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A Study Using Plagiarism Detection Services To Assess The Effect Of An Apa Formatting And Plagiarism Training Lesson On The Quality Of Student Originality Scores

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A STUDY USING PLAGIARISM DETECTION SERVICES TO ASSESS THE EFFECT OF AN APA FORMATTING AND PLAGIARISM TRAINING LESSON ON THE QUALITY OF STUDENT ORIGINALITY SCORES

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ABSTRACT

The purpose of this study is to use plagiarism detection services to assess the effect of an APA training lesson on the quality of SafeAssign and Turnitin originality scores of student research papers. Although these two services have been around more than a decade, there is minimal published research using them to measure the quality of training that students receive on preventing plagiarism, nor is there much published research comparing the two services. For this study there are two groups of students' involved, trained and not-trained groups. The trained group of students come from a specific class in which they participate in an APA training lesson for proper in-text citations, formatting and reference lists, and also take a research and writing exam. The not-trained group of students are from a class that does not use the same formal training methods on avoiding plagiarism. The results of this study show that there is no significant difference between the originality scores of the trained and not-trained groups. Furthermore, there was no relationship found between the research and writing exam, taken by the trained group, and those students' eventual originality scores. There is however, a significant difference between the reported SafeAssign and Turnitin originality scores. Recommendations for improvement include a look at the current training, and the types of questions that students frequently answer incorrectly, with a goal to re-focus future training in order to clarify topics that students have trouble with. Future research may include a closer look at the SafeAssign and Turnitin categories, used for passages returned as matching, which may then be used to improve training on how to avoid plagiarism.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Chapter Overview

The purpose of this chapter is to explain the rationale for this study and to describe the problem being investigated. First, a background of the study is presented. The background information includes an overview of the training lesson on APA formatting and plagiarism and a description of two of the more well-known and accessible plagiarism detection services. Second, the problem statement and need for the study is described. The need for the study describes the importance of students in higher education learning to properly write research papers while understanding and avoiding plagiarism. Third, the research questions and hypotheses are described. Fourth, the assumptions and limitations of the study are described. Lastly, the chapter concludes with the definitions of terms relevant to this study.

Background

Graduate program classes involved within this study incorporate, as part of their course documentation, a student manuscript preparation guide (see Appendix A) for assisting students in writing research papers with proper in-text citations, formatting and reference lists. The guide is based on the 6th edition of the APA style manual and provides students with an overview of APA requirements. Course instructors may use the Blackboard SafeAssign plagiarism detection service, in conjunction with the guide, to verify the originality of work and identify potential

plagiarism within student papers. One selected class, in addition to the guide, began to incorporate formal instructor training along with a research and writing exam for students as part of the lesson plan (see Appendix B). This study will compare the 1) plagiarism detection service originality scores of student papers from classes with formal instructor training and those without formal instructor training, the 2) students' research and writing exam scores with the originality scores and the 3) two types of plagiarism detection services used to collect the originality score data.

The classes used within this study are a mix of traditional classroom and online delivery. The type of delivery for each class will not be a variable, but instead the results of this study will be assumed to apply to both types of delivery. A study by Ison (2014) of dissertations from both traditional classroom and online delivery institutions found no significant difference in levels of plagiarized material. Therefore, a dissertation from a traditional classroom and a dissertation from an online delivery class should expect to have the same level of originality. Unfortunately, more than half of the dissertations within the study contained unoriginal material (Ison, 2014). As a result of the study, Ison (2014) suggests that improved education on avoiding plagiarism through proper citing, formatting and referencing is needed, regardless of the delivery method, up to and including the doctoral level.

For this study, two plagiarism detection services will be used, SafeAssign and Turnitin. SafeAssign was developed by Blackboard, Inc. and comes free with the Blackboard course management system (Stowers & Hummel, 2011). According to Hill and Page (2009) the detection resources used by SafeAssign include Internet web pages, ProQuest databases, a proprietary database and a shared institutional database. Alternatively, Turnitin was developed by iParadigms (Stowers & Hummel, 2011). The detection resources used by Turnitin include

Internet web pages, public databases, ProQuest and ABI databases, FindArticle databases, a proprietary database of documents and institution-specific databases (Hill & Page, 2009). According to Hunt and Tompkins (2014) their study of the comparison of SafeAssign and Turnitin found that there is no statistically significant difference between the two for detecting plagiarism, nor was there a statistically significant difference in reporting false positives. In contrast, Hill and Page (2009) found that Turnitin detected plagiarized material more accurately and had fewer false positives than SafeAssign. Because of these contrasting results, this study will include a comparison of the two plagiarism detection services used for any significant differences.

