

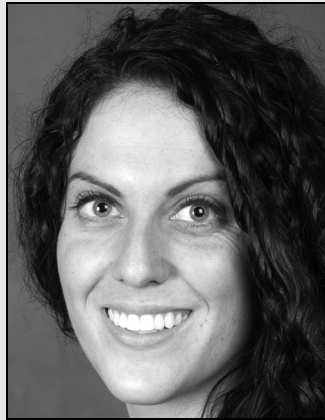
An Exploratory Study on the Effectiveness of Interactive Video Tutorials on APA Writing Proficiency in Graduate Education Students

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INTRODUCTION

In recent years, there has been a major shift from traditional face-to-face learning to online learning. One major motivation for this shift is that online learning can be accomplished 5 miles from the institution or 5,000 miles away on a dif-

ferent continent. Online learning can also be referred to as elearning or distance learning. Zhang, Zhao, Zhou, and Nunamaker (2004) defined elearning as "technology-based learning in which learning materials are delivered electronically to remote learners via a computer network"



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(p. 76). Online learning occurs in a learning management system or a virtual learning environment. As elearning is fairly new to the education scene, there are many elements and components that need to be investigated.

According to the National Center for Education Statistics (2014), there were over 5.5 million students enrolled in at least one online course at degree-granting postsecondary institutions in 2013. With the online population exceeding 5.5 million students, it is essential to ensure the proper teaching adjustments are made so distance education students have the same access to materials and resources as traditional students. According to Lane (2013), new online faculty often focus only on basic elements of an online classroom, such as uploading syllabi and documents within the learning management system, without taking the time to venture out and see what else an online environment has to offer. For veteran faculty members who are accustomed to printing out materials and watching videos in class, the thought of having to discover new

online teaching techniques can be overwhelming. In turn, the lack of preparation by faculty to teach online impacts the students enrolled in their classes.

Although many institutions do mandate first-time online faculty to take an online teaching orientation, this is not a requirement at all institutions. According to Wolf (2006), faculty who planned to teach online benefited from formal training on how to teach in an online environment (p. 55). Imagine a faculty member teaching face-to-face for 20 years, and then having to immediately adjust to a new environment in an online class. According to Wolf (2006), faculty members needed to acquire a distinctive skillset to teach online, one that did not necessarily match up with the traditional teaching skillset (p. 55). Without having the chance to ever meet students, as they may be thousands of miles away, faculty need to adapt and find other ways to create a sense of community in their online classrooms. Faculty must also find alternative ways to teach their online students.



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Support for distance education faculty is also essential. If faculty are expected to change their entire teaching pedagogy, they need to have a resource to reach out to when assistance is needed. Lane (2013) found “effective distance education programs provide ongoing faculty support in the form of mentoring, shadowing, continuing education workshops, or some combination of all of these” (p. 58). With this support available, faculty may be more willing to step outside their comfort zone and teach an online class.

Faculty are not the only group who face barriers in online learning; students are also hesitant to enroll. Muilenburg and Berge (2005) found the eight barriers to student learning are “administrative issues, social interaction, academic skills, technical skills, learner motivation, time and support for studies, cost and access to the Internet, and technical problems” (p. 29). If faculty know what issues their students face, they may be more willing to cater their courses to students accordingly. With the reluctance that exists from students, it is especially important to ensure online courses are well designed and specifically created to be taught online. Some institutions require courses to be approved by an online or distance learning department, but there are still large strides that need to be made in this area.

With the issues that plague online students, the question arises regarding what should be done to keep students engaged in these courses. As online learning is still a relatively new field, there is a push now more than ever to create interactive content to give students an equal, if not better, experience than being in a traditional classroom. For example, in many cases online discussions are considered essential elements in online courses. Discussion boards in online classes have shown many benefits, including giving students the opportunity to help each other throughout courses (Davies & Graff, 2005, p. 663). With continued research on what works in online

courses, there is hope that future online instruction will be designed with online students in mind.

