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Using Google tools to enhance secondary writing instruction

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Recommended Citation

Ebener, Sarah, "Using Google tools to enhance secondary writing instruction" (2017). *Graduate Research Papers*. 135.
https://scholarworks.uni.edu/grp/135

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Abstract

This literature review analyzes the use of Google Apps for Education and other Google tools as a way for teachers to improve writing instruction. It focuses on 30 studies conducted in the United States and internationally which investigate varying uses of technology tools with secondary and college-aged students. The results showed that students' writing improves and students experience more engagement when technology is used to enhance collaboration, feedback, editing, and revision, and that students generally enjoy using Google tools to accomplish writing tasks. Recommendations include guidelines for teachers when assigning technology-based writing activities, but further research needs to be conducted with American secondary students to ascertain the full role that Google can play in the writing classroom.

Using Google Tools to Enhance Secondary Writing Instruction

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 Ebener

August 2017

This Review by: Sarah Ebener

Titled: Using Google Tools to Enhance Secondary Writing Instruction

has been approved as meeting the research requirement for the

Degree of Master of Arts.

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Date Approved   Graduate Faculty Reader

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Date Approved   Head, Department of Curriculum and Instruction

Abstract

This literature review analyzes the use of Google Apps for Education and other Google tools as a way for teachers to improve writing instruction. It focuses on 30 studies conducted in the United States and internationally which investigate varying uses of technology tools with secondary and college-aged students. The results showed that students' writing improves and students experience more engagement when technology is used to enhance collaboration, feedback, editing, and revision, and that students generally enjoy using Google tools to accomplish writing tasks. Recommendations include guidelines for teachers when assigning technology-based writing activities, but further research needs to be conducted with American secondary students to ascertain the full role that Google can play in the writing classroom.

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Introduction

According to the Cambridge University Press blog, Ernest Hemingway once said, "There is nothing to writing. All you do is sit down at a typewriter and bleed" (2013). Although the days of the typewriter are gone, anyone who has gone through the process of writing something difficult, personal, or meaningful to him- or herself understands his analogy. When we write, we put our hearts, our brains, our blood into the keyboard. Writing is one of the most important skills that K-12 students can leave a classroom having mastered. No matter the content area, students use writing skills daily to communicate their thoughts, feelings, and knowledge to others. No matter their plans for the future or possible career paths, just about anyone and everyone writes at some point in their adult lives - whether that be a memo for colleagues, an academic research report, or a personal story on their social media account. Our students need to leave their K-12 education with robust writing skills that will help them tackle what the 21st century will throw at them.

With the rise of Google in recent decades and the rise of one-to-one technology in schools, it is no surprise that Google Apps for Education and Google Chromebooks have become commonplace tools in many school districts. Because word processing is a daily task in most classrooms, and one that could be made easier or more difficult depending on the tool used, it is important to consider the appropriate role that these new Google tools will play in writing instruction. Google makes it easy to share documents with other people, making collaboration between writers easier and quicker. Once a document is shared, the Comments and Suggesting Mode allow collaborators to give quick feedback and allow writers to incorporate suggestions given to them while still maintaining ownership over their

work (Suwantarathip & Wichadee, 2014). Students can also benefit from seeing these changes over the course of their writing in the document's revision history (Moonen, 2015; Suwantarathip & Wichadee, 2014). Many students appreciate getting comments on their work from their peers to help them improve (Brodahl, Hadjerroult, & Hansen, 2011; Brodahl & Hansen, 2014; Noroozi, Biemans, & Mulder, 2016; Yu-Fen & Shan-Pi, 2011; Zheng, Lawrence, Warschauer, & Lin, 2015) and react positively to using Google Docs on group assignments or when working collaboratively since it can help them stay organized and communicate easily (Chantoem & Rattanavich, 2015; Lin & Yang, 2013; Ware & O'Dowd, 2008; Zhou, Simpson, & Domizi, 2012). Many schools have even opted to use Chromebooks as their preferred one-to-one device in classrooms, a simplified device that uses Google's operating system. Many language arts teachers use Google Drive and Google Docs with students for writing instruction and take advantage of the many tools Google offers to help students write better.

But just how can Google technologies help teachers give more effective instruction and help student writers improve their skills? There truly has not been much academic research conducted on the subject. While there is an abundance of research on teaching writing or other language arts skills using technology, the absence of a specific focus on Google's tools is surprising considering Google's influential position in the modern world of K-12 education. The purpose of this literature review is to examine research studies focusing on using technology with writing instruction, how the technology impacts student learning and student experiences, and how this impact can be connected to the functions of the Google Apps for Education and other Google tools.

This review can be used by educators to advocate for using technology, especially

Google Apps for Education, in writing instruction. The results can be applied to secondary language arts teachers but also any teacher incorporating writing instruction into his or her curriculum. Consulting studies on this matter will show whether the Google Apps for Education and other Google tools can have a strong impact on student writers. This analysis is appropriate because Google Apps for Education has gained increasing prominence in recent years and there have not been many reviews of the research on the effectiveness of these tools in writing instruction. It will be beneficial to analyze the existing information in the hopes of lending more credibility to Google Apps for Education and other Google Tools in writing instruction.

Methodology

The method for locating sources involved conducting searches in online academic databases with varying search terms. Google Scholar, ERIC (EBSCO), Education Full Text (EBSCO) and PsycINFO were the databases used because of their scope. These databases were general enough to return a variety of possible sources during searches but to also allow for specificity in searching for articles that fall within the field of education. The descriptors used in the searches were *Google, Google Docs, Writing, Writing Instruction, Teaching, Language Arts, Collaboration, Peer-Editing, Revision, Editing, Feedback, Grammar, Technology* and *Blogs,* which were searched in various combinations. These databases and search terms cast a wide enough net to provide useful sources for possible selection.

After conducting lengthy searches on this topic, the researcher found that far too few studies focused on the use of Google tools with writing instruction specifically. While it was not difficult to find research studying the use of technology in writing instruction, studies examining the effect of *Google Apps for Education* (GAFE) or other Google tools on writing

instruction were far scarcer. In fact, of the 30 research studies cited in this literature review, only 12 of them analyzed the use of a Google technology tool. Instead, many studies focused on other writing topics, such as revision strategies, collaboration, and feedback, in relation to technology. However, since the Google Apps for Education and other Google tools are becoming what some would refer to as staples in many school districts, the researcher believed that it was important to use this existing research to review the connections to Google's tools. A number of the writing tasks examined in the research (such as giving and getting feedback, collaborating, revising, and so on) can easily be applied to functions within GAFE or other Google tools even if the study in question focused on a different tool. For example, a study investigating the use of online peer-editing with a certain digital tool to improve student writing can clearly be connected to functions within Google Docs, thus making the study relevant to this review. Conversely, some studies focused more on the tools within the Google Apps for Education than on explicit writing strategies; one study, for instance, focused on using GAFE as a Learning Management System. Because of the wide variety found in the research, this literature review will focus on studies investigating a number of technology tools used in instruction, their impacts on student writing, and their connections to tasks made easy through GAFE or other Google tools.