Problem Statement

The goal of this study is to assess the quality of a training lesson on APA in-text citations, formatting and reference lists by using plagiarism detection services to measure student research paper originality scores in order to improve research paper writing skills. This study will utilize SafeAssign and Turnitin software to determine the originality scores of student papers from two classes at a mid-western accredited university with a population of 10,000 to 15,000 students. The originality scores of student papers in the class that utilized the training lesson on APA formatting and citations will be compared to the originality scores of the class that did not utilize the training lesson. The study will then determine if there is a relationship between the research and writing exam scores of the trained group and their SafeAssign and Turnitin originality scores. The study will also try to determine if there is a statistically significant difference between the SafeAssign and Turnitin originality scores.

Need for the Study

According to Delcoure and George (2012) plagiarism is prevalent today in higher education even though institutions have many tools available to them to educate students on this issue. The approach to educating students and improving their understanding of plagiarism may include giving students' access to plagiarism detection services both during and after the writing process. Delcoure and George (2012) state that faculty members who allow students to use plagiarism detection services during the writing process, to improve research and writing skills, argue that students need to learn to manage their writing process in order to improve the quality of their work. The use of plagiarism detection services as both a final testing tool and a self-managing tool may be used by higher education institutions to reduce academic dishonesty and improve the quality of students' original work (Delcoure & George, 2012).

A study by Vieyra, Strickland and Timmerman (2013) found that the reason for one-third of research proposals in their study containing plagiarized sentences was a lack of familiarity with technical writing. They found that students who plagiarized scholarly literature made a greater attempt at paraphrasing where by contrast students who plagiarized popular websites simply copied and pasted. Furthermore, Vieyra et al. (2013) identified the location of the plagiarized sentences and found that 22% of Abstracts, 97% of Introductions, 34% of Methods, 8% of Results and 8% of Discussion sections had instances of plagiarism. Knowing how different resources are plagiarized and where in a research paper the plagiarism is most likely to be found may assist higher education institutions in educating students on how to learn about and prevent plagiarism. The results show that there are different known plagiarizing strategies or patterns used in higher education and further instruction on preventing plagiarism is needed (Vieyra et al., 2013).

Research Questions and Hypotheses

The following research questions and hypotheses will be used to determine 1) the effectiveness of the lesson on APA formatting and plagiarism, 2) if there is any relationship between the research exam scores and the originality scores, and 3) determine if there is a difference between SafeAssign and Turnitin originality scores.

RQ1: Does the trained group have significantly different SafeAssign originality scores than the not-trained group?

H_{o1}: $\mu 1 = \mu 2$: There is no statistically significant difference in SafeAssign originality scores between the trained group and not-trained group.

H_{a1}: $\mu 1 \neq \mu 2$: There is a statistically significant difference in SafeAssign originality scores between the trained group and not-trained group.

RQ2: Does the trained group have significantly different Turnitin originality scores than the not-trained group?

H_{o2}: $\mu 1 = \mu 2$: There is no statistically significant difference in Turnitin originality scores between the trained group and not-trained group.

H_{a2}: $\mu 1 \neq \mu 2$: There is no statistically significant difference in Turnitin originality scores between the trained group and not-trained group.

RQ3: Is there a relationship between the trained group's research and writing exam scores and their SafeAssign originality scores?

H_{o3}: $\mu 1 = \mu 2$: There is no relationship between the research and writing exam scores and SafeAssign originality scores.

H_{a3}: $\mu 1 \neq \mu 2$: There is a relationship between the research and writing exam scores and SafeAssign originality scores.

RQ4: Is there a relationship between the trained group's research and writing exam scores and their Turnitin originality scores?

H_{o3}: $\mu 1 = \mu 2$: There is no relationship between the research and writing exam scores and Turnitin originality scores.

H_{a3}: $\mu 1 \neq \mu 2$: There is a relationship between the research and writing exam scores and Turnitin originality scores.

RQ5: Is there a statistically significant difference between the SafeAssign and Turnitin originality scores?