STATEMENT OF THE RESEARCH PROBLEM

The problem the researchers investigated is students’ continual issues with proper formatting of research assignments in the citation style of the American Psychological Association (APA) in graduate level education courses. Although the APA publication manual is modified regularly, the principles behind the importance of APA formatting remain consistent and are staples in education courses across the country. It is common for education courses to have an APA component in one or more assignments. In traditional courses, faculty have the opportunity to sit down with students and explain formatting, one comma at a time. Yet, in online classes, that luxury does not exist. Therefore, faculty have to resort to alternative ways to teach students how to correctly format using APA.

In online courses, a teaching strategy that is frequently being used to teach APA formatting requires students to view passive tutorials on APA content. Passive tutorials may include the reading of an article or the viewing of a PowerPoint presentation. This may also involve students visiting the Purdue Owl website, which is the online writing lab at Purdue University. Here, students can see examples of correct APA formatting and read about the APA style. Yet many students complete these passive tutorials without retaining the information, if they even complete them at all. This is likely due to the lack of engagement the passive tutorials offer. As APA is critical to graduate programs, this is not a content area that can be skipped over with a quick reading or a passive PowerPoint. The lack of engagement from passive tutorials in turn hinders students from learning how to correctly format in APA. This study addressed an alternative approach

for students to retain this information so they were able to demonstrate their APA knowledge. The alternative approach researched in this study was presenting the material in an interactive video tutorial format and this could probably be applied to a wide array of teaching content other than APA formatting or even writing proficiency in general.

PURPOSE OF THE STUDY

The purpose of this study was to investigate whether or not incorporating interactive video tutorials into the online graduate education classroom would increase student writing proficiency of APA formatting. If giving students the opportunity to view this content in a different way would increase their APA proficiency, it would be valuable to many educators who have an APA component in their courses. *The Publication Manual of the American Psychological Association* (2011) has evolved “from a simple set of style rules to an authoritative source on all aspects of scholarly writing, from the ethics of duplicate publication to the word choice that best reduces bias in language” (p. 3). Through this, it is evident that the APA style of writing is very well respected and has progressed greatly since the first publication in 1929.

In an effort to understand effective learning strategies in an online class, the researchers first had to investigate the different components of an online classroom. As online learning and APA formatting continue to have a place in the world of education, this study provided valuable information on both components. Research existed on different variables to incorporate into interactive video tutorials to enhance student learning (Hughes, 2009; Tempelman-Kluit, 2006; Tewell, 2010). Yet, the connection has not yet been made on how including an interactive video tutorial can increase student proficiency of APA formatting. This topic proves to be of

continuing importance to faculty, students, and higher education institutions, as the number of students enrolled in distance education courses is consistently on the rise.

Both learning management systems and virtual learning environments are virtual locations that students log in to in order to view online materials and participate in online courses. Piccoli, Ahmad, and Ives (2001) found that virtual learning environments provided instructors with an easier way to accommodate learning on a student by student basis. With learning catered to specific students, this in turn may increase effectiveness in online classrooms. For example, if a student is not able to access a technology or software being utilized, the instructor could work with the student to find an alternative. Although these accommodations would take additional time for the instructors, they may be willing to put in the extra effort to help students. As online learning may require additional time from the instructors, if they are reluctant or incapable of giving this extra time, the online classroom may not be as successful (Piccoli et al., 2001).

Students' experiences in the online classroom depend partially on their perceptions and partially on expectations of their instructors. Piccoli et al. (2001) found “if a student's unconscious epistemic beliefs do not fit a given [virtual learning environment], we can anticipate their failure to learn in that environment” (p. 406). This shows that students entering an online class with a negative attitude about the class may perform lower than students entering an online class with a positive attitude. Additionally, if a student is able to notice the instructor's outlook and engagement in the class, it may have a vital influence on their own experiences and perceptions (Piccoli et al., 2001). This mentality could go both ways, depending vastly on the attitudes of the instructor.

