

2016


Using digital writing tools in supporting student writing

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McKee, Sarah, "Using digital writing tools in supporting student writing" (2016). *Graduate Research Papers*. 626.

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Using digital writing tools in supporting student writing

Abstract

Core Curriculum guides teachers' writing instruction, requiring students to use technology to 1) produce and publish writing, 2) interact with others, and 3) develop skills to strengthen writing. Teachers should explore digital writing tools as a means to do each. This review examines the roles digital writing tools have in meeting Core Curriculum writing standards and facilitating feedback and revision in student writing. The focus of this review is recent research evidence published in the last five years. The research evidence suggests needed changes in writing instruction, based on teachers' and students' perceptions of digital tools – especially to provide feedback and how they may influence revision. Recommendations for writing teachers are provided, as well as for future research on using digital writing tools in the secondary classroom.

Using Digital Writing Tools in Supporting Student Writing

A Graduate Review

Submitted to the

Division of Instructional Technology

Department of Curriculum and Instruction

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts

UNIVERSITY OF NORTHERN IOWA

by

Sarah McKee

May, 2016

This Review by: Sarah McKee

Titled: Using Digital Writing Tools in Supporting Student Writing

has been approved as meeting the research requirement for the
Degree of Master of Arts.

5/6/16

Date Approved

5/6/16

Date Approved

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Core Curriculum guides teachers' writing instruction, requiring students to use technology to produce and publish writing, interact with others, and develop skills to strengthen writing; teachers should explore digital writing tools as a means to do each. This review examines the roles digital writing tools have in meeting Core Curriculum writing standards and facilitating feedback and revision in student writing. The focus of this review is recent research evidence published in the last five years. The research evidence suggests needed changes in writing instruction, based on teachers' and students' perceptions of digital tools - especially to provide feedback and how they may influence revision. Recommendations for writing teachers are provided, as well as for future research on using digital writing tools in the secondary classroom.

Keywords: digital writing tools, feedback, revision, writing instruction

Table of Contents

Abstract.....	3
Using Digital Writing Tools in Supporting Student Writing.....	6
Methodology	9
Analysis and Discussion.....	10
Using Digital Writing Tools to Support Core Curriculum Writing Instruction	11
Use digital tools to produce, develop, and strengthen writing.	11
Using digital writing tools to interact and collaborate with others.	15
Using digital writing tools to publish writing.....	17
Guidance and Support from Adults to Develop and Strengthen Writing.....	19
Students' perception of digital feedback.....	19
Feedback as feed forward.....	21
Digital versus written feedback	24
Student use of teacher feedback to develop and strengthen writing.....	25
Teacher perception of feedback with digital tools.....	27
Guidance and Support from Peers to Develop and Strengthen Writing.....	29
Students' perception of peer feedback.....	30
The reality and practice of providing peer feedback.....	33
Student use of peer feedback to develop and strengthen writing.....	36
Conclusions and Recommendations.....	37
Recommendations	38
Recommendations for Teachers.	38
Recommendations for Research.	39

References..... 41

Using Digital Writing Tools in Supporting Student Writing

In starting a position as Literacy Coach in a high school, it has been important to understand what teachers perceived to be the strengths and weaknesses of students in writing. The common responses given to the inquiries are: “students don’t like to write; “I ask students to write even a paragraph and struggle to get maybe a sentence; “students just don’t write well.” This problem is not exclusive to just one high school. Mo, Kopke, Hawkins, Troia, and Olinghouse (2014) reported the 2011 National Assessment of Educational Progress (NAEP) findings that more than 70% of 8th- to 12th-grade students do not write well enough to meet the challenges of the classroom. Certainly it is interesting that students dislike writing and are so ineffective in their performance. These are students who communicate a significant amount of their conversations through writing – via texting, Facebook posts, tweets, etc. So how can students who write so much be so bad at it? Also, if they write so willingly via technology, is there a way to use their comfort of talking through their device to an educational benefit in academic writing?

On the other hand, teachers may not be confident writing instructors, either. This subject is referred to as the “neglected ‘R’ in the classic reading, writing, and arithmetic triad” (Mo et al., 2014, p. 446). In a 2008 national survey from the National Commission on Writing for America’s Families, Schools, and Colleges, almost 80% of students reported their writing assignments were a page or less (as cited in Mo et al., 2014, p. 446). So one also has to ask - do teachers give students effective instruction and enough practice to learn how to write better and more confidently?

Perhaps it is a two-fold dilemma. Unquestionably – and regardless of the causes of students' lack of success in writing – the problem requires the immediate attention of teachers, administrators, and schools. As Mo et al. (2014) point out:

Students who do not learn to write well are at a great disadvantage, because weaker writers are less likely to use writing to extend their learning, more likely to see their grades suffer, less likely to attend college and successfully complete a college degree, and more likely to face challenges in attaining successful employment and promotion in today's competitive job market. (p. 445)

The stakes are too high to continue such unsuccessful methods of instruction where students are not prepared for college and beyond.

Because Core Curriculum informs teachers' instruction, English / Language Arts (ELA) teachers know that they must provide “some guidance and support from peers and adults” for students to “develop and strengthen writing as needed by ... revising, editing, rewriting...” (National Governors Association Center for Best Practices [NGA Center], & Council of Chief State School Officers [CCSSO], 2010, p. 43). As well, Common Core writing Anchor Standard 6 connects technology use with collaboration: “use technology, including the Internet, to produce and publish writing and to interact and collaborate with others” (p. 41). By the end of their school career, students must also “update individual or shared writing products in response to ongoing feedback” (p. 46). This guidance, support, and interaction may come in the form of feedback, which Rowe and Wood (2008) clarify must be “timely, relevant, meaningful, understandable, encouraging, and manageable by both staff and students” (as cited in Jones et al., 2012, p. 595). Many writing scholars interviewed in a study also explained the importance of providing thoughtful, sensitive, and specific feedback to students in order for them to improve

their writing (Zumbrunn & Krause, 2012, p. 350, 352). Race (2010, 2007) referred to this as “feed forward,” – permitting students to use it to improve their writing (as cited in Jones, Georghiades, & Gunson, 2012, p. 595).

When considering these Core expectations, digital writing tools – defined as tools on a computer or other device, often connected to the Internet, that allows students to create compositions for real purposes and publish to an authentic audience – become essential to writing instruction (Hicks, 2009). The “synchronous and asynchronous feedback features in a technology-enhanced writing environment” (Yim, Warschauer, Zheng, and Lawrence, 2014, p. 243) can provide a multitude of ways for teachers to cover these standards. In fact, in a survey of teachers by the Pew Research Center, half of teachers interviewed felt the Internet and digital tools make it easier for them to teach writing (Purcell, Buchanan, & Friedrich, 2013). Therefore, this review explores the use of digital writing tools in secondary schools and their impact on writing instruction.

More specifically, it examines the digital writing tools’ potential to support Core Curriculum-based writing instruction and facilitate teacher and peer feedback to scaffold revision. This review will discuss digital writing tools, including audio, video, and screencast recordings; one-to-one laptop environments; blogs; wikis; social media; writing software and online programs; Google Apps; and Microsoft Word. The researcher is interested in secondary writing instruction, but expanded the review to elementary school and post-secondary education when research in the secondary level was unavailable. The research was selected for review when published within the last six years to address the following questions:

1. What role do digital writing tools play in providing Core Curriculum-aligned instruction / writing practice?

2. What role do digital writing tools play in teacher feedback and revision in student writing?
3. What role do digital writing tools play in peer feedback and revision in student writing?