H_{o5}: $\mu 1 = \mu 2$: There is no statistically significant difference in originality scores between SafeAssign and Turnitin.

H_{a5}: $\mu 1 \neq \mu 2$: There is a statistically significant difference in originality scores between SafeAssign and Turnitin.

Assumptions and Limitations

The first assumption of this study is that the classes used within this study are a mix of traditional classroom and online delivery. The type of delivery for each class will not be a variable, but instead the results of this study will be assumed to apply to either delivery type.

The second assumption of this study is that the results of this study may be generalized across multiple demographics within higher education. Factors such as age, gender, income, previous education, etc. are not variables within this study.

The third assumption of this study is that if and when plagiarized material is found within a student paper, the original source will not be evaluated as to whether the source is actually plagiarized material.

The first limitation of this study is that SafeAssign and Turnitin are the only two plagiarism detection services that will be utilized. There are other plagiarism detection services available on the web and this study does not purport to draw any comparisons to them.

The second limitation of this study is the SafeAssign and Turnitin software versions at the time this study is being conducted. Any future changes made to the software may not be applicable to the design of this study.

The third limitation of this study is the current bank of questions used on the research and writing exam for the trained group. Updates to the exam may occur in the future and any changes may have an effect on its applicability to the design of this study.

The fourth limitation of this study is the current revision of the Student Manuscript Preparation Guide. The current revision at the time of this study and the revision used within the trained classes for this study is the same, dated and effective as of April 9, 2014.

The fifth limitation is that the results of this study may only be generalized across 4000/5000 university course levels.

Definition of Terms

APA Style is a set of scientific writing rules designed to ensure clear and consistent presentation of written material. Editorial style concerns uniform use of such elements as punctuation and abbreviations, construction of tables, selection of headings, citation of references, and presentation of statistics (American Psychological Association, n.d.).

Originality Score is a percentage score ranging from 0% to 100% that indicates the probability that the submitted paper contains matches to already existing sources. The higher the score, the higher the probability that the submitted paper includes content from an existing source (Blackboard Help, n.d.).

Plagiarism is an act or instance of using or closely imitating the language and thoughts of another author without authorization and the representation of that author's work as one's own, as not by crediting the original author (Plagiarism, n.d.)

Plagiarism Detection Service is a service that searches a range of websites and databases for examining student papers in order to detect unoriginal work (Delcoure & George, 2012).

Technical Writing involves the preparation of instruction manuals, journal articles and other supporting documents to communicate complex and technical information more easily. (Brooks, 2014).

Chapter Summary

Preventing plagiarism before it happens is an essential part of research paper writing for students in higher education. Plagiarism detection services are available through different sources to aid in learning what plagiarism is and how to avoid it. The APA training lesson developed to prevent plagiarism is the approach that will be examined within this study. As plagiarism becomes more prevalent and with sources easily accessible on the web, the need for educating students on preventing plagiarism is growing. The purpose of this chapter was to provide an overview of the background and need for this study. The next chapter will explain in further details the concepts presented thus far.

CHAPTER 2

REVIEW OF LITERATURE

Chapter Overview

The purpose of this chapter is to explain concepts related to the problem of plagiarism as relevant to this study. The chapter is divided into three sections. The first section explores the need for taking an educational approach to avoiding plagiarism. Multiple studies are presented and described in order to stress the importance of educating students on how to avoid plagiarism and why it is important. The second section reviews the results of studies where different training methods for avoiding plagiarism have been employed and the results of those studies are presented. The third section describes the plagiarism detection services used within this study, SafeAssign and Turnitin, and the results of studies that have employed both of these services.

An Educational Approach to Plagiarism

To begin, Turnitin LLC. (2015) defines what it calls the ten different types of plagiarism as a guide to help instructors and students to recognize the various forms of plagiarism found today and what forms they can take. The various forms of plagiarism, as defined by Turnitin, are summarized in Table 1. A survey by Turnitin LLC. (2015, pp. 4-5) found that the "act of submitting another's work, word-for-word, as one's own" is not only the most frequent but the most problematic. While this type of plagiarism is considered intentional, the study that follows

within this dissertation takes the approach of educating students and researchers who want to avoid unintentional plagiarism.

