading problems in writing with the machine. *Research in the Teaching of English 20*, 22-35.

Hand, L. & Rowe, M. (2001). Evaluation of student feedback. *Accounting Education*, *10*(2), 147-160.

Harrison, D. J. (2015). Assessing experiences with online educational videos: Converting multiple constructed responses to quantifiable data. *The International Review of Research in Open and Distributed Learning*, *16*(1) 168-192. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/1998/3254

Hawisher, G. E. (1987). The effects of word processing on the revision strategies of college freshmen. *Research in the Teaching of English*, *21*(2), 145-159.

Haydn, T. (2010). History teaching and ICT. In *Debates in History Teaching* (pp. 236-246). London: Taylor & Francis.

Hayes, J. R. (1996). A new framework for understanding cognition and affect in writing. In C. M. Levy & S. Ransdell (Eds.), *The science of writing: Theories, methods, individual differences, and applications* (pp. 1-27). Mahwah, NJ: Lawrence Erlbaum.

Hayes, J. R. & Flower, L. S. (1980a). Identifying the organization of writing processes. In L.W. Gregg & E.R. Steinberg (Eds.), *Cognition processes in writing* (pp.3-30). Hillsdale, NJ: Erlbaum Associates.

Hejmadi, M. V. (2007). Improving the effectiveness and efficiency of teaching large classes: Development and evaluation of a novel e-resource in cancer biology. *Bioscience Education E-journal*, *9*(1), 1-12. doi:10.3108/beej.9.2

Henk, W. A. & Melnick, S. A. (1995). The Reader Self-Perception Scale (RSPS): A new tool for measuring how children feel about themselves as readers. *The Reading Teacher*, *48*(6), 470-482.

Hillocks, G. (1984). What works in teaching composition: A meta-analysis of experimental treatment studies. *American Journal of Education, 92*, 133–170.

Hillocks, G. (1986). *Research on written composition: New directions for teaching*. Illinois: National Conference on Research in English.

Hinkin, T. R. & Schriesheim, C. A. (1989). Development and application of new scales to measure the French and Raven (1959) bases of social power. *Journal of Applied Psychology*, *74*(4), 561-567. doi:10.1037/0021-9010.74.4.561

Hobart, J. C. & Thompson, A. J. (2001). The five item Barthel index. *Journal of Neurology, Neurosurgery & Psychiatry*, *71*(2), 225-230. doi:10.1136/jnnp.71.2.225

Hoffman, G. & Goodwin, S. (2006). A clicker for your thoughts: Technology for active learning. *New Library World, 107*(9/10), 422-433. doi:10.1108/03074800610702606

Hollenbeck, K., Linder, C., & Almond, P. (2002). *Statewide writing score comparability of various tools used by students with visual impairments* (Accommodations Research Report 8). Eugene, OR: Behavioral Research and Teaching, University of Oregon.

Holt, B. E. (1933). Animal drive and the learning process. An essay toward radical empiricism. *The Journal of Nervous and Mental Disease, 78*(5), 554. doi:10.1097/00005053-193311000-00056

House, J. (2009). The grammar gallimaufry: Teaching students to challenge the grammar gods. *English Journal, 98*(3), 98-102. Retrieved from http://www.jstor.org/stable/40503516

Hovey, R. B. (1958). Freshman illiteracy and professorial jeopardy. *AAUP Bulletin*, *44*(2), 430-438. doi:10.2307/40222298

Hsieh, H. F. & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277–1288. doi:10.1177/1049732305276687

Hummel, J. (1985). Word processing and word processing related software for the learning disabled. *Journal of Learning Disabilities, 18*(9), 559–562. doi:10.1177/002221948501800913

Internal Revenue Service. (2015, April 14). SOI tax stats – individual income tax statistics – ZIP code data (SOI). Retrieved from http://www.irs.gov/uac/SOI-Tax-Stats-Individual-Income-Tax-Statistics-ZIP-Code-Data-(SOI)

Irvin, L. (2010). What is "academic" writing? In C. Lowe & P. Zemliansky, (Eds.), *Writing spaces: Readings on writing* (Vol.1, pp. 3-17). West Lafayette, IN: Parlor Press.