Sources were chosen using a simple selection process. The researcher first browsed the titles and abstracts to narrow down the field of possible articles. Articles that focused on elementary-school aged children or younger were not chosen. Neither were literature reviews or opinion pieces since this analysis will focus on research studies. The researcher selected sources that focused mainly on writing instruction through the use of technology as opposed to studies that examined other academic skills since the focus of this review is writing

instruction. Each study was analyzed closely to determine how its information did or did not

fit into this topic before being finalized for selection. In that way, the selection process lead

to an analysis of each source.

When analyzing the sources, multiple aspects were considered. The researcher noted

the type of study that was conducted for each source: quantitative, qualitative, mixed

methods, experimental, etc. The design of a study colors how the study was conducted and

how the results could be interpreted, which is why this was important. The methodology and

results sections offered insight into the design of the studies. The researcher also read the

literature review sections for important information about the background behind the studies

and the discussion or conclusions sections for insight into the overall findings and

explanation of the results as they relate back to the topic or themes. These sections were all

taken into consideration when analyzing sources.

The researcher evaluated the reliability of each source by considering all of the

elements mentioned above to determine its relevance to the topic and each study's overall

contribution to the literature in this area. Studies will include participants ranging from

middle and high school students to undergraduate and graduate students since the research

shows that educators who teach students across these age ranges have been using technology

tools for writing instruction in varying degrees; however, one study conducted involved

interviewing primary school teachers. Participants in these studies include both students in

writing classes and teachers teaching writing classes.

One other criteria for the chosen studies was the year of publication. This review

contains as many current studies as possible since technology is constantly changing and

improving. However, earlier studies were used (dating back to 1992) when the emphasis

focused more on the strategies for writing instruction as opposed to the spotlight being on the technology tool. Studies with different kinds of design methods were used, but the researcher ensured that they were peer-reviewed. Studies from international journals (*The Turkish Online Journal of Educational Technology, The English Language Teaching Journal, The JALT Computer Assisted Language Learning Journal, The International Journal of Evaluation and Research in Education, The International Journal for the Scholarship of Teaching and Learning,* and *The International Journal of Teaching and Learning in Higher Education*) were used because many of the sources found emphasized English language learning in foreign countries. The researcher used two conference papers (from the proceedings of the Chais Conference on Instructional Technologies Research from 2009 and the 2005 Conference and Workshop on TEFL and Applied Linguistics) since these conference papers offered important findings to consider in this review. References included in this review fall into the criteria mentioned above with regards to author, currency, publication, peer-review, and overall relevance. These criteria allowed the researcher to find numerous articles but refine the searches enough to provide for a comprehensive and focused literature review.

Analysis and Discussion

The expansion of instructional technology overall and Google tools specifically in many school districts across the country means that more and more students are using digital tools, especially the Google Apps for Education, in secondary writing classes. Some foundational Google Apps for Education include Google Docs, a word-processing program; Google Slides, a presentation program; and Google Sheets, a spreadsheet program. These tools provide an alternative to handwritten work or time-tested Microsoft products like Word,

PowerPoint, and Excel, but they also bring new learning opportunities to the table.

Collecting and analyzing research on this topic has revealed a number of benefits in using many functions of the Google Apps for Education (GAFE) and other Google tools with student writers. Most authors examining GAFE have noted that these tools offer new opportunities for students to collaborate on pieces of writing and receive quick and helpful feedback from teachers and peers, and also motivates them to be invested in their own writing. The research on this topic has shown several important areas for discussion, and this review will be focused on the following themes:

- Teacher's Active Role During the Writing Process

- Improving Student Motivation

- Individual Revision Techniques

- Grammar's Role in Editing and Revising

- Student Writers Giving and Getting Feedback Through Collaboration

- Positive User Experiences with Google

- Teachers Assigning Collaborative Activities

- Improving Writing with Blogging

- Post-Secondary Use of GAFE

These themes will be addressed in the analysis that follows.

Teacher's Active Role During the Writing Process

One major tenet of writing instruction is to follow the writing process: start with pre-writing, move on to drafting, continue to revising and editing, and end with publishing. Although the order of the writing process is simple enough to learn, it is difficult for many student writers to fully implement. Faraj (2015), who studied Kurdish college students

learning about the writing process in English, advocates for teachers to use scaffolding with the writing process to help students work through their writing with help from the teacher. GAFE makes it easy for teachers to help students one-on-one with their writing through the simple "Share" function, which allows a student to send a draft of a paper to his or her teacher at any time. Teachers can also use GAFE in the writing process through the use of the Revision History. Yu-Fen and Shan-Pi (2011) found that one successful strategy involved the teacher showing students a first and second draft of the same piece of writing, which can be accomplished through Google's Revision History, in order to illustrate how the edits improved the work. This strategy by the teacher might help students understand how much editing and revising can truly help them, even though they might think they are done after a first draft (Yu-Fen & Shan-Pi, 2011). Both of these strategies use Google technology to help teachers improve the writing process for students.

Students often prefer this type of close interaction with the teacher during writing instruction. Working with ESL students at Zayed University in Dubai, Hojeij and Hurley (2017) found that 78% of their participants agreed that teacher feedback was the most important factor in improving their writing. Yoder (1992) also found that college journalism majors ranked revision activities involving the "instructor answering my specific questions" and the "instructor reading over my work and making editing suggestions" (p. #) as preferable during a writing assignment. In a study by Aljumah (2012) in which students wrote postings on blogs, 100% of the student participants agreed that they enjoyed reading the teacher's comments on their writing. Zheng et al. (2015) found that it was helpful when teachers provided students with comments containing specific corrections during the editing stage, but also helpful to simply provide guidance without making direct edits for them so

that students could become more independent in their writing. In a study of Japanese college

students, Shintani and Aubrey (2016) found that the teacher providing synchronous online

feedback during the writing process was more helpful than providing asynchronous feedback

in helping students learn how to fix grammar errors. For instance, this type of activity may

involve the teacher and student both bringing up the document on each of their screens

during class time; the teacher could be giving feedback to the student on the document and

the student could be resolving it instantly, and the two could be having a verbal conversation

about these edits as they take place. Shintani and Aubrey (2016) found this type of activity to

be more effective because the learning was occurring during the initial drafting phase with

the help of the teacher. Google Docs makes it easy for teachers to participate in such

feedback activities as the ones described above. Teachers can leave comments in the margins

of a document that students can see in real time or read and resolve later. Teachers can also

change the document to *Suggesting Mode* and leave colored edits on a document that the

student must either accept or reject, which helps the students identify their grammar errors

and understand the fixes as they edit. Teacher interactions of this nature during the writing

process proved helpful for students in the studies mentioned above.

Despite help from their teachers during the writing process, however, students may

still be lacking in their revision skills because of what the teacher has chosen to emphasize

during the revising and editing process. Witte (2013) found that oftentimes teachers focused

too much on grammar or spelling as opposed to bigger issues of revision such as changing

the content of their sentences or paragraphs, and this may have stopped students from feeling

excitement or continuity as they wrote. Indeed, student motivation is a huge factor for

success with writing instruction. If a student does not care about what he or she is writing and

does not find the motivation to try, then there is little hope for improvement or learning.