Table 1

Ten Types of Plagiarism from Most to Least Severe by Turnitin LLC. (2015, pp. 4)

Type of Plagiarism and Description	
1. Clone	"An act of submitting another's work, word-for-word, as one's own."
2. Ctrl-C	"A written piece that contains significant portions of text from a single source without alterations."
3. Find-Replace	"The act of changing key words and phrases but retaining the essential content of the source in a paper."
4. Remix	"An act of paraphrasing from other sources and making the content fit together seamlessly."
5. Recycle	"The act of borrowing generously from one's own previous work without citation – in one paper."
6. Hybrid	"The act of combining perfectly cited sources with copied passages – without citation – in one paper."
7. Mashup	"A paper that represents a mix of copied material from several different sources without proper citation."
8. 404 Error	"A written piece that includes citations to non-existent or inaccurate information about sources."
9. Aggregators	"The aggregator includes proper citation, but the paper contains almost no original work."
10. Re-tweet	"This paper includes proper citation, but relies too closely on the text's original wording and/or structure."

A study by Stagg, Kimmins and Pavlovski (2012) briefly describes three different schools of thought on plagiarism and how to address them: 1) a punitive approach where the appropriate approach is to discipline students after plagiarism is found to have occurred, 2) a restorative justice approach where plagiarism is looked at as an act against a community and 3) an educational approach that educates students on how to avoid plagiarism and improve

referencing skills. The study by Stagg et al., (2012) takes the approach of the third school of thought and was designed for improving the referencing skills of students. They propose that students lacking the proper understanding of why referencing is important, and how it should be done, is a problem that contributes to plagiarism (Stagg et al., 2012).

A paper by Kutz, Rhodes, Sutherland, and Zamel (2011) suggests that there are effective ways to prevent plagiarism, especially when students are pulling their references from online sources. Kutz et al., (2011) proposes that making students aware of the problem with plagiarism and timely instruction on how to avoid it may make a difference. Dee and Jacob… (as cited in Kutz et al., 2011, p. 33-34) found that student plagiarism was reduced by two-thirds after students were required to take an online plagiarism tutorial and subsequent quiz. In contrast, a study by Kier (2014) employed a set of five quizzes and found that half of students were not able to recognize plagiarized material consistently. Within this study, students were given feedback on paraphrasing correctly, but then were not able to correctly paraphrase a passage, therefore, Kier (2014) suggests that educational instructors may in some cases overestimate students' abilities in these areas. Because this type of skill is necessary for students in higher education, educating students on preventing accidental plagiarism is an important first step (Kier, 2014).

Some of the challenges faced by schools are summarized by Bretag (2013) and shown in Table 2. Bretag (2013) suggests that all educational stakeholders should work to ensure that anyone involved in research act in an honest way, both faculty and students. Plagiarism, as one part of academic dishonesty, is mainly focused on in research from preventing student plagiarism, which is why Bretag (2013) suggests that institutions take a holistic view of the broader issue when addressing plagiarism because it occurs at all levels of scholarship. As students' progress from undergraduate to graduate degrees and from graduate degrees to being

establish researchers, the need for adequate training on learning how to prevent plagiarism is important early on in a student's education.

Table 2

Challenges in Addressing Plagiarism by Bretag (2013)

Challenge and Description	
1. Academic Integrity & Plagiarism	"Plagiarism undermines the integrity of education and occurs at all levels of scholarship."
2. Plagiarism by Students	"Research indicates that both undergraduate and postgraduate students require training to avoid plagiarism."
3. Plagiarism by Established Researchers	"Established researchers are not immune to allegations of plagiarism."

A study by Boehm, Justice and Weeks (2009) surveyed a group of academic affairs officers, or provosts, at both two- and four-year colleges and universities. The purpose of the study was to identify best practices that contribute to academic integrity and tend to reduce instances of academic dishonesty (Boehm et al., 2009). They found that four of the fourteen best practices surveyed for were significant in reducing academic dishonesty, as shown in Table 3, with faculty training and clear examples of what constitutes cheating as the two most important practices. Interestingly, they found that four of the suggested best practices within their survey were perceived to be factors that would increase the chances of academic dishonesty, also shown in Table 3.