Major appeals to online learning for students include the ability to learn as they

want, when they want, where they want, and how they want. Piccoli et al. (2001) found in online classes students could choose the presentation of material as they pleased, from a textbook reading to a video animation. This could directly relate to their learning style preferences, as students themselves knew how they learned best. In comparison to traditional learning, there is much more flexibility with online learning. According to Sun, Tsai, Finger, Chen, and Yeh (2008), flexibility in a course often led to signs of student satisfaction, particularly in the form of "space, time, and location" (p. 1194). With this, online classes offer students the ability to learn on call. Students had a strong preference for distance education programs that allowed them to learn on their own schedule, instead of the mandatory schedule of traditional classes (Sun et al., 2008). When institutions are designing their online courses, they should make it a priority to ensure flexibility is among the top considerations (Sun et al., 2008).

With the research that exists on distance education, the next step is to see how this information would fit into the researcher's study of effectiveness of interactive video tutorials in the online classroom. In this study, the independent variable studied by the researchers was the type of interaction. This was a dichotomous variable, as one group of participants viewed the interactive video tutorial, and the other group of students viewed the passive video tutorial. The dependent variable in this study was student writing proficiency of APA formatting. After students watched either interactive or passive tutorials, they completed a writing assignment graded based on a rubric. Each rubric included "APA Style" criteria, and each student was assigned a number value based on their APA writing proficiency. This number would in turn measure how effective each type of tutorial was in understanding the APA formatting style. The population of this study focused on graduate students studying education

while enrolled in online classes. It was a requirement that all classes that were being studied incorporated an APA component in at least one assessment. This study was conducted at a suburban, non-profit institution located in the southeastern United States.

RESEARCH QUESTION

The research question is as follows: Will incorporating an interactive tutorial component in graduate level education courses increase student proficiency of APA formatting?

LITERATURE REVIEW

A CONSTRUCTIVIST APPROACH

The basis of this study was focused on the leaning theory known as constructivism, a theory that had contributions by Jean Piaget and Lev Vygotsky in the 1900s. According to Gagnon and Collay (2006), "constructivists believe that knowledge is dynamic rather than static, a process rather than a thing, a pattern of action rather than an object" (p. xv). Through this study, the constructivists approach was considered when working with interactive and passive tutorials.

Constructivism was built on the foundation that "students actively construct their own knowledge; teachers don't just transfer knowledge to students" (Gagnon & Collay, 2006, p. xiii). Through interactive video tutorials, this construction of knowledge is able to occur. Students are not memorizing content, but instead they are comprehending it at a higher level. Memorization itself contributes to the problem. As Gagnon and Collay (2006) found, "our system of education has often confused memorizing with learning" (p. xv). Especially with the growth of distance education, faculty need to ensure the learning theories they practice in their classes

enhance student learning and engagement, instead of hinder it.

Research suggested this constructivist approach of interactive learning could be the future of online education. Zhang et al. (2004) found techniques to enhance online learning could be “to integrate appropriate pedagogical methods, to enhance system interactivity and personalization, and to better engage learners” (p. 79). This was supported by Gagnon and Collay (2006) when they stated “thoughtful, reform-minded educators expect students to solve problems, think critically, communicate effectively, and collaborate well with others” (p. xiv). With the expectations and hopes of learners for the future, could interactive learning be the answer?

VIDEO QUALITY

If faculty plan to use interactive videos in their online classrooms, it is essential to ensure the videos are of certain a quality. Hughes (2009) examined how online videos had an overall impact on teaching his online courses firsthand. According to Hughes (2009), students hoped videos shown in their classes had a professional quality to them, but they did not need to be perfect (p. 4). Students even commented that it was nice to see minor mistakes in the videos so they could build a connection with their professors and see that they, too, made mistakes (Hughes, 2009, p. 4). This input from students should come as a confidence boost to intimidated professors. Students want to see genuine effort put into a nice quality video but are not judgmental of small flaws.

Morian and Swarts (2012) examined a framework for evaluating YouTube videos used in online classes. This study included critical information to consider when creating videos that students would view. Morian and Swarts (2012) found “even well-organized and comprehensive videos drew poor ratings for reasons that can only

be reliably attributed to poor production” (p. 10). This supported the foundation that even if content was inclusive, poor video quality would greatly decrease the probability of students perceiving the video as effective.