Improving Student Motivation

Regardless of the curriculum or the teacher's instruction, one major barrier to effective writing is student motivation. As Feltham and Sharen (2015) note, "The best feedback in the world won't promote effective revision if learners are unwilling or unable to engage in the revision process" (pg. 113), and if they are unwilling to engage in the revision process then their papers will likely remain at the quality of a first draft. Despite teacher instruction or other activities in place to help students edit and revise, students may not believe they can get better or have the personal motivation to improve their work. Feltham and Sharen (2015) cite Spinath, Spinath, Riemann, and Angleitner (2003) in saying that students who have fixed mindsets are more likely to believe that errors in their work reflect their low intelligence or ability level, whereas students with growth mindsets are more likely to believe that errors in their work show that they simply have not mastered the skill yet. Feedback from the teacher and help during the writing process, especially through the use of technology, can help build confidence within student writers and inspire growth mindsets about revision. For instance, after providing a unit of scaffolded writing instruction to Canadian college students, Feltham and Sharen (2015) saw an increase in students' beliefs in a growth mindset with regards to their writing. Witte (2013) also found that students and even teachers sometimes have negative associations with revision.

> One high school English teacher stated, "I say revision, and they go, 'Ugh'. You know, they're squeamish about it. Squeamish maybe because in the past they have revised (or so they thought) and received that paper back with all those red marks. So what's the use?" (pg. 42).

Getting feedback and making improvements needs to be a continuous cycle for students and they need to see that they are improving with each draft. Oftentimes student writers do not

realize how crucial revision and editing are to the writing process, that these tasks are just as important as completing a draft. Zheng, Lawrence, Warschauer, and Lin (2015) found that Colorado middle school students spent more time editing and revising their work when they used Google Docs than they previously had done with paper documents, which led the researchers to conclude that Google Docs provides encouragement for process-writing. Teachers need a way to continue to motivate students to revise - to help them see the errors or problems in their writing and care about changing them - and new technologies offer a way to do just that.

Teachers can use a few technology tools to help with student motivation and interest. Google offers a number of tools in its GAFE suite of which writing teachers can take advantage, especially Google Docs. One Google Docs tool that makes the revision process easier and more transparent is the revision history, wherein users can see previous versions of documents with the changes that were made appearing in a bright color. This was particularly motivating for the participants in Suwantarathip and Wichadee's (2014) study, in which student writers in Thailand said that they benefitted from seeing the changes over the course of their writing in their document's revision history. Moonen (2015), a history teacher in London, also found revision history to be helpful to her and her students during a collaborative essay-writing process; she found it easy to give formative feedback and the students could keep track of each other's writing, which helped keep them more invested in the task. Revision history is just one of Google Docs's tools that can help to motivate writers.

Individual Revision Techniques

As Witte (2013) remarks, "We live in a world of revision. Whether it be the ways in which we approach our lives, alter a recipe, accessorize an outfit, or modify our golf swings,

our world evolves because of the revision that happens within it" (pg. 33). Revision is also

key to the writing process, and students need to understand the importance of this skill in

whatever type of writing they do. However, as Dockrell, Marshall, and Wyse (2016) point

out, writing instruction is generally lacking in schools and the amount of time spent on

writing instruction needs to be increased if the goal is for students to improve in this area.

Several Google tools can help in a number of ways with improving revision skills for

students.

Researchers have attempted to find evidence showing effective revision strategies for

students in the writing classroom, from adopting one strategy (Witte, 2013) to using multiple

strategies (Alhaisoni, 2012; Ansari & Varnosfadrani, 2010). For example, in a mixed-

methods study which interviewed teachers of writing, Witte (2013) found students tended to

have positive perceptions when reading their written work aloud to themselves as a way to

check for consistency and view the work in a different way. Although this has not been

studied much, Google's *Read & Write* Chrome extension offers a unique opportunity for

students to use this strategy with their writing. The *Text-to-Speech* (TTS) function, which

reads written work aloud from the device's speakers, could be used by students to listen to

their writing being read to them by the software to help them find errors that they may not

have noticed if they had simply read the work over again silently. *Practice Reading Aloud* is

a second feature which enables students to read their written work aloud into the device's

microphone while the Read & Write extension records them. They can later replay this

recording and even share it with their teacher. Witte (2013) found that this type of revision

technique helps students slow down and see their writing in a different light when they are

revising. Google's Read & Write extension is just one tool that helps with editing and

revising.

There are also many other ways for students to individually improve their written work through revision. Alhaisoni (2012) found that Saudi Arabian college students studying English used multiple writing or revision strategies (such as think-alouds or rereading a section of text), but they also reported being unsure of how effective these strategies were. Ansari and Varnosfadrani (2010) went further to draw a connection between students' Multiple Intelligence (MI) profiles (Gardner, 1983) and different revisions strategies, finding that Iranian college students would use several types of strategies even if the strategies did not match with their MI profile. This evidence suggests that students need more explicit instruction on revising and editing their work in order to understand how these processes make their writing stronger. This supports Yoder's (1992) claim that explicit instruction of this nature will increase both their confidence and ability in writing. Explicit instruction of revision techniques can be made more effective if students feel comfortable with their grammar skills.

The Role of Grammar in Editing and Revising

Writing instructors teach editing and revising, especially with regards to grammar, in different ways. Both Yoder (1992) and Hojeij and Hurley (2017) used editing checklists with success, making a list of common grammar errors for students to look for during the editing and revision stages. Liao (2016) experimented with an automated writing evaluation and found improved accuracy in Taiwanese college students' writing for fragment sentences, subject-verb agreement, run-on sentences, and poor verb use after students used the tool to identify their errors. Finding these errors are important because even small proofreading errors may inhibit readers from understanding a piece of writing or may make the writer

appear unprofessional. However, Dockrell, et al., (2016) also found that teachers spent significantly more time teaching editing at the level of individual words in a piece of writing than the time they spent on larger editing or revision concepts. This could pose a problem for students still learning the steps of the writing process.

Although the difference between editing and revising may seem insignificant to some, these two types of changes represent different types of thinking about one's writing. Studying Taiwanese college students learning English, Yu-Fen and Shan-Pi (2011) found that strong student writers make "global revisions" meaning big-picture revisions of their organization or overall development of the piece of writing, as well as "local revisions" (pg. 6), meaning smaller edits for grammar mistakes. In this study, students who participated in an editing activity revised 90% of their sentences, but students who did not peer-edit effectively tended to focus more on local revisions and revised only 41% of their sentences. Yoder (1992) also found that groups of inexperienced, advanced, and even professional student writers all made the most changes in their writing at the surface level. One teacher in Witte's (2013) study noted, 'My seniors are very much caught up in editing mechanics and grammar, as opposed to really rethinking a piece of writing or thinking about what that vision for that piece of writing is'" (pg. 42). Truly, Google Docs does provide simple ways for identifying some grammar fixes, which is probably why so many student writers hone in on these small edits. Anyone who has spent any time on a word-processor is familiar with that red squiggly line that appears under a mistake in Google Docs. Docs also has a spell-checker tool that takes the writer through each spelling error in a document one at a time and offers suggested corrections. However, Google Docs does not catch all of the grammar errors in a document, which is why students need to be good proofreaders and editors. Writing instructors would

agree that grammar has a place in the writing process, but many teachers struggle with how to teach it most effectively and in a way that will encourage students to look for not only grammar mistakes (editing) but also content or organizational changes that they could be making to their writing (revising). One way for students to find success with both editing and revising is for teachers to provide opportunities for feedback and collaboration through Google Docs.