Johnson, A. P. (2008). *Teaching reading and writing: a guidebook for tutoring and remediating students*. Lanham, MD: Rowman & Littlefield Education.

Johnstone, K. M., Ashbaugh, H., & Warfield, T. D. (2002). Effects of repeated practice and contextual-writing experiences on college students' writing skills. *Journal of Educational Psychology, 94*, 305–315.

Jones, S. & Myhill, D. (2007). Discourses of difference? Examining gender differences in linguistic characteristics of writing. *Canadian Journal of Education/Revue Canadienne de l'éducation*, *30*(2), 456-482. Retrieved from http://www.jstor.org/stable/20466646

Joram, E., Woodruff, E., Bryson, M., & Lindsay, P. (1992). The effects of revising with a word processor on writing composition. *Research in the Teaching of English, 26*(2), 167-192.

Juniper, E. F., Guyatt, G. H., Streiner, D. L., & King, D. R. (1997). Clinical impact versus factor analysis for quality of life questionnaire construction. *Journal of Clinical Epidemiology*, *50*(3), 233-238. doi:10.1016/S0895-4356(96)00377-0

Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge; New York: Cambridge University Press.

Kaplan, A., Lichtinger, E., & Gorodetsky, M. (2009). Achievement goal orientations and self-regulation in writing: An integrative perspective. *Journal of Educational Psychology*, *101*(1), 51-69. doi:10.1037/a0013200

Kasworm, C. E. (1980). The older student as an undergraduate. *Adult Education, 31*(1), 30–47. doi:10.1177/074171368003100103

Kasworm, C. E., (1994). University adult education. In T, Husen & T, Postlethwaite (Eds,), International encyclopedia of education, research and studies (2nd ed., Vol, 2, pp, 6547-6551), Oxford, UK: Pergamon.

Kay, J. (2001). Learner control. *User Modeling and User-Adapted Interaction*, *11*(1-2), 111-127. Retrieved from http://umuai.org/anniversary/kay-umuai-2001.pdf

Keh, C. L. (1990). Feedback in the writing process: A model and methods for implementation. *ELT Journal, 44*(4), 294–304. doi:10.1093/elt/44.4.294

Kellogg, R. T. & Raulerson, B. A. (2007). Improving the writing skills of college students. *Psychonomic Bulletin & Review, 14*(2), 237–242. doi:10.3758/bf03194058

Kennedy, G., Judd, T., Dalgarno, B., & Waycott, J. (2010). Beyond natives and immigrants: Exploring types of net generation students. *Journal of Computer Assisted Learning, 26*(5), 332–343. doi:10.1111/j.1365-2729.2010.00371.x

Kerchner, L. B. & Kistinger, B. J. (1984). Language processing/word processing: Written expression, computers and learning-disabled students. *Learning Disability Quarterly, 7*(4), 329–335. doi:10.2307/1510232

Kirkland, M. R. & Saunders, M. A. P. (1991). Maximizing student performance in summary writing: Managing cognitive load. *TESOL Quarterly*, *25*(1), 105-121. doi:10.2307/3587030

Klassen, R. (2002). Writing in early adolescence: A review of the role of self-efficacy beliefs. *Educational Psychology Review*, *14*(2), 173-203.

Klassen, R. M. & Usher, E. L. (2010). Self-efficacy in educational settings: Recent research and emerging directions. In T. C. Urdan & S. A. Karabenick (Eds.), *Advances in motivation and achievement: Vol. 16A. The decade ahead: Theoretical perspectives on motivation and achievement (pp. 1–33)*. Bingley, UK: Emerald Publishing Group

Koers, D. (2011). *Picture yourself learning Microsoft Word 2010*. Boston, MA: Cengage Learning.