To reinforce the importance of video quality, according to Tewell (2010), a common concern in his study was image quality being impacted by video compression. Tewell (2010) examined the quality and effectiveness of video tutorials in academic art libraries. With this, faculty hurt themselves by spending vast amount of time creating videos, and then lost the video quality due to compression issues. As creating videos can take numerous hours, faculty must ensure the video quality is high so students benefit from and absorb the full understanding of the content

Research on flipped classrooms often includes useful information on the overall quality of videos. As flipped classrooms included online and face-to-face work, the online portion of the class often strived to include videos. Obradovich, Canuel, and Duffy (2015) studied the implementation of how libraries used online videos in relation to flipped classrooms. With the usability of the technology that was available, it was fairly simple to create and edit videos with little knowledge of video software, and therefore it was expected video quality should be good (Obradovich et al., 2015). The research indicates that video quality must be considered when used in online classrooms.

IMPORTANCE OF INTERACTIVITY

The literature shows the importance of interactivity in both online classrooms and online videos. Tempelman-Kluit (2006) examined an HTML and a streaming version of the same library video tutorial. The HTML version “demonstrates the standard library instructional approach, with text and images included, and a hierarchical navigation bar with content organized in

modules," while the streaming version was a "less-traditional approach to library instruction that employs streaming audio and narration" (Tempelman-Kluit, 2006, p. 368). This study was critical because the interactive component was examined. According to Tempelman-Kluit (2006) "interactive elements are designed to allow the user to reflect on the information delivered before moving to the next step in the learning process" (p. 368). Including an interactive component ensured that the learner understood and comprehended the content, instead of simply viewing it. Tempelman-Kluit (2006) also added that "pauses between sections of content represent good opportunities for providing interactivity, which further encourages and assists the learner in synthesizing and organizing information" (p. 368).

This importance of interactivity in online tutorials was supported by Slebodnik and Riehle (2009) when they examined the creation of video tutorials and video software choices at higher education libraries. They found interactive components, such as quizzes or online exercises, should be included when creating online tutorials (Slebođnik & Riehle, 2009). They also concluded "an action as simple as clicking from screen to screen rather than passively watching the tutorial advance automatically can enhance interactivity and increase user attention" (p. 36).

This was supported by Zhang et al. (2004) when they explored whether or not elearning could altogether replace classroom learning by using an interactive virtual mentor. It was found that using elearning could be an alternative to classroom learning as their model indicated "learning is an active knowledge acquisition process via continuous interaction between [virtual mentor] and learners" (p. 77). This established that interaction in an online classroom was critical in numerous forms. Anderson and Wilson (2009) also studied the effectiveness of passive and interactive tutorials in the medical field

and found that the interactive tutorials had greater impact on students than the passive videos. This evidence showed that an interactive component should be considered when using videos to guide student instruction.

PLAYER CONTROLS IN VIDEOS

When viewing videos, research shows that the presence of player controls has an overall positive impact on the video. Player controls are usually found on the bottom of any video, and allow the user to pause, rewind, or re-watch the video. Hughes (2009) explained that when he created videos in his course, he ensured that students had the chance to "pause, rewind, review, and reflect as they progress through the content" (p. 4). This advantage allowed students to work at their own pace and not become overwhelmed if they missed a concept. Tewell (2010) also emphasized the importance of playback control, as he considered this in his "usability" section when reviewing online video tutorials (p. 56).

To support the importance of player controls, Kelly, Lyng, McGrath, and Cannon (2009) examined the effectiveness of online video tutorials when teaching clinical nursing skills. In their study, they found that 54% of the sample enjoyed the ability to watch the video as many times as they wanted to make sure they completely understood the material (Kelly et al., 2009, p. 297). This showed that player controls had a positive impact when incorporating videos into online classes.