Student Writers Giving and Getting Feedback Through Collaboration

One unique feature in Google Docs is its ability for contributors on a document to leave feedback. Zheng, et al., (2015) note that Google Docs provides the ability to leave *Comments* and *Suggestions* in the margins of documents, allowing students to interact more quickly and conveniently than if they were writing on paper or using other word-processing programs. The research shows that these comments and suggestions can be beneficial for both the students giving the feedback and the students receiving the feedback.

Writers see value in peer feedback. Understanding the purpose and seeing the value in peer-editing is crucial to making the process work. Throughout the research, students expressed their appreciation for receiving quality feedback from their peers. Working with English as a Second Language (ESL) students in Dubai, Hojeij and Hurley (2017) found that 92% of their participants agreed that the peer-editing process was either useful or very useful when they were completing an English-language essay. In a study by Schunn, Godley and DeMartino (2016), 28 Advanced Placement (AP) teachers from across the United States had their classes participate in an online peer-editing exercise. Using an online tool called Peerceptiv (Panther Learning, 2014), students were distributed essays from their peers in order to give electronic feedback. They were asked to give open-ended feedback and

numerical ranking feedback about various aspects of their peers' papers. The original authors

then received the feedback, revised their papers, and all students were surveyed at the end of

the study. A majority of the students surveyed agreed that peer review offered many benefits

to writers (Schunn, et al., 2016). Students enjoy using different online tools, especially

Google Docs, for this purpose. In a case study by Brodahl and Hansen (2014), 177

Norwegian undergraduates completed a reflective paper using either Google Docs or a

collaborative tool called EtherPad (etherpad.org). Students from both groups appreciated

getting help from peers on spelling and grammar errors that they might not have noticed and

that their peers could contribute different ideas to improve the document (Brodahl & Hansen,

2014). Getting different kinds of feedback from peers during the writing process was

positively received by a number of students, and Google Docs makes this process easy.

Studies also showed that while students often appreciate getting comments from peers

on their writing, they acknowledge the importance of when they comment on others' writing

as well. Results from Brodahl and Hansen (2014) showed that 72.1% of students felt neutral

or positive about editing and commenting on other students' contributions and 88.3% felt

neutral or positive about others editing or commenting on their own work. Some students

noted that reading and editing others' writing was an even more helpful activity for them

than receiving the feedback (Schunn, et al., 2016). Deriving benefits from peer-editing

activities can even be seen when there is a difference in ability level. In Lin and Yang's

(2013) study involving beginning English language learners at a Taiwanese university and

their more advanced peer-tutors, many of the more advanced students reported a number of

benefits from the peer-editing activities, including an improvement in their own English

skills. One commented, "During the course of this service learning project, I found I can

always learn something from others, even from the tutees" (Lin & Yang, 2013, pg. 86).

These studies showed that the process of giving comments to others during peer-editing was beneficial for the commenter as well as the original writer. When a reciprocal process like this is formed, such as when two students share their individual Google Docs with each other for feedback, both students benefit. In a study by Yu-Fen and Shan-Pi (2011), 25 undergraduate students from Taiwan participated in an online peer-editing activity in which they were given choices regarding how they edited each other's work. The researchers found that a reciprocal process emerged in which the writer received helpful feedback from peer-editors and gave editing comments to his or her partners (Yu-Fen & Shan-Pi, 2011). When Hanjani (2015) instructed students to participate in a collaborative revision activity, the students reported feeling that their opinions were worthwhile and helpful to their partners and that the activity was reciprocal in that they felt their own writing was improved as well. However, sometimes negativity does arise among student writers during peer-editing activities.

Students may feel negativity toward peer-editing. One issue that arose in several studies involved whether or not all students felt positive about and saw the benefit in the peer-editing process. Zheng, et al., (2015) found that students were not only reluctant to edit each other's work but also hesitant toward having their own work being changed during peer-editing. In a study conducted by Brodahl, Hadjerrouit, and Hansen (2011), students agreed that they saw the benefits of commenting and editing others' work but only 31.3% enjoyed commenting or editing a peer's work. Although Brodahl, et al., did not delve into why students disliked commenting on or editing their peers' work, Yu-Fen and Shan-Pi (2011) found an issue with student disagreements during peer-editing and analyzed the problem

more closely. Some of the student writers in this study felt frustrated by peer-editing when they disagreed with the comments left by their peers. The researchers described this as students "encounter[ing] the conflicts between their prior knowledge and peer editors' corrections and suggestions" (p. 13). They found that students in this situation often simply needed to communicate with peers through the editing activity to reconcile the disagreements over how to improve the writing (Yu-Fen & Shan-Pi, 2011). In this instance, clear communication and an open conversation helped assuage some of the negative feelings.

It is not uncommon for students to feel that their peers did not help them with their writing (or, worse, feel that their editor decreased the quality of the writing), but this can be avoided when the peer-editors are instructed to offer suggestions rather than give direct edits. In a quantitative study by Blau and Caspi (2009), Israeli undergraduates wrote essays using Google Docs and later revised their writing for a final draft. Two of the five groups participated in a peer-editing activity, with one group making suggestions on their peers' documents and one group making direct edits to their peers' documents. The results showed that some participants did feel that their peers made their writing worse through their edits and even suggestions, but the respondents did not actually feel that they made their peers' writing worse when they offered suggestions or edits. The researchers suggested that only asking peer editors to make suggestions as opposed to direct edits would help improve collaboration in writing and negate some of these negative experiences (Blau & Caspi, 2009). This solution is easy to implement when using Google Docs for a peer-editing activity. Once a document is shared, peer-editors can make comments in the margins that authors can later resolve, which results in no changes to the actual written work. Additionally, peer-editors can also switch to *Suggesting Mode* and type in suggestions on the document. These appear in a

different colored font and the author can choose to either accept or reject these changes by clicking a check mark or an X in a box that appears on the side of the document; once again, with this method, nothing in the author's original writing is changed without his or her approval. If teachers show these simple functions to students, much of the negativity and conflict that might have come with the peer-editing activity can be avoided. Although not all students say that they enjoy the task, and some may doubt its effectiveness, the research shows that students' writing does in fact improve after online peer-editing activities.

        Peer-editing promotes improvement in quality of writing. Study results often show improvements in students' writing after different peer-editing activities. As mentioned above, correct peer-editing activities result in both "global revisions" (pg. 6) and "local revisions" (pg. 6), meaning that the author interacts more deeply in the writing process and produces better writing by the end (Yu-Fen & Shan-Pi, 2011). Zheng, et al., (2015) also found that students improved their literacy abilities as both writers and readers during the peer-editing process in that they needed to think deeply about their peers' work in order to give helpful feedback in addition to reading their peers' comments and improving their own work. Amount and depth of revision is just one example of improvement in students' writing.