This review may be enlightening to secondary educators and could have an impact on future student success in writing – and, as a result, their overall success in school and as life-long learners. The results could potentially be used in the development of future practices in teaching writing.

Methodology

Research was located through Google Scholar and the University of Northern Iowa's Rod Library OneSearch!, which searches the ERIC and EBSCO databases. Both allowed the researcher to explore peer-reviewed journals and to limit the search to recent publications. Searches were conducted with combinations of the following terms: *digital writing tools, educational technology, instructional technology, computer-mediated writing tools, writing apps, writing instruction, e-feedback, feedback, digital feedback, peer feedback, secondary education, and high school.*

As digital writing tools change and develop quickly, review articles had to be published no earlier than 2011. In order to find credible sources, articles must have been a primary source publication in a peer-reviewed journal or come from a reputable author respected in the field of writing and technology. If the article met these two initial criteria, the researcher reviewed the abstract to evaluate relevance. Articles needed to address secondary writing instruction, but did not have to focus on writing in English / Language Arts. The research was found to be useful for the review if it examined the digital writing tool's impact in providing Core-aligned instruction / writing practice or feedback on student writing or in the revision process. If there were no

articles on secondary instruction, elementary or post-secondary research was allowed, as long as the digital writing tools and instructional methods would also be efficient in a secondary environment.

Based on these criteria, 26 studies were selected for review, including 13 that focused on teacher feedback and 11 on peer feedback. Within those articles, a variety of digital writing tools were discussed, including: audio tools (4), video tools (2), screencasting tools (6), one-to-one laptops (4), Microsoft Word (2), Google Docs (4), writing software and online programs (4), social media sites (3), blogs (3), and wikis (1). The studies covered all grade levels, including: elementary (2), secondary (6), and post-secondary (17).

Analysis and Discussion

Traditionally students write on paper, likely possessing just one working copy of their writing without using digital writing tools. This type of writing process does not allow many opportunities for students to receive feedback on their writing or continue work to improve the text because the teacher likely kept the drafts for commenting and grading. As the research shows, this has changed through the use of technology.

By critically reading and reviewing the research on the use of digital writing tools in writing instruction, several impacts on student writing have been realized. The review will be organized according to the three research questions: the potential of digital writing tools' use 1) to meet Core Curriculum expectations, 2) to facilitate teacher feedback and revision, and 3) to facilitate peer feedback and revision. This discussion will include the capabilities of digital writing tools; the perceptions of teachers and students; the potential for feedback to become feed forward - qualified here as meaningful and understandable, encouraging, manageable, and timely; and the impact on student revision.

Using Digital Writing Tools to Support Core Curriculum Writing Instruction

Since Core Curriculum has been adopted by many states starting in 2010, teachers have been responsible to use the standards as the basis of instruction. While the standards are explicit about what should be taught, they are unclear about how to teach it. Research demonstrates how digital writing tools can help students achieve the writing standards.

Use digital tools to produce, develop, and strengthen writing. Students have to learn to develop and strengthen their writing by revising, editing, and rewriting (NGA Center, & CCSSO, 2010); writing in a digital environment may provide students the opportunity to see that writing is a process that requires persistence. Lin and Yang's study (2011) of students' experiences using a wiki in English writing in a college "Reading and Writing" course in Taiwan discussed a change in a student's perception, stating in an interview, "I will throw away traditional writing work once it's completed instead of saving it ... but [using a] Wiki can help reflect [on] my own writing stuff and the processes ..." (p. 98). He started to view writing as more of a process. Woodard & Babcock (2014) discussed how the process becomes more visible to students using digital writing tools like Google Docs, as the revision history allows writers to see every change to the document (p. 2). Their research of two high school classes using Google Docs in a one-to-one setting sought to learn if students increased revision given feedback provided in a "live" text environment (Woodard & Babcock, 2014). In addition, research from Yim et al. (2014) found that as students developed writing on Google Docs, they started to see their writing as a "living document" that continues to develop over time" (p. 249). They had examined how middle school students in a one-to-one laptop district used Google Apps for writing a wide range of text types and for a variety of purposes. Students were encouraged to continue developing their ideas in numerous revisions and quantitative data confirmed they did.

Students worked on texts an average of 15 days, producing 13.74 documents on average, and making 67.84 edits per written piece. Some documents were revised for almost a whole year (p. 249). Zheng, Lawrence, Warschauer, and Lin (2014) studied the same students, analyzing student work, student responses to surveys, and test score data to answer questions on student perception and use of Google Docs, as well as the impact of use on achievement. Students self-reported using Google Docs more for revising than writing, editing documents an average of 4.11 times per week; this suggests that the tool supports a “process-writing perspective,” encouraging students to work to strengthen writing over longer amounts of time (p. 201, 221). No comparative data was available, however.

Students’ purpose in revising and definition of revision also has changed in technology-enhanced writing environments. Thompson and Lee’s study (2012) of video feedback with college students suggested that video feedback engages the writer more, encouraging a response; this leads to student revision not to get a better grade or to satisfy the teacher, but as an ongoing learning experience. Students modified their definition of revision in Hunt-Barron and Colwell’s (2014) formative experiment in a middle school one-to-one ELA classroom. They used Microsoft Word to compose and the Ning social media site for publishing drafts and commenting. Students’ understanding of revision changed from merely fixing mistakes to include text alterations - additions, deletions, or rearrangement – to hold a reader’s interest or for clarity (p. 142). Nobles and Paganucci’s study (2015) of high school English students in a hybrid class blogs and Google sites also revealed a difference. A student felt revision was “deeper” online than on paper, contrasting capitalization and punctuation changes on paper to organization and wording revisions online (p. 26). As well, Ellis’s quantitative research (2011) comparing college-level peer feedback on paper versus a blog showed higher numbers of in-depth, meaning-

influencing feedback online; paper comments had a higher level of surface revision comments (p. A-94). This development is important because “meaning-based revision skills” are connected with advanced writing skills (as cited in Yim et al., 2014, p. 247).

This could positively impact students’ beliefs about developing their writing skills. For example, Zheng, Warschauer, and Farkas (2013) investigated two elementary one-to-one laptops programs for the impact on student writing achievement and processes and found 64% of students perceived an improvement in their quality of writing post laptop implementation (p. 285). This was confirmed with Nobles and Paganucci (2015), as students felt that writing with the support of digital tools increases writing quality and advances skill development more than on paper (p. 24-25). Students felt in digital writing they used more vivid vocabulary, varied sentence structure, increased organization and clarity, and better spelling (p. 22-24). While just student perception, these results are promising and promote a digital writing environment.

Not all of the studies showed student growth in the revision process, however. A case study of an 8th-grade student focused partially on writing and revising using an online writing environment, *Scholar* (McCarthy, Magnifico, Woordard, & Kline, 2014). Students wrote a narrative story, submitted each section of the story - introduction, rising action, etc. - separately for review, submitted a second draft, and finally put all sections together for an additional round of feedback. Despite liking peer feedback and valuing his “accurate” reviews, the student only revised one section of his story (p. 159). He did insert hundreds of words of new content and made two other minor changes – moving two paragraphs and deleting an unnecessary space (p. 160).