A study by Chiesl (2007) suggested multiple approaches for an online education instructor to take in order to reduce the possibility of cheating by students who are enrolled in online higher education classes. The four courses of action suggested are 1) disseminate

Table 3

Practices Affecting Academic Dishonesty in Higher Education by Boehm et al. (2009, pp 60-61)

Perceived Positive and Negative Initiatives

Perceived initiatives that contribute to academic integrity & reduce academic dishonesty:

1. "Placing an XF on official transcripts when a student has been found responsible for cheating. XF would be defined as "failed class due to academic dishonesty" and could be changed to an F upon completion of an educational program."

2. "Provide training for faculty on academic integrity issues such as how to discourage cheating via effective classroom management, how to properly confront infractions, and what current research offers as to why students cheat."

3. "Promote effective classroom management strategies: examples could include the utilization of multiple exams, maintaining small class sizes, and prohibiting calculators and other electronic devices."

4. "Provide clear definitions and specific examples of what constitutes cheating under the College's Honor Code."

Perceived initiatives that negatively affect academic integrity and academic honesty:

1. "Faculty encouragement of more collaboration on homework assignments in an attempt to better prepare students for today's workforce and to reduce the temptation of inappropriate collaboration assignments expected to be completed independently."

2. "Penalize those students who do not confront cheaters. If students are to assist in the promotion of integrity, then they must be held accountable for not confronting incidences of cheating."

3. "Recognize those faculty members who properly confront and process instances of cheating. Student newspaper announcements, annual awards, campus mailings and appreciation luncheons could be used to demonstrate appreciation."

4. "Provide additional support for faculty during the formal adjudication process (available legal counsel, informal hearings, and clear communication from the Honor Court regarding the process after a charge has been filed)."

information to distance students, 2) change the process used by students to turn in written assignments, 3) change the process by which exams are administered and 4) create a nonsequential chapter assortment of questions (Chiesl, 2007). The suggestions and their main

points are summarized in Table 4. Overall, student feedback led Chiesl (2007) to suggest that the merits of the approaches were confirmed. In a student survey, 53% of students agreed that cheating would be less likely to occur in a class using those approaches versus a class not using those approaches.

Plagiarism detection services may be used for assessing the originality of student papers, however, they are also used by educators as a tool for students to use during the writing process in order to improve their research and writing skills (Delcoure & George, 2012). This educational style approach allows students to submit research paper drafts to plagiarism detection services so that they may learn to understand how those services work, how to read the results given, and then use that feedback to avoid plagiarism (Kutz et al., 2011). There is value in using these types of services as education tools for students learning about preventing plagiarism and interpreting their results, not as simply tools for catching plagiarized material (Kutz et al., 2011). Sammel, Weir and Klopper (2014) found that students said they felt more accountable for the originality of their final research papers as a result of having used the SafeAssign plagiarism detection service during the writing process.

Paul and Cochran (2013) suggest that student usage of plagiarism detection services for submitting paper drafts is not only beneficial to the student, but to the instructor as well. The use of these services and therefore prevention of plagiarized material in the final paper submission allows the instructor to spend less time identifying possible plagiarism and more time focusing on other activities (Paul & Cochran, 2013). Plagiarism detection services such as SafeAssign and Turnitin may be used in higher education to help instructors both detect and discourage plagiarism (Stowers & Hummel, 2011). If a student uses or knows that the instructor will use a plagiarism detection service then they may be deterred from copying work by others. In fact, a

Table 4

Suggested Pragmatic Approaches to Reduce Academic Dishonesty by Chiesl (2007)

Suggested Approach:	Summary of the Approach:
1. Disseminate information to students.	Communicate important information to students through email or by posting announcements. Students should know that cheating will not be tolerated and that there are strict penalties for cheating. Many universities already have a code of conduct that addresses cheating in place. Make certain that students are clear on the class goals and what is required to earn a specific grade for the course. Avoiding curving that only allows a certain percent of students to earn an A, B, C, D or F.
2. Change the process used by students to turn in written assignments.	Rather than turning in a printed copy of an assignment, students should be required to always submit their assignment in electronic format. Professors may then submit each assignment to a plagiarism detection service, such a Turnitin or SafeAssign, in order to detect possible plagiarized material.
3. Change the process by which exams are administered.	Professors using course management systems, such as Blackboard, Inc., may upload a course cartridge from a publisher that contains study guides, test banks, etc. already created for the class. Specifically for examinations, professors may set the test options for selecting from a random pool of possible questions, select the shortest timeframe that is reasonable for a test to be completed in, show only one test question at a time, do not let students backtrack to a previous question, leave the exam time open for an entire week, create a large number of exams to be taken over an entire semester (i.e., 10 exams instead of two), set a low point value for each exam, and finally, allow multiple attempts because each time a student retakes the test a new random set of questions appears and enhances student learning of the materials.
4. Create a non-sequential chapter assortment of questions.	For example, if an exam covers chapter 1, 2 and 3 with 20 questions from chapter 1, then 20 from chapter 2, and then 20 from chapter 3, the questions are sequential by chapter. Conversely, a non-sequential exam would allow the questions to skip back and forth between chapters and their questions. This would make exam questions less predictable to the student.