        Not only did study participants tend to revise their work more after feedback, but their work also showed improvements in the grades they received. In a study by Noroozi, Biemans and Mulder (2016), 189 Dutch undergraduates were separated into groups of three and asked to write argumentative essays. The participants read and researched the topic, wrote an in-class essay, peer-edited in their groups online using feedback scripts in the form of questions (such as "To what extent [does] your learning partner provide arguments in favour of the topic?" and "What do you think about his/her conclusion?"), and then revised

the essay. The results showed that the average scores on their writing increased from 8.80 to 9.56 out of 10 between the pre- and post-assessments, demonstrating the online peer-editing and the feedback script as a benefit in the writing process (Noroozi, et al., 2016). In a quasi-experimental study by Suwantarathip and Wichadee (2014) at Bangkok University, 80 students in an English course were separated into two groups: one group used Google Docs to complete collaborative writing assignments while the other completed the same assignments in a face-to-face setting. The Google Docs group used several features of Google Docs to collaborate (Sharing and Commenting) and also viewed their progress over time (Revision History). The researchers conducted a pre-assessment and post-assessment of students' writing skills, and the results showed that the Google Docs group outperformed the face-to-face group on the writing post-assessment with a significance level of 0.05. The researchers noted that this collaboration method allowed students to read and give feedback on each other's work and the writers were able to learn from their mistakes when a partner pointed them out (Suwantarathip & Wichadee, 2014). All of these results indicate improvement in writing skills after online collaboration and peer feedback.

Student writers maintain ownership. One area of concern in collaboration and feedback revolves around ownership: will students still feel ownership over their writing when others have some form of control over it during online peer-editing? Students do sometimes feel that peer-editing activities can be too intrusive when peers make direct changes to their documents (Blau & Caspi, 2009). These students felt higher levels of ownership over their writing when peers made suggestions instead, as described earlier, even when the suggestions offered criticism (Blau and Caspi, 2009). Google Docs makes this possible through its Comments function as well as its Suggesting Mode; both of these types

of feedback can be accepted or rejected at the author's discretion which helps the author maintain ownership. Interestingly, another study found that writers did not feel violated or bothered when their work was changed by an editor in a shared document and did not feel private ownership over the document at all (Suwantarathip & Wichadee, 2014). This suggests that individual ownership is not a major issue in the context of collaborative or group writing and only becomes violated for a student when a peer directly changes his or her individual work. Peer-editing in the form of suggestions which can be considered by the author before making an edit were much preferred in this context. Yu-Fen and Shan-Pi (2011) also found that when discrepancies arose between what a writer and peer-editor believed to be the correct way to edit the text, it helped for both of them to discuss their disagreement. This served an important purpose - for the writer to have his or her voice heard and to understand the reasoning behind a possible error in the document (Yu-Fen & Shan-Pi, 2011). Zheng, et al., (2015) also found that although the student participants in their study felt somewhat comfortable making grammar edits to a peer's work, they did not feel comfortable making larger edits to the content or structure of the piece; they, too, left this feedback in the form of comments or suggestions in the margins. By leaving feedback in this way through Google Docs, students can still retain strong feelings of ownership and control over their writing even when completing online peer-editing and receiving constructive feedback from peers.

Positive User Experiences with Google Docs

Despite some negative responses when asked to complete peer-editing activities, many students reported positive experiences using Google Docs for writing overall and collaboration in particular. In a study by Zhou, Simpson, and Pinette Domizi (2012), 35 undergraduate students enrolled at the University of Georgia completed writing assignments

outside of class time in small, randomly assigned groups. Although students were mostly

unfamiliar with Google Docs before participating in the study (with only 19% having used it

before), 93% of the students surveyed agreed that it was a helpful tool for completing group

work, 85% felt their experience using Google Docs was either 'positive' or 'very positive,'

and 50% commented that they would like to use Google Docs as a tool in the future (Zhou, et

al., 2012). Moonen (2015) also found that although she had not used Google Docs with her

13- and 14-year-old students previously, they were enthusiastic about their collaborative

writing task, were more focused throughout the writing process, and produced better writing

products on Google Docs. These studies have shown positive student reactions overall.

Students in general tend to enjoy working with each other and teachers know how

effective collaboration can be in a lesson. When asked to rate their attitudes toward

collaborative writing using Google Docs, students averaged a mean of 3.70 on a scale of 1

(negative) to 5 (positive) (Suwantarathip & Wichadee, 2014). Participants also commented

positively about all of the students contributing to one final, improved product (Brodahl &

Hansen, 2014). Zheng, et al., (2015) found that students felt more positive about using

Google Docs for organizing their writing as well as giving and receiving feedback on their

writing than they did when using other word-processing programs. In the studies examined,

Google Docs fostered positive user experiences, and this is especially true for students

learning a second language.

Language students enjoy collaboration. Working with partners or groups during

writing instruction provides benefits beyond simply helping with grammar suggestions,

especially for students learning a second language. Hegelheimer and Fisher (2006) found that

ESL students who submitted writing for an English placement test at Iowa State University

often lacked the necessary knowledge of English grammar to write a successful academic

essay. The researchers ultimately concluded that peer-editing using an online system could

help these students learn correct grammar terms and identify grammar errors as a way to

prepare the students for college-level writing (Hegelheimer & Fisher, 2006). In a study by

Ware and O'Dowd (2008), ESL students in Spain were partnered with American students in

groups with different conditions: the first group of American students were designated as *e-tutors* and were instructed to give corrective feedback online to their assigned Spanish

partners while the second group of American students were designated as *e-partners* and

were only asked to give feedback online when asked questions by their Spanish partners. The

students were surveyed at the end of the study about their experiences with e-tutoring and

most felt positive about the experience, with one commenting,

> In class you write down notes about grammar and vocabulary and it stays in your
> notebook. With an exchange partner she corrects and the information stays with you
> .... You learn more from mistakes in the forums than from reading rules from the
> blackboard. (Ware & O'Dowd, 2008, pg. 53)

Similarly, Chantoem and Rattanavich (2015) studied high-school-aged Thai students learning

English through the use of web activities and found that working online provided students

with a more realistic writing situation; they felt more comfortable taking risks when

communicating with friends online and they appreciated the teacher's guidance during these

activities. These English language learners enjoyed different types of online collaborative

activities as they improved their writing skills. As has been described above, the Google tools

in the GAFE suite are all designed with collaboration in mind and provide positive

collaborative experiences for students.

　　　　Just as with English-speaking students, the results showed that ESL students needed

guidance from the teacher when conducting online writing activities. When the students were

separated into e-tutoring (where they were *told* to give their partners feedback) and e-partnering (where they were told that they *could* give their partners feedback, but were not required to) many more Language-Related Episodes (LRE), meaning words directly related to their language learning, appeared in the e-tutoring condition than the e-partnering condition, with 13.5% of the words exchanged being identified as LREs during e-tutoring and only 3% being identified as LREs in e-partnering (Ware & O'Dowd, 2008). When the study was replicated in another phase with different students, 14.7% of the words used in the e-tutoring partnerships were identified as LREs and only .003% of the words used in the e-partnering groups were identified as LREs (Ware & O'Dowd, 2008). This is just one example that illustrates the importance of the teacher's guidance in peer-editing or other collaborative activities.