One possible explanation for the increase in student revision and persistence in writing in one study (Yim et al., 2014) and not the other (McCarthy, et al., 2014) is because a writing

workshop model of instruction was implemented, where frequent time in class was devoted to writing, revision, and feedback processes. In addition, McCarthy et al.'s student (2014) was at a disadvantage without a device at home to access and continue his work. Yet a case study is limited in participants; a bigger study may be needed to determine validity.

The digital writing tools' characteristics may affect students' perception of the writing process and ability to revise. More than 70% of students felt they wrote, revised, and edited more due to composing on laptops (Zheng et al., 2013, p. 285). One student thought traditional writing was a good method, but now appreciates online writing because he can "modify [his] own writing, make it better, and feel a sense of achievement" (Lin & Yang, 2011, p. 95). On paper students had to recopy by hand the entire draft to make revisions or edits. Unlike the printed document that cannot be altered after printing, now students have an electronic document that is easily altered, as on a wiki or Google Doc (Lin & Yang, 2011, p. 95; Yim et al., 2014, p. 246; Zheng et al., 2014, p. 10-11). For example, students appreciated the ease of moving chunks of text versus on paper (Nobles & Paganucci, 2015, p. 26). Additionally, students can visualize their revisions in ways they have not before with features like "Track Changes" in Microsoft Word or "Revision History" in Google Docs; teachers said this "helped them to see the ways their writing changed" (Hunt-Barron & Colwell, 2014, p. 145). Teachers also saw potential in digital writing tools, as 56% of teachers surveyed believe digital tools make revision easier, which makes students more likely to write well (Purcell et al., 2013).

Drawbacks of digital writing tools. However, technology has its drawbacks in the classroom. Hunt-Barron and Colwell (2014) found problems with school policy, as the teacher had to monitor student computer use, detracting from her instruction. Broken machines or reserving computer lab time in a school without one-to-one devices can also complicate writing

and feedback time. What is more, some students felt the tool was challenging to learn or cumbersome because of technical difficulties (Lin & Yang, 2011, p. 97; Tanduklangi, 2014, p. 138), which would impact the students' ability to write and collaborate effectively. Finally, students may be hesitant to use digital tools if they are used to or prefer traditional paper-and-pencil writing methods (Lin & Yang, 2011, p. 97; Silva, 2012, p. 9).

Using digital writing tools to interact and collaborate with others. Digital tools prove to be superior to paper-and-pen writing in terms of interacting with others. A study from Pew Research Center (2013) of teachers of Advanced Placement and National Writing Project classes revealed 79% of those surveyed felt that digital tools foster greater collaboration among students (Purcell et al., 2013). Students, teachers, and peers can all share an electronic draft at the same time - even from different locations or asynchronous times (Yim et al., 2014, p. 246). This allows more opportunity for students to gain feedback (McCarthy et al., 2014, p. 163-164; Nobles & Paganucci, 2015, p. 25; Yim et al., 2014, p. 246; Zhen et al., 2014, p. 211), which is constantly available on the students' text through annotation and commenting tools. For example, Google Docs allows readers to insert comments or participate in live conversations via the chat function (Woodard & Babcock, 2014, p. 2). When using the notification feature in Google Docs, students even receive an email as comments are posted on their writing. This may encourage interaction as students feel the need to respond to emails (p. 17). So writers and readers can interact both "conveniently and immediately," which was less probably when writing on paper or using software that is not cloud-based (Zheng et al., 2014, p. 218).

Peer feedback via a blog demonstrated the power of the tool to help students build relationships (Ellis, 2011, p. A-96). Some students commented to peers beyond their required partners, providing affirming rather than revision comments. One even invited another to discuss

their writing on Facebook if wanting more assistance (p. A-96). Another student interacted with the writer by commenting, “Nice poem, Morgan. I miss seeing you” with a smiley-face emoticon (Zheng, 2014, p. 218). Digital tools seem to provide a comfortable format for students to share and reach out to help.

Digital tools also allow students to learn in more communicative ways. One experimental study examined a college-level writing course experimenting with hybrid instruction using Edmodo, a social network site (Tanduklangi, 2014). Students posted their writing on Edmodo and received feedback from both the teacher and peers, with continued support through questions posed and answered on the site or via email (or face to face) as students revised. The researcher concluded that web-based instruction had a positive impact on students’ writing performance (p. 140).

In addition to collecting feedback, digital writing tools could facilitate collaborative writing, though little research was found to examine co-writing. Certainly the tools allow for collaboration, as multiple students can access and edit a digital document at any time. Yet Yim et al.’s (2104) analysis of 3,537 Google documents from 247 students revealed an average of 1.4 co-authors and a maximum of 6 co-authors collaborated on each document for editing and revision (p. 247). Teachers asked students to provide feedback, but rarely asked them to collaboratively write together. They found “true co-authorship was rare” (p. 247), as 73% of documents were written by one person (p. 248).

Only one study examined the success of collaborative writing, with ambiguous results. Karsak, Fer, and Orhan (2014) used a mixed research design to examine fifth-grade students’ writing performance, comparing the effects of cooperative and individual blog writing instruction on writing performance. A pretest showed groups did not differ in basic writing

skills; however, a post-test showed individual writers performed better than collaborative writers, with a statistically significant difference in “ideas/content” in writing scoring (p. 235). Three students liked collaborative writing, saying they could learn easily through group discussion and liked exchanging information. Yet four students discussed the disadvantages of collaborative writing, including group conflict, trouble focusing, and the intolerance of some group members to accept others’ ideas (p. 236). Researchers felt the students’ young age may have impacted their ability to work cooperatively (p. 239). More research is needed to draw more complete conclusions.

Using digital writing tools to publish writing. A Pew Research Center study (Purcell et al., 2013) surveyed nearly 2,500 middle and high school writing teachers on the impact of digital tools on student writing and writing instruction and found that 96% agree that “digital technologies ‘allow students to share their work with a wider and more varied audience.’” Many teachers are using those digital technologies, as 40% have students share their work on wikis, website, or blogs (Purcell et al., 2013). When writing is produced for an audience, then it can become more than just an “assignment given by the teacher” (Lin and Yang, 2011, p. 90). For example, publishing their work on a blog or Google Site helped students realize a wider audience for their work (Nobles & Paganucci, 2015, p. 22).

Feeling connected to an audience in publishing can have a profound impact on the writer. First, students using Google Docs have the ability to choose their readers through the “share” feature. They also can control how much the audience can interact with the text, allowing readers to view, comment, or edit the document. This allows them some control over “their own level of security and comfort in the collaborative writing environment” (Yim et al., 2014, p. 251). Students also recognized the influence of audience, which is “present during the composition

process” (Nobles & Paganucci, 2015, p. 27), stating, “...when it comes down to it writing isn’t for yourself, it’s for the people” (McCarthy et al., 2014, p. 164). For example, students revised their documents to better hold a reader’s interest or to be clearer (Hunt-Barron & Colwell, 2014, p. 142). A student publishing to classmates through an online peer review system noted that she made changes to her writing when considering how the “naive reader” would interpret her writing, including altering complex working and elaborating where she lacked detail (Kaufman & Schunn, 2011, p. 403). Students asserted they write better with an audience because someone other than instructor would read their work (Lin & Yang, 2011, p. 95), so they are more engaged and motivated to produce quality work in writing (Nobles & Paganucci, 2015, p. 22, 27; Zheng et al., 2013, p. 290). However, this is not true of all students. Phillips’s study (2016) of college accounting students giving peer feedback in an online system - Calibrated Peer Review - revealed in a survey that many students did not put more effort into their writing assignment, even knowing peers would be reading their work (p. 8).