EFFECTS OF AUDIO NARRATION

As most videos contain audio, research exists on how audio narration should be considered when creating videos for online classes. Morian and Swarts (2012) found that using voice overs contributed to the overall increased effectiveness of the video, and videos without narration and directions contributed to a poorer video (p. 10). If narrators in the videos explain direc-

tions, the language should be specific and directly related to the content and technology being utilized (Morian & Swarts, 2012). For faculty who think they should strictly play music in the background instead of narrate, they may benefit from re-examining the impact that audio narration has on students.

In a study conducted by Winslow, Dickerson, and Lee (2012), the researchers focused on studying screen captured videos with narration, in comparison to screen captured videos without narration. To support Morian and Swarts's (2012) findings, it was established that when students were exposed to both video and audio narration at the same time, they performed better than those who were exposed only to video (Winslow et al., 2012).

In relation to audio narration, Slebodnik and Riehle (2009) found "music or narrative audio files may enhance learning and provide a deeper sense of connection with the sometimes geographically distant instructor" (p. 35). Correctly used and rehearsed narration could strengthen many learning styles (Sleobodnik & Riehle, 2009). For faculty who are not comfortable recording their own voice, simple *text to speech* software is available on the Internet. Creating a connection with students, especially in the case of distance education students, is essential to ensure a comfortable learning environment, and audio narration can assist in this process.

Tewell (2010) also had similar findings when he stated that videos with unwanted background noise, or no noise at all, significantly decreased audio quality. Morian and Swarts (2012) added that when narrators spoke at a "conversational pace," it created a better quality video (p. 10). Good videos were videos that included "narrators who were professional and who spoke clearly, conversationally, and enthusiastically" and occasionally added a bit of humor without going overboard (Morian & Swarts, 2012, p. 14). Quality and well-

thought-out narration audio should be included when creating videos, and background noise should be kept to a minimum.

VIDEO LENGTH

Current research exists on the appropriate length of instructional videos. There are many common misconceptions about teaching pedagogy when faculty shift from face-to-face classes to online classes. A critical mistake made often when incorporating video into online classes is the idea that videos have to be just as long (if not longer) than a regular lecture would be. Research suggests just the opposite, as students excelled when videos were *chunked* or *segmented* into smaller videos. Moreno (2007) examined segmentation methods in an effort to decrease cognitive load. The author's research supported the foundations that segmenting or chunking videos into smaller segments was more effective for students to comprehend the material presented (Moreno, 2007).

Hughes (2009) found that without the interaction of students and faculty in the face-to-face classroom, it was less likely students would sit through online video lectures that were the same length as classroom lectures. To support the idea of the increased effectiveness of short videos, Sleobodnik and Riehle (2009) found similar results. Their study showed "the best online tutorials are designed to organize information into smaller chunks that can be absorbed at a learner's own pace" (p. 36). They even suggested creating multiple, concentrated short videos, as opposed to one long video (Sleobodnik & Riehle, 2009).

It is important to add that even though each video was only a few minutes long, it still took a significant amount of time to create these videos, as factors such as script writing and production must be taken into consideration (Winslow et al., 2012). When deciding whether or not to include video

in classes, production time should be a deciding factor. In support of the faculty members, Hughes (2009) found that creating shorter videos was much easier if they need to be edited, as faculty would only have to rerecord a small clip, as opposed to an entire chapter lecture. If video length is a priority from the beginning of the video creation process, both students and faculty have the chance to benefit greatly.

INTERACTIVE VERSUS PASSIVE TUTORIALS

Another issue regarding tutorials involves the results of using both interactive and passive videos in classrooms. Kelly et al. (2009) found that online videos should be used in conjunction with other learning materials, instead of as a replacement. This idea was disputed by Turner, Fuchs, and Todman (2015), as this study concluded that students preferred static (text and image) tutorials opposed to dynamic (video and audio) tutorials. Therefore, static tutorials could help students smoothly navigate information and “more easily review tutorial content” (Turner et al., 2015, p. 46). The idea is that if there is less to distract the student, the better chance they have to learn the information.