Many foreign language students also appreciate the collaborative and social nature of peer-editing. In an exploration case study by Hanjani (2015), eight Iranian undergraduates, all of whom spoke Persian as their first language, developed first drafts of their English essays and submitted them to the instructor for feedback, who then returned the drafts with comments to the authors. During the class session, the students performed collaborative revision with their self-selected partners. All of the participants felt positively about the collaborative process and how it affected their English writing skills. Several students noted that the collaboration made the revision process easier and more accurate, enhanced their motivation when their partners recognized their writing strengths, and boosted their confidence in writing. Participants also said that having a partner helped make them feel better about the process, parse out the comments from the instructor, and lowered their stress level. They also appreciated when their partners were able to provide them with new ideas to

incorporate into their writing (Hanjani, 2015). The sample size for this study was very small

and the students did not work online for the revision task, but they still identified all of these

benefits from the peer-editing exercise in itself. Similarly, Ling and Yang (2013) found that

advanced peer-tutors assisting beginning English language learners in an online editing

activity gained interpersonal communication skills. The peer-tutors focused on positive

feedback so as to help the tutees feel less pressure during their revisions and this helped the

tutors learn to give effective feedback. One tutor commented, "…this experience gave me the

most real life communication with another person… I try to measure the phraseology in order

not to hurt the tutees" (Lin & Yang, 2013, pg. 87). These communication skills were just an

added benefit in addition to the improved writing and language skills.

Although these results are based on studies of foreign language learning, the core

issue is peer communication and feedback online during writing activities, and the results

show that these experiences were positive for students. In this way, adding peer-editing

activities through Google Docs or other GAFE tools can help any writing instructor add a

motivating and effective writing exercise into his or her curriculum.

Teachers Assigning Collaborative Activities

The research shows benefits and positive examples of online collaboration and

feedback making a difference for student writers, but one major factor to be considered is

how the teacher assigns these activities. Students may feel that their writing is unfairly

changed or violated if a peer-editor makes changes to an author's work (Blau & Caspi, 2009;

Suwantarathip & Wichadee, 2014), so teachers need to tread carefully when designing

activities and instructing students on how to correctly give each other feedback.

Teachers can help students improve the quality of the feedback by setting up a peer-editing exercise that extends beyond a two-person editing group, since writers are more likely to take a suggestion into consideration if two different peer-editors suggest it (Noroozi, et al., 2016). Additionally, having two editors helps students avoid the pitfalls that may come with having only one editor, such as feeling a lack of trust for their peer-editor, and it gives them the chance to read two other students' papers and compare their work with others' in order to note what they might have been missing in their own work (Noroozi, et al., 2016). Yu-Fen and Shan-Pi (2011) also recommend assigning rotating roles to students during peer-editing and for teachers to hold them accountable for their responsibilities as peer-editors in order to achieve the best results. Google Docs makes this easy because a student can simply press the "Share" button and type in the names of their peer-editors, who will then instantly have access to the document. In these ways, teachers can establish specific roles for their students in order to improve the peer-editing activities and the students' writing.

Additionally, students tend to find it easier to give feedback when teachers give specific guidelines for peer-editors to follow. In the study by Noroozi, et al., (2016), students who received higher-quality feedback wrote higher-quality essays than writers who received lower-quality feedback. Similarly, student editors who provided higher-quality feedback also wrote higher-quality essays than student editors who provided lower-quality feedback (Noroozi, et al., 2016), so both giving and receiving good feedback are connected to strong writing skills. Teachers can help students give higher quality feedback by giving them scripts to follow or specific questions to answer about their peer's writing, which helps the peer-editor know what to look for and give more helpful comments (Noroozi, et al., 2016). In fact, when editors gave feedback and scored their peers' essays based on a simple but specific

rubric, the results showed that student editors were able to reliably assess complex aspects of

the essays in both high-performing and low-performing schools (Schunn, et al., 2016).

Student editors also rated their peers' writing very accurately since the average ratings

among five peer-editors matched closely with the teacher ratings on the same essay, and

students' mean scores for their peers' essays even correlated more closely with expert AP

scorers than the teachers' ratings.

The carefully designed rubric proved helpful in simplifying the scoring and providing

high quality feedback (Schunn, et al., 2016). To accomplish this, teachers can easily create a

Google Doc with questions for peer-editors to answer or a checklist for them to use as they

are reading over their peers' papers. Using Google Classroom (another Google App for

Education that serves as a simplified Learning Management System), the teacher could create

a copy of that peer-editing sheet for all students. At that point, every student would get a

personal copy of that original template to write on and later share with the person he or she is

peer-editing for. This type of activity would ensure accountability for all students and GAFE

makes it easier than if the students were writing on paper or even on a more traditional word-

processing program.

Collaboration, feedback, revision, and editing are all tasks that can be enhanced in the

writing classroom using various Google Apps for Education. However, one other aspect to

consider is how educators can make writing more authentic. Authentic writing tasks often

involve giving students real-world writing prompts or assignments, or possibly giving them a

real audience so that they know someone besides their teacher is reading their writing. This

often motivates them to write better, become more cognizant of their mistakes and remind

them to fix them, keep them invested in what they are writing, and overall provides a more

interesting assignment. One way that teachers can use Google tools to create a more authentic writing task is to assign students to use Google Blogger.

Improving Writing with Blogging

Blogging has been a popular tool among educators in recent years, and for good reason. There are many advantages to blogging, especially for the writing classroom, and Google makes blogging easy with its Blogger tool.

Many teachers and students who have used blogs, especially Google Blogger, have found them easy to use and integrate into the classroom. Working with 35 Saudi students learning English at Qassim University, Aljumah (2012) found that 91.4% of the students said it was easy to create and publish posts on their blogs, 85.7% said that they had no difficulty using it, and 82.9% felt comfortable using it. Similarly, Wu, (2005) of Chung Hua University in Taiwan, who worked with intermediate level English learners using Blogger, found that 66% of students agreed that their blogs were easy to set up; the rest of the respondents had no opinion on the topic of ease-of-use. For teachers worried that blogs might be too confusing or difficult to do in their classrooms, these studies show otherwise.

Its ease-of-use is one benefit of using Blogger in the classroom, but there are so many more advantages that improve student achievement and enjoyment. In Aljumah's (2012) study, students said that they enjoyed the ability to access their blogs at any time from any computer with an Internet connection, which is true of all of the GAFE tools. As with other GAFE products, another advantage of Blogger is the ability to share one's writing with others. Many students reported seeing the benefits of having an authentic audience through their blogs, with 77% of Aljumah's students agreeing that they enjoyed inviting others to view their posts, 74.3% agreeing that their learning was improved through reading the

comments of viewers on their blogs, and 80% agreeing that responding to others' comments improved their own writing (2012). Like peer-editing, blogging activities in the writing classroom help students learn through collaboration and sharing their writing.