Using the feedback features of Google Docs can help connect writers to their audience. Yim et al. (2014) discussed the tool’s capacity to accommodate conversation between the two, as the reader can “raise questions, concerns, and suggestions, which can help enhance the writers’ general awareness of their readers” helping authors understanding how readers “perceive the content” (p. 248). This encourages “reader-directed revision of texts” (p. 248). The conversations that could stem from this type of feedback have the potential to help students gauge their readers’ understanding, thereby judging the success of their own writing. Teachers did sense that students may be more effective revisers of their own writing after experiencing peer feedback (Hunt-Barron & Colwell, 2014, p. 146).

Guidance and Support from Adults to Develop and Strengthen Writing

As teachers are the best writers in a classroom, they have the knowledge to help students “narrow the gap between their current and desired performance” (Borup, West, & Thomas, 2015, p. 163). However, teachers are often frustrated at the times that students disregard comments on their writing, flipping to the end to see their grade and then tossing their papers aside, or worse, not even collect their work to receive feedback (Eckhouse & Carroll, 2013, p. 460; Phillips, 2016, p. 11-12). Feedback certainly cannot become feed forward if students ignore the advice of the writing expert in the room. Can digital feedback, provided as an electronic audio or video file, make a difference?

Students’ perception of digital feedback. Numerous studies examined students’ perception of teacher feedback using audio or video tools with mostly positive results (Cann, 2014; Eckhouse & Carroll, 2013; Moore & Filling, 2012). For example, Cann (2014) looked at three different groups of university students whose work was evaluated with three different audio tools: Turnitin Grademark, an online marking system that allows audio recordings; SoundCloud, an online file hosting site that can record audio and share files; and GarageBand, a local audio recording tool for Macintosh, Audacity, a local audio recording tool for Windows, and DropBox, an online file hosting site. One group’s survey results - using Turnitin Grademark - revealed “generally positive” views of the audio feedback, the second group’s students - using SoundCloud - were “very positive,” and the third - using GarageBand or Audicity with DropBox - provided many positive remarks (Cann, 2014, p. 35).

Eckhouse and Carroll’s study (2013) spanned four years, surveying over 300 college students about voice feedback via Audio Record Wizard, a stand-alone software program, which their professor had used. Nearly all undergraduate students - 88 to 100% - responded that it was

“very useful” or “useful,” while all graduate students found it to be “very useful” (p. 466). On the other hand, Cavanaugh and Song’s (2014) comparative qualitative results were less definitive; 4 of 7 university students preferred audio comments, shared as MP3 audio files, to text comments (p. 128). As well, Voelkel and Mello’s comparative case study (2014) showed 50% of undergraduate students and 62% of graduate students would prefer audio feedback recorded with a mobile digital voice recorder, sent as an MP3 file via email (p. 20, 25).

With video feedback Moore and Filling’s mixed-methods study (2012) found all 45 college students thought video feedback was better than written after experiencing video recorded through iMovie, video editing software for Mac, and shared through either Dragon Drop, a private website that houses unsearchable videos, or BBVista, an online course management system (p. 10). Jones et al. (2012) also had positive results with screencapture video feedback - a recording that captures the image on a computer screen with audio commentary - over two years; their mixed-methods study reported 98% of undergraduate participants preferred online feedback rather than paper and 98% of students thought watching the video created with the Virtual Learning Environment, a web-based system for delivering learning materials to students, was a good experience (p. 600). Also all graduate students who viewed a pilot student’s screencast video chose this over handwritten comments (p. 602). Next, 28 of 30 college students receiving screencast feedback in a writing course for Thompson and Lee’s research (2012) preferred video feedback created with Jing, a computer program that uploads to the Internet, to written feedback. Vincelette and Bostic’s study (2013) of the use of screencast-recorded feedback with Jing with 39 college students in a basic composition course also revealed positive results; students felt this feedback was more efficient than traditional (p. 263).

Additionally, Denton's case study (2014) of 36 undergraduate students receiving screencast feedback recorded with Screenr, a web-based application, revealed a strong preference for video over written feedback, scoring an average 4.48 out of 5 on a Likert-scale survey (54). Yet only about half of Silva's college participants in a multi-methods study (2012) using Camtasia software preferred screencast-video feedback compared to text comments in Microsoft Word (p. 9). Worse, the results for Borup et al.'s complimentary mixed-methods research (2015) revealed students strongly preferred text rather than screencapture video comments recorded and embedded through Canvas, a learning management system (p. 171).

Feedback as feed forward. We must further examine the qualitative data of the research to see if students' perceive the feedback to be effective as feed forward: meaningful, understandable, encouraging, and manageable. If it is not, then student writing likely will not improve. Overall, students did find benefits to audio (Cann, 2014; Cavanaugh & Song, 2014; Eckhouse & Carroll, 2013; Voelkel & Mello, 2014) and video (Borup et al., 2015; Denton, 2014; Jones et al., 2012; Moore & Filling, 2012; Silva, 2012) instructor feedback.

First, digital feedback was meaningful and understandable to students (Borup et al., 2015; Eckhouse & Carroll, 2013; Jones et al., 2012; Moore & Filling, 2012; Vincelette & Bostic, 2013, p. 266; Voelkel & Mello, 2014, p. 20). Students felt it was more understandable or clearer than written feedback (Cavanaugh & Song, 2014, p. 128; Jones et al., 2012, p. 601, p.; Silva, 2012, p. 10). In part, the obstacle of unintelligible handwriting was removed (Cann, 2014, p. 35; Eckhouse & Carroll, 2013, p. 467) and hearing the instructor's tone of voice and visual cues helped them better interpret the comments (Borup et al., 2015, p. 177; Cavanaugh & Song, 2014, p. 128). Students also noted that video feedback "made the thought process of the reader visible," which they connected to better advice on how to improve writing (Thompson & Lee, 2012). As

well, students are given the chance to learn in multiple modalities in screencast feedback, as students can see their writing and hear the teacher talking at the same time (Thompson & Lee, 2012). Also, they felt the teacher said more digitally than in written feedback and were more specific (Cann, 2014, p. 36; Moore & Filling, 2012, p. 8), though students preferring written comments valued the blunt, concise feedback they received (Borup et al., 2015, p. 175). Finally, struggling readers, who may have difficulty with text comments (Warnock, 2008, as cited in Moore & Filling, 2012, p. 5), and aural and visual learners may find audio and video feedback more beneficial (Silva, 2012, p. 9-10). However, students with learning disabilities or second-language learners may prefer written comments (Eckhouse & Carroll, 2013, p. 467). One student explained that writing while listening became an obstacle for her to use the feedback to revise her paper (Cavanaugh & Song, 2014, p. 130).