study by Heckler, Rice & Bryan (2013) found that the average Turnitin originality score dropped from 76% to 48% when students were made aware that a plagiarism detection service would be used to evaluate the originality of their paper. Stowers and Hummel (2011) go on to suggest that educators with a high volume of papers to assess may find the use of these services as a less tedious option for evaluating originality. One reason being that the services compare papers across a wide range of databases beyond simple web searches. In addition to SafeAssign and Turnitin, other services available on the web, but not used within this study include www.grammarly.com; en.writecheck.com; academicplagiarism.com; www.plagtracker.com; and plagiarismdetect.org.

Studies on Training for Avoiding Plagiarism

The studies on training for avoiding plagiarism vary between on-line and classroom, differing levels of education, courses, demographics and also differing avoidance methods. It can be said that no one plagiarism avoidance strategy is effective for all of the differing fields and demographics (Brennan, 2015). Many universities have their own academic integrity principles that guide them in their own approach towards avoiding any type of academic dishonesty within their university. Harmful effects, such as taking a toll on administrative resources, a poor reputation or a loss of respect for an institution, may result from undeterred plagiarism (Brennan, 2015). Therefore, avoiding plagiarism, and the strategy for how that will be accomplished, should play an important part within a universities' own set of academic integrity policies or standards.

A study by Henslee, Goldsmith, Stone and Krueger (2015) compared two online strategies for instruction on how to reduce student incidents of plagiarism. The study incorporated SafeAssign to compare an online academic integrity tutorial with a pre-recorded

online lecture on academic integrity, both followed by an academic integrity quiz. Henslee, et al. (2015) found no significant statistical difference between the two instructional approaches in reducing instances of plagiarism. With no significant difference in instructional approaches, the authors suggest that the use of a tutorial or pre-recorded lecture could be applied in not only online delivery classes, but also as online alternatives to live classroom lectures, through a learning management system like Blackboard.

A study by Holt (2012) focused on the effect of plagiarism trained by comparing undergraduate students, one class with direct training on what plagiarism is and how to identify it, and another class receiving no direct training. Students in the plagiarism trained group were given assignments that included defining plagiarism, practicing how to avoid it, developing skills on paraphrasing and then writing a two-page research paper over the topics covered in the class throughout the semester. The not-trained class, in contrast, was only provided links to resources for learning about plagiarism and were simply instructed to think critically and avoid plagiarism on class assignments; direct training on plagiarism was not required as part of the course instruction or assignment materials (Holt, 2012). Both class types were given a survey at the beginning of the semester and then a final survey at the end of the semester. The pre-treatment survey at the beginning of the semester found no significant difference between the two groups. However, the post-treatment survey found a significant difference between the two groups, with the students who received plagiarism training demonstrating more ability to successfully identify problems with paraphrasing, citing and quoting. Holt (2012) found that students who were not able to identify plagiarized material had an incomplete understanding of what it is and how to avoid it. Therefore, Holt (2012) suggests that educating students on plagiarism has a significant effect on improving students understanding and helps to avoid unintentional plagiarism.

Similar to the Holt (2012) study, Chao, Wilhelm and Neureuther (2009) examined approaches for avoiding plagiarism, including the use of Turnitin, and found a significant difference between the group with training on how to avoid plagiarism and the not-trained control group. The not-trained group was allowed to read the Code of Student Conduct that includes university information regarding plagiarism and cheating; they were also made to send the instructor that identified several types of plagiaristic behavior as identified in the Code of Student Conduct. The trained groups were split into two different levels, with more rigorous training exercises being introduced for the second level group. According to Chao et al., (2009) the significant differences between the control group and the level two group showed that students who received training on avoiding plagiarism were less likely to have plagiarized material in their reports. In all, and based on Turnitin originality scores, the control group resulted in 55% of papers containing plagiarized material, level one group with 36% of papers containing plagiarized material and the level two group with 29% of papers containing plagiarized material. Although there was an improvement from the control group to the level one trained group, the difference was not significant.