However, as is the case with peer-editing activities through Google Docs, not all students enjoy the reciprocal and sometimes critical nature of commenting on each other's blogs. For instance, 31.4% of Aljumah's (2012) participants did not like making comments on others' blogs, and 31.4% felt uncomfortable giving criticism to a peer in a blog post. A significant 68% of students in Wu's student reported that they had not invited peers to read and comment on their blogs (2005), but this could likely be negated by the teacher requiring students to comment on a certain number of other students' blogs. As with traditional peer-editing activities, although some students might feel cautious about giving negative comments, a majority of students enjoy reading others' work and feedback on their own writing: 85.7% of students in Aljumah's student enjoyed reading others' comments and 91.4% enjoyed reading others' blog posts. Similar to peer-editing activities in Google Docs, providing criticism could get tricky with blogging. However, most students enjoy writing blogs and reading each other's work, and some of the negativity can be alleviated with structure provided by the teacher.

Perhaps most importantly, blogging often helps improve students' writing skills. Students in Aljumah's (2012) study tended to write longer sentences in their blogs than in other mediums, and 91.4% agreed that they expressed themselves better. Additionally, 80% self-reported better grammar knowledge and 91.4% reported learning new vocabulary through the blogging activity. Fellner and Apple (2006) also used Blogger with ESL students in Japan who were classified as having low motivation in this subject area. By the end of a

seven-day writing program using Blogger, students had increased their average word count from 31.5 words used to 121.9 words used on their blog posts (Fellner & Apple, 2006). The researchers also noted that students enjoyed the commenting features and would often encourage their peers in class to read and comment on their blog posts online (Fellner & Apple, 2006). That authentic audience of peers helped make students care more about their writing and make sure they checked their work for mistakes; indeed, 60% of Aljumah's (2012) students said that they were more aware of checking their grammar before posting to their blogs than when they wrote traditional papers. Similarly, when Hojeij and Hurley (2017) used the platform Edmodo (2008) to have students post their writing in a way similar to blogging, the researchers noted, "[o]ne student said that sharing her work with the rest of the class in this format made her take more care with her writing and she checked it more carefully than if she had been handing it in solely to the teacher" (pg. 3). Overall, students' writing can improve through the use of blogs in the classroom, and students notice it, too; 85.7% of the students in Aljumah's (2012) study agreed that they wrote better on a blog post than on paper in their class sessions. Providing that authentic audience helped to improve students' writing in many of the studied examined here.

Blogs are a great way for students to have authentic voices in the writing classroom, and Google Blogger is just one more Google tool that enhances writing instruction. GAFE and Google tools have become increasingly popular with K-12 school districts around the United States and internationally, but what will happen once those 12th graders walk across that stage and receive their high school diploma? Are the Google Apps for Education being used at the college level, or would we have been better off preparing students with tools like Microsoft Word? How far does Google reach?

Post-Secondary Use of GAFE

One concern for educators is whether or not students will be using the Google Apps for Education at the college level. Although many colleges and universities have started using GMail as their preferred campus-wide email system, the other Google tools have been slower to catch on. Awuah (2015) describes the trend of universities adopting GAFE as a major system on their campuses, including Arizona State University and Valparaiso University in the United States. Working with the University of Ghana, Awuah (2015) used GAFE in a class of computer science students to gage their reactions to using the various GAFE tools. 84% of these students agreed that GAFE improved their class performance and 91% agreed that they were more satisfied with this GAFE-integrated course than their other courses that used little or moderate levels of technology. Hariadi, Dewiyani Sunarto, and Sudarmaningtyas (2016) studied this topic on a larger scale, examining 1153 student users and 70 instructors at the Institute of Business and Informatics Stikom Surabaya in Indonesia. The researchers used GAFE in an application they called Brilian, which served as a sort of Learning Management System for the classes in addition to providing GAFE tools like Google Docs to the students. By the end of the study, 79% of students agreed that they felt comfortable using GAFE and 82% of the instructors said it helped their teaching process (Hariadi, et al., 2016). However, the researchers did find some areas for improvement, including needing a stronger network infrastructure at the university, making their Learning Management System more user-friendly, and making some of the functions of the tools easier to use. This illustrates that although some colleges and universities are making a switch to using the Google Apps for Education, it is still unclear how big of a role GAFE will play in the future at the post-secondary level. However, if Google's expansion at the college

level is anything near its recent expansion in the K-12 world, more colleges and universities would be wise to consider all that GAFE has to offer.

Conclusions and Recommendations

While the Google Apps for Education are certainly not the only digital tools available to student writers, they provide unique learning opportunities that, when done effectively, can vastly improve students' writing. The findings of this literature review provide interesting conclusions and recommendations for classroom teachers and researchers interested in the integration of technology, especially Google tools, in writing instruction.

Conclusions

First, the research showed that students often do see the benefit in collaborative revision activities like peer-editing with Google Docs and appreciate this feedback in terms of how it can improve their writing (Brodahl & Hansen, 2014; Hojeij & Hurley, 2017; Lin & Yang, 2013; Schunn, et al., 2016). However, one major discrepancy in the research concerned whether or not the positives outweighed the negatives when students both gave feedback to their peers and received feedback on their own writing from peers.

In its simplest form, peer-editing should help students by giving them another pair of eyes to look over their writing for errors and overall clarity. Many students felt positive about receiving this help (Brodahl & Hansen, 2014) and believed that collaboration results in better writing overall because of the feedback and constructive criticism they received (Blau & Caspi, 2009). Students often understand the necessity for peer-editing and do not feel that their writing is violated when their peers give them suggestions (Suwantarathip & Wichadee, 2014). On the other hand, students did experience negative perceptions of peer-editing (Brodahl, et al., 2011), especially when their peers made direct changes to their work or

when peers made suggestions that the author did not agree with (Blau & Caspi, 2009). However, disagreements of this nature could result in a conversation between the students that would help them come to an agreement or understand the nature of the error more clearly (Yu-Fen & Shan-Pi, 2011), especially after researching the question further or asking the teacher for help. Despite these mixed results, it seems that the negative student perceptions of receiving peer-editing can be negated through instructing the students to give constructive feedback in the form of suggestions and to discuss any disagreements that arise. Google Docs makes such suggestions easy with its Suggesting Mode and Comments.

Similar mixed results were evident concerning students' perceptions of giving feedback to others. Many students felt positive about the contributions they were able to give to their peers (Brodahl & Hansen, 2014; Blau & Caspi, 2009; Lin & Yang 2013) and some even felt it was more beneficial to give feedback than to receive it (Schunn, et al., 2016). However, a number of students also commented that they did not enjoy giving feedback (Brodahl, et al., 2011) and, as mentioned above, students had concerns about whether the feedback actually improved their writing. This is not an uncommon concern in a writing class since teachers will often have students of varying ability levels, which makes it difficult to cultivate a reciprocal and effective peer-editing activity between students of disparate writing abilities.

However, the results overwhelmingly showed that collaboration and feedback in the form of peer-editing, and specifically peer-editing done through online tools like Google Docs, improves students' writing skills. The results showed this through student perceptions (Blau & Caspi, 2009; Lin and Yang, 2013), evidence of revision (Yu-Fen & Shan-Pi, 2011), and grades on essays (Noroozi, et al., 2016; Suwantarathip & Wichadee, 2014). These results

show what writing teachers already know: that students' writing gets better with revision, and

revision is done more effectively when the writer gets feedback.