Another benefit of audio and video feedback is affective. First, students did not have to imagine how the teacher sounded from the written comment, which may be heard as “harsh or punishing” or “criticizing”; he/she could hear on video the tone of the instructor (Thompson & Lee, 2012). Students liked the personalized evaluation, which felt like a one-on-one, in-person conference or like a coach or tutor was in the room with them (Eckhouse & Carroll, 2013, p. 467-468; Jones et al., 2012, p. 601; Moore & Filling, 2012, p. 10; Thompson & Lee, 2012; Voelkel & Mello, p. 21). Students even referred to the feedback as “interactive,” with the teacher available 24/7 (Thompson & Lee, 2012). Others commented that the feedback felt friendly, like a conversation (Borup et al., 2015, p. 176-177; Cavanaugh & Song, 2014, p. 126; Silva, 2012, p. 9). Some even believed that the instructor cared more than in written comments (Moore & Filling, 2012, p. 11; Silva, 2012, p. 9). This is important because students perceived that tone softened the blow of criticism left them feeling encouraged that the suggested revisions were

possible (Cavanaugh & Song, 2014, p. 126; Moore & Filling, 2012, p. 11). On the other hand, some students found it difficult to hear harsh comments verbally (Borup et al., 2015, p. 177; Eckhouse & Carroll, 2013, p. 468, Voelkel & Mello, p. 23).

This type of feedback was also manageable for students, as digital feedback seems to appeal to the “digital-native” generation, who is already familiar with the medium (Eckhouse & Carroll, 2013, p. 471; Jones et al., 2012, p. 602). Some felt it was easier to keep track of electronic files that could not be lost as easily as paper (Cann, 2014; p. 36; Jones et al., 2012, p. 604). Overall, students had few or no troubles with the technology (Cann, 2014, p. 36; Cavanaugh & Song, 2014, p. 126; Eckhouse & Carroll, 2013, p. 466-467; Jones et al., 2012, p. 605; Silva, p. 8, 11; Voelkel & Mello, 2014, p. 20), although there were some problems, especially if the tool required more than just “click and open” viewing (Thompson & Lee, 2012). For example, Cann’s students (2014) found it difficult to access their feedback (p. 35). Also, Silva (2012) found the audio was distorted in some parts of videos and that one video was cropped, keeping valuable feedback from a student (p. 13).

Students also appreciated the fact that audio, video, and screencast video feedback could be repeated as many times as needed (Cann, 2014, p. 36; Eckhouse & Carroll, 2013, p. 467; Jones et al., 2012, p. 601; Moore & Filling, 2012, p. 10; Silva, 2012, p. 8; Vincelette & Bostic, 2013, p. 264). In fact, Silva (2012) found that nearly all of the students viewed at least parts of their feedback videos more than once (p. 8) and Vincelette and Bostic (2013) found on average students viewed the video three times (p. 264). Some repeated to clear up misunderstandings (Jones et al., 2012, p. 601; Moore & Filling, 2012, p. 11) while others re-watched to take notes or actively revise (Moore & Filling, 2012, p. 10).

Even though aspects of digital feedback were convenient for students, there were complaints as well. Some criticized the fact that they had to watch the entire video to get feedback, versus the advantage of skimming text comments to hone in on sections needing improvement - especially if the video was too long (Borup et al., 2015, p.174; Cann, 2014, p. 36; Cavanaugh & Song, 2014, p. 130; Moore & Filling, 2012, p. 10; Silva, 2012, p.9). Some felt it was easier to review the information additional times if it was written out (Thompson & Lee, 2012). Others preferred written comments that could be accessed anywhere at any time, as video comments could require equipment, like headphones, to view (Borup et al., 2015, p.173-174). Finally, some may struggle with the newness or unfamiliarity of digital feedback, needing instruction before they can effectively utilize feedback in revision (Thompson & Lee, 2012). Still, given the qualifications of effective feedback, digital comments clearly have the potential to be feed forward.

Digital versus written feedback. When contrasting audio and video with written feedback, it seems that the medium affects the type of feedback provided to students. First, it allows a type of feedback that cannot be provided in written comments: teachers can read aloud the students' work, allowing them to hear their audience's interpretation (Moore & Filling, 2012, p. 8; Thompson & Lee, 2012). Video comments differed, as they seemed to focus more on relationship building, praise, and identifying students' strengths (Borup et al., 2015, p. 172; Denton, 2014, p. 54; Moore & Filling, 2012, p. 7; Voelkel & Mello, p. 23), while only 1.3% of written feedback was affective (Zheng et al., 2014, p. 217). Also, it appeared that instructors elaborated more than correcting or suggesting on video (Moore & Filling, 2012, p. 8; Thompson & Lee, 2012; Vincelette & Bostic, 2013, p. 265), though teachers did provide suggestions for

improvement (Denton, 2014, p. 54; Moore & Filling, 2012, p. 7; Voelkel & Mello, p. 23). On the other hand, 72% of written feedback was directive (Zheng et al., 2014, p. 214).

Text feedback lacked the detail and specificity found in screencast videos (Jones et al., 2012, p. 604; Moore & Filling, 2012, p. 8), with the average word count for digital feedback significantly higher than text (Borup et al., 2015, p. 172; Voelkel & Mello, p. 23). While written comments tended to focus on “micro-level” feedback - grammar, spelling, word choice, mechanics, etc. - audio and video comments focused more on “global” issues - thesis, content, development, organization, etc. (Cavanaugh & Song, 2014, p. 126-127; Silva, 2012, p. 9; Vincelette & Bostic, 2013, p. 265). Teachers did not focus on content, organization, and word choice in written feedback as much as pointing out mechanical and grammatical errors (Zheng et al., 2014, p. 217). Yet one instructor did think she was more effective in correcting conventions because she could explain the rules, not just fix them (Vincelette & Bostic, 2013, p. 263). The type of feedback given is important, as teachers tend to view the global issues as the heart of revision and the micro-level more as editing (Yim et al., 2014, p. 247).

Student use of teacher feedback to develop and strengthen writing. If feedback is truly “feed forward,” then it must be used by the student to improve writing and it was (Denton, 2014; Eckhouse & Carrol, 2013; Moore & Filling, 2012). For example, Eckhouse and Carrol (2013, p. 467) found that students increased the amount of time they spent working on the assignment, playing back the comments to revise. Students even self-reported that they re-listened to the feedback when writing for other classes and would for future writing in that course (p. 469). The feedback also encouraged more interaction between teacher and student over the course of the semester, prompting many students to request follow-up meetings with their professors to go over revisions they made to their writing or to further discuss feedback

(Eckhouse & Carrol, 2013, p. 469; Moore & Filling, 2012, p. 11; Vincelette & Bostic, 2013, p. 265). Some students even continued to revise beyond their final graded submission (Moore & Filling, 2012, p. 11).

What is more, students felt they understood what they needed to do to improve their scores in the future (Voelkel & Mello, p. 21, 25) and believed voice grading improved their writing (Eckhouse & Carrol, 2013, p. 470; Vincelette & Bostic, 2013, p. 263). Perhaps this is because they felt teachers explained why something was not working or could hear what was confusing the reader, so they better understood how and were more willing to revise (Thompson & Lee, 2012; Vincelette & Bostic, 2013, p. 263). Instructors also noticed that students were more aware of “big picture issues,” using video feedback to make “global revisions rather than merely edits to surface level errors” (Thompson & Lee, 2012). However, there was no quantitative data to confirm this conjecture.