Kolich, E. M. (1985). Microcomputer technology with the learning disabled. *Journal of Learning Disabilities, 18*(7), 428–431. doi:10.1177/002221948501800714

Kriel, L. (2015, November 5). Just how diverse is Houston? 145 languages spoken here. *Houston Chronicle*. Retrieved from https://www.houstonchronicle.com/news/houston-texas/article/Houstonians-speak-at-least-145-languages-at-home-6613182.php

Kurt, A. A., Günüc, S., & Ersoy, M. (2013). The current state of digitalization: Digital native, digital immigrant and digital settler. *Journal of Faculty of Educational Sciences*, *46*(1), 1-22. Retrieved from http://dergiler.ankara.edu.tr/dergiler/40/1799/18993.pdf

Larson, B. L. & Roberts, B. B. (1986). The computer as a catalyst for mutual support and empowerment among learning disabled students. *Journal of Learning Disabilities, 19*(1), 52–55. doi:10.1177/002221948601900111

Lee, J. (2013). Can writing attitudes and learning behavior overcome gender difference in writing? Evidence from NAEP. *Written Communication*, *30*(2), 164-193. doi:10.1177/0741088313480313

Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior, 45*(1), 79–122. doi:10.1006/jvbe.1994.1027

Guba, E. G. & Lincoln, Y. S. (1982). Epistemological and methodological bases of naturalistic inquiry. *ECTJ*, *30*(4), 233-252.

Locke, E. A., Zubritzky, E., Lee, C., & Bobko, P. (1982). The effect of self-efficacy, goals and task strategies on task performance. doi:10.21236/ada121490

Lockyer, L., Patterson, J., & Harper, B. (2001). ICT in higher education: Evaluating outcomes for health education. *Journal of Computer Assisted Learning, 17*(3), 275-283. doi:10.1046/j.0266-4909.2001.00182.x

Long, J. S. (2011). *Regression models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage Publications.

López, E. J., Ehly, S., & García-Vásquez, E. (2002). Acculturation, social support, and academic achievement of Mexican and Mexican American high school students: An exploratory study. *Psychology in the Schools, 39*(3), 245–257. doi:10.1002/pits.10009

Lowes, S. (2008). Online teaching and classroom change: The trans-classroom teacher in the age of the internet. *Innovate: Journal of Online Education, 4*(3), 1-5. Retrieved from http://www.editlib.org/p/104251

Lu, M. Z. & Horner, B. (2000). Expectations, interpretations, and contributions of basic writing. *Journal of Basic Writing*, *19*(1), 43-52. Retrieved from https://wac.colostate.edu/jbw/v19n1/lu.pdf

Lunsford, A. A. (1979). Cognitive development and the basic writer. *College English, 41*(1), 449-59. doi:10.2307/376358

Luszczynska, A., Gutiérrez-Doña, B., & Schwarzer, R. (2005). General self-efficacy in various domains of human functioning: Evidence from five countries. *International Journal of Psychology, 40*(2), 80–89. doi:10.1080/00207590444000041

Lynch, J. (2002). Parents' self-efficacy beliefs, parents' gender, children's reader self-perceptions, reading achievement and gender. *Journal of Research in Reading*, *25*(1), 54-67.

MacArthur, C. A. & Cavalier, A. R. (2004). Dictation and speech recognition technology as test accommodations. *Exceptional Children, 71*(1), 43–58. doi:10.1177/001440290407100103

MacArthur, C. A., Graham, S., & Schwartz, S. S. (1991). A model for writing instruction: Integrating word processing and strategy instruction into a process approach to writing. *Learning Disabilities Research & Practice, 6*, 230-236.

Maddux, J. E. & Gosselin, J. T. (2003). Self-efficacy. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 218-238). New York: Guilford.

Malone, T. W. & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. *Aptitude, Learning, and Instruction*, *3*(1987), 223-253.