GAFE makes this process easier and more engaging for students, and student writers

in the studies examined overall felt positive about using GAFE tools, especially Google

Docs. Although some students may have had little experience with Google Docs before

(Moonen, 2015; Zhou, et al., 2012), many agreed that it was a useful tool and enjoyed using

it for collaborative activities (Moonen, 2015; Zhou, et al., 2012; Brodahl & Hansen, 2014;

Suwantarathip & Wichadee, 2014). Some even stated that they preferred online feedback as

opposed to face-to-face feedback (Schunn, et al., 2016). This may be due to the fact that if

students receive online feedback in written form, they can read it over multiple times when

revising to see if their edits are matching with the given feedback. Students studying a second

language especially enjoyed using Google tools, saying that it helped them revise their

writing, motivated them, enhanced their confidence, allowed them to collaborate with others

in a reciprocal way, and help them understand feedback from the teacher (Hanjani, 2015).

Several other benefits of receiving feedback through Google Docs include the ability to see a

document's Revision History to track changes over time (Moonen, 2015; Suwantarathip &

Wichadee, 2014) and the ability to work asynchronously (Brodahl & Hansen, 2014;

Suwantarathip & Wichadee, 2014), which is especially helpful when collaborating with a

peer outside of class time. Finally, Google Blogger also proved to be a beneficial tool for

writing instruction, giving students an authentic writing task that helped them revise their

work for a real audience (Aljumah, 2012; Fellner & Apple, 2006; Wu, 2005). With GAFE at

their disposal, students can complete collaboration and feedback tasks much more effectively

than if they were using a traditional word processor or even a pen and paper. GAFE has

helped many students improve their editing and revision processes, and with better editing and revising comes better writing overall.

Recommendations for Teachers

The results of the research offer a number of recommendations for classroom teachers looking to improve their writing instruction. One strategy that proved successful in the research is for teachers to give examples of a first draft and a second draft for the same piece of writing (which can be illustrated through the Revision History in Google Docs) in order to show students - especially those who might not be interested in following their peers' suggestions during editing - how revision improved the essay (Yu-Fen & Shan-Pi, 2011). This could also be accomplished by revising a piece of writing with students as a whole class or for the teacher to model revision by using a think-aloud as he or she edits a document. The studies found that student appreciate close teacher interaction during the writing process and improve their writing the most when given quality feedback, so teachers need to be available and in frequent conversation with students during writing instruction.

Another guideline for teachers to follow when assigning collaborative feedback activities such as online peer-editing would be to make the roles and responsibilities for all students very clear. When students are not required to give certain types of feedback, they are far less likely to do so when reading their peers' work (Ware & O'Dowd, 2008). Teachers can also assign students to small group peer-editing so as to help diversify the suggestions given to the writers and make them feel more trusting in the feedback they are given from multiple partners, in addition to giving them the opportunity to read the work of their peers and compare it to their own writing (Noroozi, et al., 2016). The research clearly shows that students who receive quality feedback from peers and those who offer quality feedback to

peers become better writers (Noroozi, et al., 2016), so teachers should also strive to assign

peer-editing tasks in a way that encourages specific, high quality feedback. This can be done

through prompts or questions for the peer-editors to elicit their response so they know what

to look for in an essay and what their partners might be missing in their writing (Noroozi, et

al., 2016). The research shows that giving students a simple but specific rubric to assist with

peer-editing helped multiple students give very similar scores to the same peer's paper. In

doing so, the writer would have a much better idea of the current state of his or her paper

before taking it to a final draft (Schunn, et al., 2016). Detailed rubrics help teachers remain

objective when grading papers but they can also help students effectively grade their peers'

writing during the revision stage. An added benefit of this tactic is that all students are more

familiar with the rubric before submitting their final paper, which should make for writing

that is more closely aligned with that rubric when the teacher assesses the students. Quality

peer-editing activities can greatly improve student writing when done correctly; the teacher

just needs to make sure that the structures are in place for the peer-editing to be as effective

as possible.

Recommendations for Research

Conducting this literature review made it clear that more research needs to be done in

several areas. First and foremost, it is abundantly clear that more research needs to be

conducted the role of Google technology in writing instruction. Despite Google and GAFE

being a powerhouse in many K-12 school districts, there are surprisingly few studies

focusing on the effect it can have in secondary language arts classrooms. As mentioned

above, only 12 of the 30 sources cited in this literature review focused on the use of a Google

tool specifically, while the others discussed other tools or specific aspects of writing

instruction. The research focusing on GAFE and other Google tools being used in secondary writing instruction needs to be expanded significantly.

Secondary language arts teachers in the United States would also benefit from more studies examining the use of technology, especially Google tools, in writing instruction with American students since many of the current studies were conducted by researchers from outside of the United States. Of the 30 studies used in this review, only six were conducted in the U.S. The other 24 were conducted in a wide range of countries from around the world, representing four different continents: Saudi Arabia, Iran, Ghana, Israel, Norway, Thailand, the United Kingdom, Iraq, Japan, Canada, Indonesia, Dubai, Taiwan, the Netherlands, and Spain. While this lends an international perspective on writing instruction and especially emphasized the use of digital tools for students learning English as a second language, more research needs to be done in the United States with participants who are in secondary language arts classes learning how to write more effectively in their native language.

More research also needs to be done on the expansion of GAFE on college campuses. Although many of the studies analyzed involved college-aged participants, the conditions of the studies did not look at the college environment specifically. Most studies focused on writing activities or assignments that could be completed in any 6-12 language arts or English language learning class, but the environment of a college classroom was likely chosen because of the convenience for the researchers, who are often practicing college professors. Few of the studies, however, focused on acceptance of GAFE among college students, teachers, or administrators. More research should be done specifically on whether colleges are integrating and accepting the use of GAFE as a set of tools on par with traditional tools like Microsoft Word or PowerPoint.

Given the mixed results regarding students' positive and negative perceptions of peer-editing activities, more research also needs to be conducted on students' perspectives on online collaboration and feedback in writing. Although the negative experiences some participants described can be explained through the context of the study or, more importantly, avoided by teachers through assigning peer-editing in different ways, continued research on this topic would shed some light on this issue. What do students like and dislike about peer-editing? What can teachers do to make them see more value in it? What roles can technology, especially Google tools, play in peer feedback? There are still many questions to be answered that would benefit from continued research.

Overall, the research showed positive results and possibilities regarding how teachers can continue to use Google Apps for Education and other Google tools to enhance writing instruction. Despite the gaps in the research, the studies examined here point to the notion that technology, and GAFE especially, does help to engage students and improve their writing skills when they are able to collaborate with and get feedback from peers, work closely with the teacher, and find an authentic audience. As one student commented about an online peer-editing activity, "Maybe it's more interesting by the net. You are chatting so you are enjoying." (Ware & O'Dowd, 2008, pg. 53) Any current classroom teachers would likely agree that if they can get students to enjoy themselves while learning and improving their skills, it has been a successful lesson.

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