Researchers postulated that perhaps student use of digital feedback was due to its novelty (Eckhouse & Carrol, 2013, p. 469; Jones et al., 2012, p. 603; Silva, 2012, p. 10; Vincelette & Bostic, 2013, p. 266). Yet revision with the feedback did improve student writing (Denton, 2014; Moore & Filling, 2012) more often than not (Voelkel & Mello, 2014, p. 25). Denton (2014) found the mean score on student writing increased from 82.75 to 91.13 when students were given the chance to revise after video feedback (p. 53-54). For Moore and Filling (2012) two students made no significant changes, but all other students made “global” revisions - focusing on their thesis, cohering main ideas with the thesis, adding evidence, and reorganizing their writing (p. 9). With these revisions, all but two students improved their writing through three drafts (p. 10). While complete conclusions cannot be drawn without comparative data, these results show promise that digital feedback can positively impact students’ revision and writing abilities.

Teacher perception of feedback with digital tools. Even if audio and video feedback are effective for prompting revision in students' writing, it will not matter if instructors are not willing to use it. So teachers' perceptions must be considered as well. Fewer studies examined teacher perception, but many included qualitative data that may reveal insight into instructor use of digital feedback.

Instructors' perceptions revealed many similarities to students. They also felt more understandable to students through digital feedback, providing more complete and coherent comments verbally (Borup et al., 2015, p. 178; Eckhouse & Carroll, 2013, p. 470). Some teachers also remarked that digital feedback allowed students to hear what teachers were thinking, something not occurring in Microsoft commenting, which allowed students to view instructors as readers, not mere assessors of the work (Vincelette & Bostic, 2013, p. 264, 270). In addition, teachers felt closer to their students, providing personal instruction and affective support through a conversational tone and facial and vocal cues (Borup et al., 2015, p. 603; Eckhouse & Carroll, 2013, p. 11; Jones et al., 2012, p. 603; Moore & Filling, 2012, p. 470; Vincelette & Bostic, 2013, p. 265). Instructors also believed that video feedback let students feel they were "working through something together" (Vincelette & Bostic, 2013, p. 265). On the other hand, they also preferred the convenience of text any where at any time (Borup et al., 2015, p. 175; Vincelette & Bostic, 2013, p. 268).

One major benefit of instructor feedback with digital tools is the time factor. While one study reported audio feedback took on average 5 minutes longer than written (Voelkel & Mello, p. 24) and another teacher perceived screencasting took longer than written (Vincelette & Bostic, 2013, p. 269), most studies discussed time savings over written comments (Cann, 2014, p. 37; Denton, 2014, p. 54). One teacher felt using video feedback saved time because he could talk

through comments without worrying about being concise (Moore & Filling, 2012, p. 11); another believed she was more detailed verbally, stating much more than she could write in the same amount of time (Vincelette & Bostic, 2013, p. 266). Problems that would add time to written comments, like dyslexia, poor typing skills, or pressure to self-edit for fear of making mistakes in comments, were all alleviated with verbal comments via digital tools (Borup et al., 2015, p. 176; Jones et al., 2012, p. 603). However, some did prefer the ability to pause and think and revise, which is not as easily allowed in verbal feedback (Denton, 2014, p. 5).

Others quantified their time savings. Lunt and Curran (2009) suggested that one minute of audio feedback would take 6 minutes of writing feedback (as cited in Cann, 2014, p. 32). On average Silva (2012) took 12 and 20 minutes to create a video from beginning to end, versus 20 and 30 minutes via Microsoft Word comments, respectively (p. 11). Warnock could do six or more responses an hour on video, while written feedback was a slower four or more per hour (as cited in Moore & Filling, 2012, p. 5). Even though videos included more details than text, “complex corrective feedback” took 2 minutes in video rather than 5 to 10 minutes in writing. Finally, Eckhouse and Carroll (2013) estimated that once the system was learned, voice grading reduced the time per paper by 5 to 10% (p. 471). These are significant suggestions considering the importance of timely feedback for students.

Yet despite these benefits, most of these studies found that teachers preferred to provide written feedback (Borup et al., 2015, p. 171; Cavanaugh & Song, 2014, p. 128; Jones et al., 2012, p. 175). Instructors’ lack of experience with audio or video creation or file sharing may have made implementation a challenge (Cann, 2014, p. 38; Cavanaugh & Song, 2014, p. 126), as well as sound quality problems (Vincelette & Bostic, 2013, p. 269). Moreover, editing, which is easily accomplished in text, can be difficult technically or add extra time to evaluation (Borup et

al., 2015, p. 175). Some ultimately felt digital feedback was less efficient because videos have to be entirely new each recording, whereas text can be copied and pasted where students make the same errors (p. 175). One teacher preferred face-to-face conferences with students over screencasting to avoid “talking at” students (Vincelette & Bostic, 2013, p. 264).

Regardless of the reason, it may be problematic when instructors’ and students’ first choice for feedback do not align. If teachers want students to use feedback as feed forward, they will need to attend to student preference.

Guidance and Support from Peers to Develop and Strengthen Writing

Even though the instructor possesses the writing expertise to help students improve, there are reasons why teachers choose to partner students for feedback. Lin and Yang (2011) discuss these. First, the power balance between teacher and students may prevent students from requesting more help if they do not understand comments and suggestions made by the teacher. Students appreciate comments written at their level, which peers can likely provide. Plus, feedback is not always timely with teachers who can have over 100 students’ essays to which they will need to respond (p. 96). Finally, students benefit from an authentic audience (McCarthy et al., 2014; Nobles & Paganucci, 2015; Zheng et al., 2013) and peer feedback can present students with “meaningful negotiation and construction for writing” (Lin & Yang, 2011, p. 90). As well, students’ confidence to evaluate their own work and to know how to write a good essay improved more in students who benefitted from peer evaluation, as opposed to their peers who received feedback from only the instructor (Likkell, 2012, p. 45-46). Providing opportunity for peer feedback, then, could be essential for students to strengthen writing. This theme is discussed both from the perspectives of students and teachers.

Students' perception of peer feedback. Overall, students liked receiving peer feedback (McCarthy et al., 2014; Nobles & Paganucci, 2015, p. 25; Woodard & Babcock, 2014) and were motivated to provide feedback to students close to them (Woodard & Babcock, 2014, p. 16). Those surveyed in Phillips's research (2016) generally agreed feedback from peers was valuable and agreed that the grade assigned by classmates through the Calibrated Peer Review (CPR) online peer review system was "close to what was deserved (p. 6). Only 2% of students complained about being graded by classmates rather than their professor using this system (p. 8). Students generally felt they received accurate comments from peers in Kaufman and Schunn's study (2011) of college students' peer reviews using Scaffolded Writing and Reviewing in the Discipline (SWoRD), an online peer review system (p. 396). However, students held mixed feelings about receiving peer feedback in place of instructor evaluation, with more positive perception with grading by both peers and the instructor (p. 396-397).