Craig and Friehs (2013) found similar results to Kelly et al. (2009) when they studied the effectiveness of both a video and an HTML version of a biology online tutorial. Their findings suggested that students achieved higher scores on a post-tutorial quiz when they watched the video tutorial, opposed to the HTML tutorial (Craig & Friehs, 2013).

Slebodnik and Riehle (2009) supported this idea, as their research suggested that, although learning styles differ and face-to-face instruction should not disappear, the use of a “well-designed online tutorial can effectively provide instruction and assistance to a wide range of library users” (p. 34). With the research that existed, there

was evidence that online video tutorials could enhance courses significantly if used correctly.

CURRENT STUDY

Over recent years, numerous studies have examined the effectiveness of passive versus interactive tutorials. In particular, library tutorials were the major focus of most studies (Tempelman-Kluit, 2006; Tewell, 2010), as well as those in other disciplines such as biology and nursing (Craig & Friehs, 2013; Kelly et al., 2009). Yet, no research exists on the effectiveness of these tutorial types on APA proficiency in graduate students.

APA formatting is used in numerous differing fields, most obviously in psychology, but also in education and nursing, therefore this study will appeal to multiple disciplines. Education professionals in particular will value this study to understand how teaching formatting styles in online classes through passive and interactive videos affects students. According to Clark-Ibanez and Scott (2008), “the growth of online learning is hard to ignore” (p. 34). This study will contribute to the future of online learning and the most efficient ways to teach to distance education students.

Studies performed in the past contributed to the knowledge base of what elements to include in a quality online video. Research shows adding an interactive element to a video can enhance student learning (Slebodnik & Riehle, 2009; Tempelman-Kluit, 2006), but scant research reflects on how interactive video quizzes will fit into the big picture of content comprehension. The interactive video tutorial used in this study included an accompanying quiz to measure how this affects student proficiency of APA formatting. The quiz consisted of a variety of reading comprehension multiple choice questions to see if this interaction contributes to the overall understanding of APA formatting.

Currently, the research of numerous authors shows that including audio narration in video tutorials increases effectiveness (Morian & Swarts, 2012; Slobodnik & Riehle, 2009; Winslow et al., 2012). Yet, research does not indicate whether or not having two or more narrators of opposite sexes would have any effect on student engagement with the video. As students have a hard time staying focused regardless, the addition of differing tones and pitches may be the solution they need. The interactive video tutorial presented in this study featured narrators of opposite sexes. The results of this study could greatly enhance the knowledge needed when creating video tutorials when considering elements such as APA formatting style, interactive quizzes, and audio narration.

RESEARCH HYPOTHESIS

The research hypothesis is as follows: Incorporating an interactive tutorial component in online graduate courses will increase student proficiency of APA formatting.

METHODS

PARTICIPANTS

Participants ($N = 52$; $M_{age} = 29.24$, $SD_{age} = 5.38$; $M_{GPA} = 3.48$, $SD_{GPA} = .38$) included graduate students from six sections of an introductory research course at a suburban, public teaching college in the southeastern United States. The proportions of gender and race in the sample compared favorably to the college's population of graduate students and are shown in Table 1.

PROCEDURE

This exploratory study employed a quasi-experimental design with historical data. Three sections of the introductory research course used a passive APA tutorial, while the other three sections piloted a more interactive APA tutorial. The students enrolled in the three sections utilizing the passive tutorial were given access to their tutorial at the beginning of the course, as were the students enrolled in the three sections who were utilizing the interactive tutorial.