APA Style Technical Research and Writing

According to Belzer (2016) a recent survey by the website RefME found that 75% of college students consider citing correctly a concern when writing papers, and 54% recall improper citations as a reason for getting a lower grade. The survey found that there is a general lack of understanding for how to properly cite and reference sources. Belzer (2016) lists different styles of writing, including Modern Language Association (MLA), American Psychological Association (APA), Chicago Press (Chicago Style), American Sociological Association (ASA), Institute of Electrical and Electronics Engineers (IEEE), and American

Medical Association (AMA) which all have different formats. The APA style is used within the trained group as part of this study. This style is taught to this particular group of students because APA is a technical, or scientific, style of writing to ensure clear and consistent presentation of written material. APA style addresses writing elements such as punctuation and abbreviations, construction of tables, selection of headings, citation of references, and the presentation of statistics (American Psychological Association, n.d.). The trained group comes from a course geared towards operations management in industry today. Topics covered within the class and potential research paper subjects include industrial management principles and applications, management science, operations analysis and design, manufacturing processes, process life cycle, production inventory, and quality control.

Online and Traditional Classroom Delivery

In addition to the study by Ison (2014) of dissertations from both traditional classroom and online delivery institutions, which found no significant difference in levels of plagiarized material, there are further studies related to this matter. Hollister and Berenson (2009) conducted a study in which they compared exam performance of students who took a proctored, in-class online exam versus students who took an unproctored, offsite online exam. They found no significant difference in overall performance on exam scores. Even with increased variation in performance results of those students who took the unproctored, offsite online exam, no evidence of cheating behavior was found even though researchers might expect to see some evidence of academic dishonesty when course assessments are given outside of the classroom.

In contrast, Lanier (2006) conducted a survey study of students in order to determine the prevalence of cheating in traditional lecture courses and online courses. The study was conducted at a large, state-funded university over the course of two years with students enrolled

in core criminal justice and legal studies courses. The instrument was a 22 item, Likert-scale and open-ended question survey with four different demographic measurements. As this was a self-reporting survey, all students were assured anonymity and no identifying marks were used. Lanier (2006) found that 41.1% of students admitted to cheating during online courses while 21.3% admitted to cheating in a lecture course. In traditional lecture courses, students who were more likely to admit to cheating were young, male and had low GPAs. In online courses, students who were more likely to admit to cheating were young, male and single. The study shows that students will admit to cheating, in both online and in traditional/ courses, but more so in the online environment. Because of this, faculty members play an important role in decreasing or eliminating academic dishonesty, especially with an increase in the use of online delivery.

Because of the apparent mixed results of studies discussed here, there does appear to be a need for future studies to include delivery type as a variable. The researcher has chosen a mix of both traditional classroom and online delivery classes as part of this study. However, the type of delivery for these classes will not be a variable, but is discussed in Chapter 5.

SafeAssign and Turnitin

According to Blackboard Inc. (2007) SafeAssign was unveiled in August 2007 as part of the Blackboard system. The SafeAssign service is no additional charge for institutions who already use Blackboard. SafeAssign's purpose is aimed at preventing plagiarized material, protecting the existing base of original work and at aiding instructors who are educating students on the importance of proper citation and attributing work. Now also available within Blackboard, but at an additional cost, Turnitin was introduced in 1997 (Heckler et al., 2013) and developed by John Barrie, a former professor at Berkeley (Joyce, 2001). According to Turnitin LLC. (2015) the company uses a cloud-based service for originality checking, online grading and peer

review. The following section describes studies related to both SafeAssign and Turnitin plagiarism detection services.