Ultimately students learned from interacting with peers in providing feedback. One professor reflected on the power of peer evaluation, as students could see and understand the desired structure of the analysis that had been assigned, even if they were not able to create it themselves (Phillips, 2016, p. 12). One student found value in peer comments, saying it helped highlight his errors (Karsak et al., 2014). Students also found benefits from reviewing peers' work, noting reading others' work helped decide how to make their own papers better (Kaufman & Schunn, 2011, p. 403) and they learned from others' writing – including grammar, spelling, vocabulary, and sentence structure (Lin & Yang, 2011, p. 94). In addition to learning from assessing peers, students also learned through a calibration training process provided in CPR, where students learn how to evaluate peers' work accurately. In fact, results suggest students learned as much from the peer review process as they did in writing their own work (Phillips,

2016, p. 8). Likkel (2012) also studied the use of CPR in college science classes, contrasting a CPR peer review group with a traditional teacher-reviewed group, finding students' confidence to accurately self-assess their writing - if not already secure in this ability - twice as likely to increase (p. 46). So reviewing others' work made them better evaluators of their own writing.

Feedback as feed forward. Students must value the comments that peers provide in the same way they must with their instructors: was the feedback meaningful and understandable, encouraging, and manageable? If so, then students may find the feed forward helpful in revision, improving the quality of their work.

Digital tools can lead to more understandable feedback for students by connecting them to their peers. Peer feedback was preferred to teacher's feedback by some (Lin & Yang, 2011, p. 96). Students feel less pressure when revising with peer comments because they better match the ability level of the writer, whereas teachers' thinking is likely more complex. A student expanded on this, saying, "... decoding teacher's comment is tough and takes more time. We will encounter difficulties if we fail to figure out the comments" (p. 96).

Additionally, students proved to be thoughtful, sensitive, and encouraging in providing feedback. First, students could construct community through the informal and non-academic uses of the Ning social media site (Hunt-Barron & Colwell, 2014, p. 143-144). Furthermore, Ellis's study (2011) revealed a "'Facebook register' style of feedback" online (p. A-93). Both could make it easier to give and receive feedback. Students welcomed constructive criticism from peers (Yim et al., 2014, p. 247). One student explained:

I improved my writing based on comments by others... Sometimes I thought I wrote a good composition but didn't get the grades I had expected. I didn't know why... If many people correct my writing for me, then I know where I can make improvement. (Lin &

Yang, 2011, p. 95-96)

Also, Kaufman and Schunn (2011) found students' perception about the positivity of peers' feedback rose slightly when comparing pre- and post-survey responses (p. 399). Once they engaged in feedback, their opinions improved.

Research also referred to student experience in providing supportive feedback. Students were impressed by their ability to help their friends improve their text, saying "We showed them how to write. It helped them" (Karsak et al., 2014, p. 238). Via blogging, students would pose their suggestion as a question, like "capitalize?" (Ellis, 2011, p. A-95), which could be considered assistance rather than criticism. Students were conscious of their choice to be encouraging in responding to peers' writing; some students were worried about comments hurting their classmates' feelings, sometimes over-polite as a result of cultural beliefs (Lin & Yang, 2011; McCarthy et al., 2014). More affirming, positive comments were made via blogging than on paper, perhaps because comments are available for all to see on a blog (Ellis, 2011, p. A-93, A-96). As well, some students only provided feedback to affirm student's writing. While positive feedback was appreciated, students felt the most helpful comments suggested modification (Woodard & Babcock, 2014, p. 9).

Digital tools may make feedback manageable for students as well. *Scholar*, the online writing environment used in McCarthy et al.'s study (2014) allows students to work with a teacher-created rubric to guide comments and an annotation tool, which could aid students' comments. Another tool, the Ning social media site, made peer evaluation manageable because it reminded them of the fun of Facebook while at school (Hunt-Barron & Colwell, 2014, p. 143-144). The convenience of email notifications when comments are posted to their writing in Google Docs also helped (Woodard & Babcock, 2014, p. 17). Finally, students appreciated the

posted comments in Microsoft Word, as they could revisit comments left by peers, unlike face-to-face meetings where you have to remember the verbal comments (Hunt-Barron & Colwell, 2014, p. 145).

Yet, there were limitations to using peer feedback. Students did not feel like all students took the feedback process seriously (Woodard & Babcock, 2014; Karsak et al., 2014). Other students complained that the comments were not detailed enough and the students repeated their comments (Karsak et al., 2014). In addition, some students were unhappy with the quality and quantity of feedback provided by peers, with too much focus on grammar, mechanics, and style (Lin & Yang, 2011). Peers were also reluctant to suggest significant changes when needed (Ellis, 2011, p. A-96). In providing feedback students also expressed discomfort. One student was worried about making suggestions for fear of telling peers the wrong idea (Lin & Yang, 2011). Others commented that they felt unqualified or lacked enough experience in critiquing papers, although their perceptions about their own feedback being reliable, useful, and valid slightly increased after providing feedback (Kaufman & Schunn, 2011, p. 398).

Researchers provided some quantitative data analyzing the feedback provided by peers. However, none of the studies explicitly compared the feedback provided to judge the accuracy of student perception. Regardless, if students do not feel feedback was quality, then it is unlikely to be used as feed forward to revise and improve text. Student perceptions of peer feedback may have been impacted by teacher decisions regarding feedback processes, which will be developed next.

The reality and practice of providing peer feedback. Unfortunately, many teachers do not seem to take advantage of the digital writing tools to connect writers with peers, as only 29% of teachers surveyed have students use collaborative web-based tools to edit others' work

(Purcell et al., 2013). Yet of those who do, many teachers were aware that students needed scaffolding to be successful in providing helpful peer feedback. Teachers judged 37% of secondary students “fair” in their ability to provide constructive feedback on classmates’ work; 13% were deemed “poor” (Purcell et al., 2013). However, when a teacher provided clear grading criteria and training for students to apply that criteria to peers’ writing, he recognized that students are effective assessors of peer work (Phillips, 2106, p. 12).

Some teachers provided direct instruction, modeling, and/or examples of responses to students before they started commenting on classmates’ writing (Ellis, 2011; Hunt-Barron & Colwell, 2014; Kaufman & Schunn, 2011; Lin & Yang, 2011; Woodard & Babcock, 2014), while others did not (Yim et al., 2014; McCarthey et al., 2014). Further, one online peer review system, CPR, provided students training in evaluating peer work through a calibration process with a clear rubric (Likkell, 2012; Phillips, 2016). Some teachers provided frequent opportunity for feedback. Students did peer revisions in class at least once each week and at various points in the writing process (Hunt-Barron & Colwell, 2014; McCarthey et al., 2014). Another teacher encouraged students to do it “as much as possible” (Yim et al., 2014, p. 247). Finally, teachers took time to “sell” peer assessment to students, promoting it as a way to enhance their learning and build important thinking, writing, reviewing, and career skills (Likkell, 2012, p. 47; Phillips, 2011, p. 12).

Some of the scaffolding may have helped students provide effective feedback (Hunt-Barron & Colwell, 2014; Phillips, 2016). In Phillips’s study (2016) where students were evaluated by peers using CPR, only 6 cases in over 100 submissions required an adjustment of the teacher by more than one point (p. 8). In other words, the peers’ scores and instructor scoring were very close. Separately, students learned quickly how to provide effective peer feedback,

likely because of the class time devoted to the practice. They switched from fixing mistakes to feedback on content and structure, although the study lacks qualitative measurement of these types of comments (Hunt-Barron & Colwell, 2014, p. 146). Students reported that just the practice of receiving feedback helped: “now that I can see how people have helped me, I can help other people in that way” and when someone provides feedback “that’s something else I can tell somebody else, because their writing could be similar” (p. 145).