Manning, K. (1997). Authenticity in constructivist inquiry: Methodological considerations without prescription. *Qualitative Inquiry, 3*(1), 93–115. doi:10.1177/107780049700300105

Martinez, J. G. R. & Martinez, N. C. (1987). Are basic writers cognitively deficient? *Journal of College Reading and Learning, 20*(1), 16–23. doi:10.1080/10790195.1987.10849893

Matsuda, P. K. (2003). Basic writing and second language writers: Toward an inclusive definition. *Journal of Basic Writing*, *22*(2), 67-89.

Matute-Bianchi, M. E. (1991). Situational ethnicity and patterns of school performance among immigrant and nonimmigrant Mexican descent students. In Gibson, M. A., and Ogbu, J. (Eds.), Minority Status and Schooling: A Comparative Study of Immigrant and Involuntary Minorities. Garland, New York.

McConnell, D. (2005). Sustaining networked e-learning through collaborative pedagogies. In A. Paul (Ed.), *Changing higher education: The development of learning and teaching* (pp. 85-96). London: Routledge.

McConville, S. A. & Lane, A. M. (2006). Using on-line video clips to enhance self-efficacy toward dealing with difficult situations among nursing students. *Nurse Education Today, 26*(3), 200–208. doi:10.1016/j.nedt.2005.09.024

McFall, R. M. (1991). Manifesto for a science of clinical psychology. *The Clinical Psychologist*, *44*(6), 75-88.

Meier, S., McCarthy, P. R., & Schmeck, R. R. (1984). Validity of self-efficacy as a predictor of writing performance. *Cognitive Therapy and Research, 8*(2), 107–120. doi:10.1007/bf01173038

Meskill, C. & Higgins, J. (1990). Language, learners, and computers. *TESOL Quarterly, 24*(2), 307. doi:10.2307/3586907

Metzner, B. S. & Bean, J. P. (1987). The estimation of a conceptual model of nontraditional undergraduate student attrition. *Research in Higher Education, 27*(1), 15–38. doi:10.1007/bf00992303

Miller, N. E. & Dollard, R. (1941). *Social learning and imitation*. New Haven, CT: Yale University Press.

Miller, R. (1998). Epistemology and psychotherapy data: The unspeakable, unbearable, horrible truth. *Clinical Psychology: Science and Practice*, *5*(2), 242-250.

Monahan, B. D. (1984). Revision strategies of basic and competent writers as they write for different audiences. *Research in the Teaching of English*, *18*(3), 288-304.

Montague, M. (1990). *Computers, cognition, and writing instruction*. Albany, NY: State University of New York Press.

Moran, C. (1983). Electronic media: Word processing and the teaching of writing. *English Journal*, *72*(3), 113-115. doi:10.2307/816146

Murphy, K. R., Myors, B., & Wolach, A. H. (2014). *Statistical power analysis: A simple and general model for traditional and modern hypothesis tests*. New York, NY: Routledge.

National Center for Educational Statistics. (2010). Educational technology in U.S. public schools: Fall 2008. Retrieved from https://nces.ed.gov/pubs2010/2010034.pdf

National Union of Students. (2010). *Student perspectives on technology – demand, perceptions and training needs* (Rep.). Retrieved from http://www.hefce.ac.uk/media/hefce/content/pubs/2010/rd1810/rd18_10.pdf

Nauman, A. D., Stirling, T., & Borthwick, A. (2011). What makes writing good? An essential question for teachers. *The Reading Teacher*, *64*(5), 318-328. doi:10.1598/RT.64.5.2

Nelson, J. (1990). This was an easy assignment: Examining how students interpret academic writing tasks. *Research in the Teaching of English, 24*(4) 362-396.

Nelson, J. (1993). The library revisited: Exploring students' research processes. In A. Penrose & B. Sitko (Eds.) *Hearing ourselves think: Cognitive research in the college writing classroom*, (pp. 102-122). New York: Oxford University Press

Nichols, R. G. (1986). Word processing and basic writers. *Journal of Basic Writing, 5*(2), 81-97.