Table 1. Demographic Profile of the Sample Versus the College Population

Demographic	Sample Frequency	Sample Percentage	College Frequency	College Percentage
Gender				
Male	14	27	4,242	41.3
Female	38	73	6,102	59
Race				
White	38	73	6,467	63
Black	6	12	2,103	20
Hispanic	3	6	645	6
Asian	1	2	156	2
American Indian or Alaska Native	0	0	34	0.3
Native Hawaiian or Pacific Islander	0	0	27	0.3
Other	4	85	912	8

The passive APA tutorial consisted of a PowerPoint authored by the course instructor outlining and providing examples of the fundamentals of APA formatting. This was self-paced, and did not include any interaction between the content and the student aside from the student reading the information provided. It was the responsibility of the student to read the content and then implement it in their course work. The interactive video tutorial was written and produced by library faculty who had success creating information literacy tutorials for the University. The 19-minute video tutorial employed best practices found in the review of literature, including interactivity, player controls, audio narration, and appropriate video length. The interactive video also included captions, as well as an embedded quiz with 10 true/false and multiple choice questions to allow students to evaluate their APA knowledge and understanding. After students utilized either the interactive or passive tutorial, they completed a final writing assignment graded using a rubric. Within each rubric, there was an "APA Style" section in which each student was assigned a number value based on their APA writing proficiency. This number would in turn measure how effective each type of tutorial was in understanding the APA formatting style.

A preliminary analysis was first conducted to inspect the data for completeness and accuracy and then to compile the descriptive statistics for the study. Because scores came from two different instructors teaching the course, raw scores were converted to standardized z scores for comparison and analytical purposes. Outlying scores below two standard deviations from the mean were excluded from the study due to the increased likelihood that other variables apart from the effectiveness of the APA tutorial could be potential contributors to their low scores (as indicated by their low scores on all parts to their research papers); this comprised only two

scores. The nature of the data determined the inferential analysis to follow.

RESULTS

To test the difference in APA proficiency between those who used the passive and interactive APA tutorials, an independent samples t test was conducted. In other words, the mean scores measuring APA proficiency for those who used the passive tutorial and those who used the interactive tutorial were compared to see if a statistically significant difference existed between the two (with an alpha level set at .05). The score distributions for the two groups were both fairly normal.

To test the assumption of homogeneity of variance between the two groups, the Levene's Test for Equality of Variances was performed. Since this assumption was not met ($p = .001$), information pertaining to the assumption of equal standard deviations was analyzed, because "if the largest standard deviation is less than twice the smallest standard deviation ... methods based on the assumption of equal standard deviations [can be used] and ... results will still be approximately correct" (Moore, McCabe, & Craig, 2009, p. 646). The smallest standard deviation ($SD = .668$) was among students who used the interactive tutorial and the largest standard deviation ($SD = 1.116$) was observed within the group of students who used the passive tutorial. Since the largest standard deviation was not more than twice the smallest standard deviation, the assumption of equal standard deviations was met (Moore et al., 2009).

Because the samples were normally distributed and the assumption of equal standard deviations was met, an independent samples t test was considered appropriate to analyze the data. The results indicate that there was a statistically significant difference between the mean APA scores for the two groups, $t(25.576) = 2.358, p = .026$. In other words, students who used the

Table 2. APA Scores by Instructor

Measure	Instructor 1		Instructor 2		Total	
	M	SD	M	SD	M	SD
Passive APA tutorial						
Raw scores	76.9	12.169	65.8	17.440		
Standard scores	-.333	1.154	-.345	1.135	-.336	1.116
Interactive APA tutorial						
Raw scores	85.0	5.774	72.4	14.939		
Standard scores	.433	.548	.083	.972	.326	.668

interactive APA tutorial had a statistically significantly higher mean score ($M = .326$, $SD = .668$) than that of those who used the passive APA tutorial ($M = -.336$, $SD = 1.116$); see Table 2. Cohen's d was calculated for an effect size of .72 (moderate to large effect). All analyses were conducted using SPSS, version 24.

ASSUMPTIONS AND LIMITATIONS

When conducting this study, it was important to address the assumptions that the researchers had. To begin, the researchers did not think that the students were studying APA on their own time, instead relying directly on the tutorials that were presented during their online courses. Researchers also presumed that all students had the technical means to view the interactive tutorials. The technical requirements to view the interactive tutorials were the same requirements that are needed to take an online course at the studied institution. Finally, the researchers expected that students would watch and complete the entire tutorial.