Yet at times teacher’s scaffolds seemed more a hindrance than help. McCarthy et al. (2014) wanted students to hear numerous perspectives and switched reviewers for each section of the stories written. However, students provided reviews over small sections without reading the whole story to understand the author’s overall goals. Also, the requirements to review other’s work at so many stages – and without the capability to work outside of class time – took away from writing time, and the review criteria limited students’ comments (McCarthy et al., 2014). While 33.8-46.8% of comments focused on content with a teacher-provided rubric (McCarthy et al., 2014), a class with no rubric provided 73-85% of feedback on content (Woodard & Babcock, 2014). Feedback was also limited in terms of content and organization, with more focus on grammar, mechanics, and style in another study (Lin & Yang, 2011, p. 96). However, this was a class of English as a foreign language, which may spend more time with language features than native speakers. Of course, as all of the studies use different methods, definitive conclusions cannot be drawn.

In analyzing the types of comments provided, researchers found that students more frequently gave affective / affirming feedback than teachers (Zheng et al., 2014, p. 217), amounting to 36.9-50% of the time (McCarthy et al., 2014; Woodard & Babcock, 2014). This may be one of the reasons why some students were dissatisfied with peer feedback, as a student

saying, “Excellent essay!” or “Nice!” (Zheng et al., 2014, p. 217) is not helpful in revising. Yet despite students’ worry about offending peers, only one study reported demeaning comments, which ranged from 0 to 3.1% of the comments given, even though students identified problems 48.9-60% of the time (McCarthy et al., 2014). Also, 49.1% of comments focused on mechanics and 28.6% on grammar (Zheng et al., 2014, p. 217). Perhaps students find it easier to critique details with clear right or wrong answers according to rules rather than criticize peers’ thoughts and the structure they use to convey them.

Although the digital tools facilitate conversation between author and audience, not all feedback elicited discussion between them. McCarthy et al. (2014) commented that students “rarely asked questions to encourage dialogue” (p. 163). Woodard and Babcock’s study (2014) compared two classes of students and the types of conversations students had in feedback via Google Docs. One class reviewing peers’ argumentative writing found the class did not “engage in in-depth conversations about the content of the writing,” yet in another class reviewing the teacher’s narrative as modeling, students “genuinely interacted” with the writer and other peers, debating writing techniques and discussing the author (p. 8). Eliciting feedback ranged from only 2% of comments to 11% of comments provided by peers (McCarthy et al., 2014; Woodard & Babcock, 2014).

Student use of peer feedback to develop and strengthen writing. The feed forward provided by peers can provide “scaffolding ... [so the] novice students can progress from their initial writing capabilities to their potential level ...” (Vygotsky, 1978, as cited in Lin & Yang, 2011, p. 96). Students improved their writing and developed their writing abilities through the process of giving and accepting feedback and revising (Zheng, 2014, p. 218). One student even revised the comment she provided to a peer, showing growth as a writer and a reader (p. 218).

Similarly, the goals to increase student revision over multiple drafts and to improve the quality of student writing through online peer revision and collaboration were realized. Analysis of student writing showed students both improved the quality of their writing and the amount of revision; 28 of the 30 students showed overall growth from the pre- to the post-writing sample (Hunt-Barron & Colwell, 2014, p. 141). Other students generally believed their writing improved in revisions made responsive to peer comments, and analysis of quality of student work showed no influence from their opinion of peer assessment, whether positive or negative (Kaufman & Schunn, 2011, p. 396, 401). However, another study was not as promising. Overall students did not make significant changes in revision, but did use feedback – mainly from the teacher – to improve text (Woodard & Babcock, 2014, p. 12). Unfortunately, no other studies were discovered to examine the impact of peer feedback on students' revision.

Research is also lacking in examining the impact of peer feedback on future writing, as only one study commented on this (Phillips, 2016). Even when students did not revise the work under review, using received peer feedback to strengthen writing, they were able to apply their learning of giving feedback to improve further writing in the course (p. 12). In this case it is clear that peer assessment of student writing can contribute positively to academic performance.

Conclusions and Recommendations

This review has sought to examine the use of digital writing tools in providing Core Curriculum-based instruction and facilitating feedback and revision in student writing. Clearly the research supports the use of digital writing tools, as students are able to write, revise, publish, and interact to meet the demands of the Core Curriculum writing standards. When given the chance to see their writing as a “living document” via digital writing tools like Google Docs, wikis, or Microsoft Word, they are altering their beliefs about the writing process to include a

more accurate definition of revision. The feed forward students gain from teachers and peers allows students to improve their own writing. For the most part, students like receiving feedback, although they point out its failings. Finally, research has documented successful feedback practices, as well as those that worked less effectively.

Recommendations

Recommendations for Teachers. In order to improve students' competence as writers, teachers must learn more about these digital writing tools, how they can be used to alter instruction, and make an effort to start with at least one new tool. During implementation, teachers need to have an understanding of how the tool works to support student use, although they do not need to be an expert in the tool. Teachers also must endeavor to see all students have equal access to use the tool outside of school. If not currently using a writer's workshop model, serious consideration should be given to adopting that method of instruction. Finally, teachers should encourage more collaborative writing, in which "multiple authors share various forms of responsibilities and contributions" because it is increasingly expected in both academic and professional situations (Yim et al., 2014).

The contradictory reviews of teacher and peer feedback demonstrate there is no "one size fits all" approach to responding to student writing. As well, different methods of review appear to provide different types of feedback for students to consider as they work to revise and strengthen their writing. If teachers want students to use these comments as feed forward, then they will have to consider student perception and needs and allow for a variety of written and digital, teacher and peer feedback.

Given student concerns with peer feedback, teachers need to work to create a classroom community with clear success criteria where students feel safe to try new techniques in writing,

share work with others, and provide useful feed forward. Teachers should carefully consider grouping of students in providing feedback. Perhaps further learning about peer feedback not provided in the review will supply more techniques to test, such as anonymous commenting. Finally, teachers must promote peer feedback as a valuable learning opportunity while instructing students in providing effective feedback. Modeling and scaffolding should be provided as needed, but need to be tested to ensure they help, not hinder, feedback.

Recommendations for Research. Still there is a need for much more research to be done. Few studies have been published examining the effects of these digital writing tools in secondary classrooms. What is more, some of the studies published in these topics have been studied in the English as a Second/Foreign Language classroom. While good instruction transcends subjects, not all recommendations from an English-learning classroom apply to the writing of special education, average, or talented and gifted students.

Further research is also needed to evaluate the effectiveness of using feedback in improving student writing. In other words, researchers cannot simply study students' perception of feedback or merely the amount and type of feedback given, but must examine when/how the feedback given was used to revise and improve writing. This would help teachers understand which types of feedback are the most effective and instruct students how to provide them. As well, research to evaluate students' perceptions of peer feedback by comparing the feedback data with student opinion would be helpful. If students do not value feedback, they likely will not use it and then may not improve writing.

Writing can no longer be the ignored "r" in instruction. If teachers can learn from available research to make pedagogically sound choices in digital writing, student success in

writing is sure to follow. Students need this change, as they currently are unsuccessful in academic writing. Effectively using digital writing tools quite possibly is one of the solutions.

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