Owston, R. D., Murphy, S., & Wideman, H. H. (1991). On and off computer writing of eighth grade students experienced in word processing. *Computers in the Schools, 8*(4), 67–88. doi:10.1300/j025v08n04_08

Pajares, F. (1996). Self-efficacy beliefs in academic settings. Review of Educational Research, 66(4), 543-578. doi:10.2307/1170653

Pajares, F. (2003). Self-efficacy beliefs, motivation, and achievement in writing: A review of the literature. *Reading & Writing Quarterly*, *19*(2), 139-158. doi:10.1080/10573560390143085

Pajares, F. (2006). Self-efficacy during childhood and adolescence: Implications for teachers and parents. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 339– 367). Greenwich, CT: Information Age Publishing.

Pajares, F. (2007). Empirical properties of a scale to assess writing self-efficacy in school contexts. *Measurement and Evaluation in Counseling and Development*, *39*(4), 239-249.

Pajares, F. & Cheong, Y. F. (2003). Achievement goal orientations in writing: A developmental perspective. *International Journal of Educational Research, 39*(4-5), 437–455. doi:10.1016/j.ijer.2004.06.008

Pajares, F. & Johnson, M. J. (1994). Confidence and competence in writing: The role of self-efficacy, outcome expectancy, and apprehension. *Research in the Teaching of English*, *October* (1), 313-331.

Pajares, F. & Kranzler, J. (1995). Self-efficacy beliefs and general mental ability in mathematical problem-solving. *Contemporary Educational Psychology, 20*(4), 426–443. doi:10.1006/ceps.1995.1029

Pajares, F., Miller, M. D., & Johnson, M. J. (1999). Gender differences in writing self-beliefs of elementary school students. *Journal of Educational Psychology*, *91*(1), 50-61. doi:10.1037/0022-0663.91.1.50

Pajares, F. & Urdan, T. (Eds.), (2006). *Adolescence and education, Vol. 5: Self-efficacy beliefs of adolescents*. Greenwich, CT: Information Age Publishing.

Pajares, F. & Valiante, G. (1997). Influence of writing self-efficacy beliefs on the writing performance of upper elementary students. *Journal of Educational Research, 90*(6), 353-360. doi:10.1080/00220671.1997.10544593

Pajares, F. & Valiante, G. (1999). Grade level and gender differences in the writing self-beliefs of middle school students. *Contemporary Educational Psychology, 24*(4), 390–405. doi:10.1006/ceps.1998.0995

Pajares, F. & Valiante, G. (2001). Gender differences in writing motivation and achievement of middle school students: A function of gender orientation? *Contemporary Educational Psychology, 26*(3), 366–381. doi:10.1006/ceps.2000.1069

Pajares, F. & Valiante, G. (2006). Self-efficacy beliefs and motivation in writing development. In C.A. MacArthur, S. Graham, & J. Fitzgerald (Eds.) *Handbook of writing research* (pp. 158-170). London: The Guilford Press.

Pajares, F., Valiante, G., & Cheong, Y. F. (2007). Writing self-efficacy and its relation to gender, writing motivation, and writing competence: A developmental perspective in G. Rijlaarsdam (Series Ed.) and P. Boscolo & S. Hidi (Volume Eds.), *Studies in writing*, Volume 19, *Writing and motivation* (pp. 141–159). Oxford: Elsevier

Palfrey, J. G. & Gasser, U. (2013). *Born digital: Understanding the first generation of digital natives*. New York: Basic Books.

Palmquist, M. (1998). *Transitions: teaching writing in computer-supported and traditional classrooms*. Greenwich, CT: Ablex.