There were also limitations to this study that the researchers faced. The first limitation was the reliability of the measure. In detail, more than one faculty member assessed APA proficiency on the written assignment after the students completed the tutorial. Therefore, there was room to interpret proficiency differently, and there-

fore grade the assignment using the APA rubric differently. Another limitation was the limited sample size, which threatens the external validation of the study. Establishing causal inference in small, non-randomized studies presents methodological challenges, and cautious, limited interpretation of the results is necessitated by the small sample size used in the study. Further investigation with larger sample sizes is encouraged to support the differences that were found to exist between the two groups in this exploratory study.

Finally, the last limitation was tutorial completion. There was no way to tell whether or not the student had watched the entire tutorial. If students closed the tutorial before it was completed, then they likely would not learn or retain all the content, and therefore it would affect their APA proficiency score.

DISCUSSION

This project was the first video tutorial collaboration between faculty in the College of Education and the library. As stated previously, the education faculty presented the idea to the library faculty because of the librarians' success in creating information literacy tutorials for the university. Particularly, the tutorial on how to avoid plagiarism was very successful and highly used by faculty across campus. However, it was a passive tutorial that had the quiz

component as separate from the video. It was widely known that the library video production team members were able to assess their information literacy tutorials by both qualitative and quantitative means in order to measure what functioned well and what needed to be edited. They utilized assessment tools to evaluate online accessibility, the video presentation, the composition of each quiz question, and students' scores. The video portion of the project began with a scriptwriter who took the passive PowerPoint presentation and turned it into an informative and entertaining script to engage with graduate students. A librarian with extensive design experience created numerous storyboards to illustrate a graphical representation based on the script.

During the first phase of the video production, the library held a focus group viewing in order to receive feedback. The focus group included faculty, staff, and students. In the production phase of the video, the education faculty challenged the librarians to see if they could develop a way for the video to be interactive, recommending that the video stop intermittently to quiz students over the content they just viewed. The library video production team used After Effects, Audition, and Media Encoder from the Adobe Creative Cloud to create the video tutorial. However, it was still a passive video. An IT Analyst, who is a member of the library's video production team, wrote a customized program and embedded it in the YouTube video using JavaScript and an application programming interface to make this intermittent quiz interactive and functional. Moreover, the production team made it where students could not advance the video until they answered each quiz question, compelling the student to learn in chunks and at their own pace. The quiz questions were hosted on the library's web server and loaded individually by asynchronous JavaScript and XML using PHP, thus the questions were only requested when they

were needed. Additionally, the video production team and the education faculty unanimously decided to disable video controls so students could not advance the video. The video would only advance once the student actively answered each of the quiz questions. The video did not time out and required student interaction to progress to the next section of information. In turn, the students would not miss answering a question.

Overall, the interactive APA tutorial proved successful. Everyone involved in the production met their objectives for the tutorial and, most importantly, as mentioned above, the students who completed the interactive APA tutorial had statistically significant higher mean scores in APA proficiency than those who used the passive APA tutorial. However, the results of this project raised additional questions for the researchers and ideas for future investigation. This exploratory study, the first to attempt to determine the effectiveness of interactive versus passive components of an online tutorial in increasing student proficiency in APA formatting, was conducted on a small scale. The researchers recommend creating a similar study on a larger scale so it can be more generalized. In addition, the students in this sample were all graduate students in the College of Education. Since APA formatting is used in a number of other disciplines, most obviously in psychology, but also in nursing, political science, and business at our institution, the scope of the study could be widened to students in other fields. Further, this study looked specifically at graduate students, but would the results be similar for undergraduates? Perhaps implementing an assessment prior to the intervention would glean useful results. Finally, it might also be of interest to survey students to learn their perceptions of the methods of access to the APA tutorial. If students exhibit a preference for the interactive versus passive tutorial, what would such a preference mean in compari-

son to the competence exhibited by students as evidenced by their quiz results and their writing assignments grade based on the APA scoring rubric? The results of these research questions could lead to further improvement of student proficiency in APA formatting, reducing common errors and helping students to get more comfortable with the research process and citing overall.

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