Paulus, T. M. (1999). The effect of peer and teacher feedback on student writing. *Journal of Second Language Writing, 8*(3), 265–289. doi:10.1016/s1060-3743(99)80117-9

Perl, S. (1979). The composing processes of unskilled college writers. *Research in the Teaching of English, 13*(4), 317-336.

Phelps, E. S. (1966). Models of technical progress and the Golden Rule of research. *Review of Economic Studies*, *33*(2), 133-145. doi:10.2307/2974437

Phinney, M. (1988). Computers, composition, and second language learning. In M.C. Pennington, (Ed.), *Teaching languages with computers: The state of the art* (pp. 81-96). San Francisco: Athelstan.

Phinney, M. (1991). Computer-assisted writing and writing apprehension in ESL students. In P. Dunkel (Ed.), *Computer-assisted language learning and testing* (pp. 189-204). New York: Newbury House.

Pokay, P. & Blumenfeld, P.C. (1990). Predicting achievement early and late in the semester: The role of motivation and use of learning strategies. *Journal of Educational Psychology, 82*, 41-50.

Poverjuc, O. (2011). The experiences of feedback practices on academic writing undergone by students with English as an additional language in a Master's programme: A multiple case study. *Journal of Academic Writing, 1*(1), 143–152. doi:10.18552/joaw.v1i1.17

Powell, P. R. (2009). Retention and writing instruction: Implications for access and pedagogy. *College Composition and Communication*, *60*(4), 664-682. Retrieved from http://www.jstor.org/stable/40593424

Prat-Sala, M. & Redford, P. (2010). The interplay between motivation, self-efficacy, and approaches to studying. *British Journal of Educational Psychology*, *80*(2), 283-305. doi:10.1348/000709909X480563

Puccio, E. (1995) Developmental needs of older adults: Implications for community colleges. *Community College Journal of Research and Practice, 19*, 225-265.

Pullins, E. B. (2001). An exploratory investigation of the relationship of sales force compensation and intrinsic motivation. *Industrial Marketing Management, 30*(5), 403–413. doi:10.1016/s0019-8501(99)00095-4

Ramachandran, D., Canny, J., Das, P. D., & Cutrell, E. (2010). Mobile-izing health workers in rural India. *Proceedings of the 28th International Conference on Human Factors in Computing Systems - CHI '10*. doi:10.1145/1753326.1753610

Reid, M. J. & Moore, J. L. (2008). College readiness and academic preparation for postsecondary education oral histories of first-generation urban college students. *Urban Education*, *43*(2), 240-261. doi:10.1177/0042085907312346

Rivard, L. O. P. (1994). A review of writing to learn in science: Implications for practice and research. *Journal of Research in Science Teaching*, *31*(9), 969-983. doi:10.1002/tea.3660310910

Roscoe, R. D., Allen, L. K., Weston, J. L., Crossley, S. A., & McNamara, D. S. (2014). The Writing Pal Intelligent Tutoring System: Usability testing and development. *Computers and Composition, 34*, 39–59. doi:10.1016/j.compcom.2014.09.002

Roscoe, R. D., Snow, E. L., & McNamara, D. S. (2013). Feedback and revising in an intelligent tutoring system for writing strategies. *Artificial Intelligence in Education*, 259–268. doi:10.1007/978-3-642-39112-5_27

Ryan, R. M. & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67. doi:10.1006/ceps.1999.1020

Salomon, G. (1988). AI in reverse: Computer tools that become cognitive. *Journal of Educational Computing Research*, *4*(2), 123-139.

Sanders-Reio, J., Alexander, P. A., Reio, T. G., & Newman, I. (2014). Do students' beliefs about writing relate to their writing self-efficacy, apprehension, and performance? *Learning and Instruction*, *33*, 1-11.

Schunk, D. H. (1989). Self-efficacy and achievement behaviors. *Educational Psychology Review*, *1*(3), 173-208.

Schunk, D. H. (1991). Self-Efficacy and Academic Motivation. *Educational Psychologist, 26*(3-4), 207–231. doi:10.1080/00461520.1991.9653133

Schunk, D. H. & Hanson, A. R. (1989). Self-modeling and children's cognitive skill learning. *Journal of Educational Psychology, 81*(2), 155-163.

Schunk, D. H. & Zimmerman, B. J. (1997). Developing self-efficacious readers and writers: The role of social and self-regulatory processes. In J. T. Guthrie & A. Wigfield (Eds.), *Reading engagement: Motivating readers through integrated instruction*. Newark, DE: International Reading Association.

Shaughnessy, M. (1977). *Errors and expectations*. New York: Oxford.

Shell, D., Colvin, C., & Bruning, R. (1995). Developmental and ability differences in self-efficacy, causal attribution, and outcome expectancy mechanisms in reading and writing achievement. *Journal of Educational Psychology, 87*(3), 386 –398. doi:10.1037/0022-0663.87.3.386

Shell, D. F., Murphy, C. C., & Bruning, R. H. (1989). Self-efficacy and outcome expectancy mechanisms in reading and writing achievement. *Journal of Educational Psychology*, *81*(1), 91-100. doi:10.1037/0022-0663.81.1.91

Shermis, M. & Burstein, J. (Eds.). (2003). *Automated essay scoring: A cross-disciplinary perspective*. Mahwah, NJ: Erlbaum.

Shermis, M. D. & Burstein, J. (2013). *Handbook of automated essay evaluation: Current applications and future directions*. New York: Routledge.

Silva, M. L. (2012). Camtasia in the classroom: Student attitudes and preferences for video commentary or Microsoft Word comments during the revision process. *Computers and Composition*, *29*(1), 1-22. doi:10.1016/j.compcom.2011.12.001

Singh-Corcoran, N. (2011). Composition as a write of passage. *Writing Spaces: Readings on Writing, 2*, 24-36. Retrieved from http://www.parlorpress.com/pdf/singh-corcoran--composition-as-a-write.pdf

Sinha, N., Khreisat, L., & Sharma, K. (2009). Learner-interface interaction for technology-enhanced active learning. *Innovate: Journal of Online Education*, *5*(3), 1-7. doi:10.1.1.186.4941

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417-453. Retrieved from http://steinhardt.nyu.edu/scmsAdmin/media/users/lec321/Sirin_Articles/Sirin_2005.pdf

Snyder, I. (1993). Writing with word processors: a research overview. *Educational Research, 35*(1), 49–68. doi:10.1080/0013188930350103

Sommers, E. A. (1984). A writing teacher experiments with word processing. *Computers and Composition*, *1*(2), 1-3. doi:10.1016/S8755-4615(84)80002-X

Sommers, E. A. (1985). Integrating composing and computing. In J. L. Collins & E. A. Sommers (Eds.), *Writing on-line: Using computers in the teaching of writing* (pp. 3-10). Upper Montclair, NJ: Boynton/Cook.

Sommers, N. (1988). Revision strategies of student writers and experienced adult writers. In G. Tate, E.P.J. Corbett (Eds.), *The writing teacher's sourcebook* (pp. 119-127). New York: Oxford UP.

Stan, S. & Collins, T. G. (2002). Basic writing: Curricular interactions with new technology. In G. DeLuca, L. Fox, M. Johnson, M. Kogen (Eds.), *Dialogue on writing: Rethinking ESL, basic writing, and first-year composition* (pp. 409-431). Mahwah, NJ: Erlbaum.

Usher, E. L. & Pajares, F. (2006). Inviting confidence in school: Invitations as a critical source of the academic self-efficacy beliefs of entering middles school students. *Journal of Invitational Theory & Practice, 12*, 7-16

Walker, B. J. (2003). The cultivation of student self-efficacy in reading and writing. *Reading & Writing Quarterly, 19*(2), 173–187. doi:10.1080/10573560308217

Walpole, M. (2003). Socioeconomic status and college: How SES affects college experiences and outcomes. *The Review of Higher Education, 27*(1), 45–73. doi:10.1353/rhe.2003.0044

Walsh, B. (1998). Why Gerry likes history now: The power of the word processor. *Teaching History*, (93), 6-15.

Weigle, S. C. (2013). English language learners and automated scoring of essays: Critical considerations. *Assessing Writing, 18*(1), 85–99. doi:10.1016/j.asw.2012.10.006

Whaley, A. L. & Noël, L. T. (2012). Sociocultural theories, academic achievement, and African American adolescents in a multicultural context: A review of the cultural compatibility perspective. *The Journal of Negro Education*, *81*(1), 25-38. doi:10.7709/jnegroeducation.81.1.0025

White, M. J. & Bruning, R. (2005). Implicit writing beliefs and their relation to writing quality. *Contemporary Educational Psychology, 30*(2), 166–189. doi:10.1016/j.cedpsych.2004.07.002

White, J. W. & Lowenthal, P. R. (2011). Minority college students and tacit "codes of power": Developing academic discourses and identities. *The Review of Higher Education* 34(2), 283-318. The Johns Hopkins University Press. Retrieved from https://muse.jhu.edu/article/406140

Wolfgang, M. E. & Dowling, W. D. (1981). Differences in motivation of adult and younger undergraduates, *Journal of Higher Education, 52*(6), 640-648.

Wolters, A. (1999). The relation between high school students' motivational regulation and their use of learning strategies, effort, and classroom performance. *Learning and Individual Differences, 11*(3), 218-299.

Wong, B. Y. L., Butler, D. L., Ficzere, S. A., & Kuperis, S. (1996). Teaching low achievers and students with learning disabilities to plan, write, and revise opinion essays. *Journal of Learning Disabilities, 29*(2), 197–212. doi:10.1177/002221949602900209

Wresch, W. (1984). *The computer in composition instruction: A writer's tool*. National Council of Teachers of English, Urbana, IL. Retrieved from http://files.eric.ed.gov/fulltext/ED247602.pdf

Wresch, W. (1987). *A practical guide to computer uses in the English/language arts classroom*. Englewood Cliffs: Prentice-Hall.

Xi, X. (2010). Automated scoring and feedback systems: Where are we and where are we heading? *Language Testing, 27*(3), 291–300. doi:10.1177/0265532210364643

Yale Human Subject Research Resource & Education Program. (2006). General Guidance Protocol Design – Consent Process. Retrieved from http://learn.yale.edu/hsp/module_2/3a_guidance.asp

Young, D. B. & Ley, K. (2002). Brief report: Self-efficacy of developmental college students. *Journal of College Reading and Learning, 33*(1), 21–31. doi:10.1080/10790195.2002.10850134

Zaller, J. & Feldman, S. (1992). A simple theory of the survey response: Answering questions versus revealing preferences. *American Journal of Political Science, 36*(3), 579. doi:10.2307/2111583

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82–91. doi:10.1006/ceps.1999.1016

Zimmerman, B. J. & Bandura, A. (1994). Impact of Self-Regulatory Influences on Writing Course Attainment. *American Educational Research Journal, 31*(4), 845. doi:10.2307/1163397

Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal, 29*(3), 663. doi:10.2307/1163261

Zimmerman, B. J. & Martinez-Pons, M. (1990). Student differences in self-regulated learning: relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology, 82*(1),51–59.

Zumbrunn, S. K., Bruning, R. H., Kauffman, D. F., & Hayes, M. (2010). Explaining determinants of confidence and success in the elementary writing classroom. In *Annual meeting of the American Educational Research Association, Denver, CO*. Retrieved from goo.gl/qJvHDm

Zumbrunn, S., Marrs, S., & Mewborn, C. (2015). Toward a better understanding of student perceptions of writing feedback: a mixed methods study. Reading and Writing, 29(2), 349–370. doi:10.1007/s11145-015-9599-3