Hunt and Tompkins (2014) investigated the effectiveness of SafeAssign and Turnitin for detecting plagiarism on 284 college-level papers. On average, SafeAssign originality scores were 6.95% and Turnitin scores were 7.64%. After accounting for false positives, Hunt determined that the SafeAssign and Turnitin originality scores were 2.75% and 3.38% respectively. The statistical results of Hunt's study show that there is no significant difference in originality scores or false positives. Of 284 papers, only 31 were found to contain instances of plagiarism. Because of the possibility for false positives, educators may use caution when allowing students to submit their papers, as non-plagiarized material could be highlighted as plagiarized (Hunt & Tompkins, 2014). Both educators and students should be able to identify false positives. In all, Hunt suggests that both SafeAssign and Turnitin provide the same level of plagiarism detection, but that educator's should focus less on plagiarism detection service scores and more on educating students on what plagiarism is and how to prevent it.

A study by Hill and Page (2009) consisted of submitting 20 of their own undergraduate and graduate papers, spanning several years and multiple topics, to both SafeAssign and Turnitin. Before submitting their papers, the 20 documents were divided into four categories of five documents each, with plagiarized material added to papers in three of the categories. In total, the categories included unaltered papers, papers with copied material from general web pages, papers with copied material from public web databases, and papers with material copied from subscription databases. In contrast to the study conducted by Hunt and Tompkins (2014), the Hill and Page (2009) study found that Turnitin detected plagiarized passages more accurately and returned fewer false positives. Furthermore, Turnitin detected a more accurate and higher

percent of plagiarized material in all three categories where copied web material was added to the papers. Perhaps most importantly, Hill and Page (2009) suggest that educators and students should not rely on originality scores as proof of plagiarism, but instead all results require interpretation. Especially in cases where plagiarism may be reported to school authorities and could lead to discipline; the results given by plagiarism detection services should always be reviewed before it is purported that plagiarism has taken place.

SafeAssign and Turnitin Databases

According to Blackboard Inc. (2010) the Blackboard Global Reference Database is a separate database apart from each institutions internal database. Those who submit papers may volunteer to have their paper added to the Global Reference Database as a deterrent to prevent someone from plagiarizing their paper. However, once submitted to the database, a paper cannot be removed. In addition to the Global Reference Database, SafeAssign also includes an Institutional Database. The Institutional Database is separate from the global database and is also kept separate from other institution's databases and therefore a student's paper is never checked against another institution's Institutional Database. Each paper submitted by a student is automatically stored by the Institutional Database, only the Global Reference Database is optional (Blackboard Support, 2011). If the students uses the option to submit their paper as a draft, then it will not be added to the Institutional Database. Papers submitted by instructors through the Direct Submit option will not be added to the Global Reference Database, however, the instructor does have a choice to opt out of submitting the paper to the Institutional Database by submitting the paper as a draft. However, if an instructor submits a paper through Direct Submit and it is added to the Institutional Database, the file may later be removed by the

instructor from the Institutional Database by deleting it from the list of papers uploaded through Direct Submit (Blackboard Inc., 2011).

In contrast, the Turnitin database has more flexible options than the SafeAssign databases. The Turnitin database is one global student database, with institutions having the option to add their own institutional database through Turnitin if they choose. Like SafeAssign, before submitting a paper, the student has the option to opt out of the Turnitin database (Turnitin Blog, 2013). However, unlike SafeAssign, a paper may be deleted from the Turnitin student database. The requests to permanently delete a student paper from the database must be submitted in writing by the school's Turnitin administrator and include the class ID number, assignment name and document ID number (Flax, n.d.).

Chapter Summary

The purpose of this chapter was to explain concepts related to the problem of plagiarism as relevant to this study. The need for taking an educational approach to avoiding plagiarism was explained and multiple studies were described in order to stress the importance of educating students on how to avoid plagiarism and why it is important. Furthermore, the chapter described the results of studies where different training methods for avoiding plagiarism were employed and the results of those studies. Lastly, the plagiarism detection services to be used within this study, SafeAssign and Turnitin, and the results of studies that have employed both of these services were discussed. The following chapter describes the procedures that will be used to conduct the study.

CHAPTER 3

METHODOLOGY

Chapter Overview

The purpose of this chapter is to explain how the research will be conducted, including the specific procedure for collecting data, analyzing the data, and interpreting the results. The chapter begins with a restating of the problem statement, the research questions and hypotheses. The population, sample and variables are explained. The data and collection of the data is then explained. The overarching design and procedures used to analyze are then described. Finally, a summary of the chapter is provided.

Problem Statement

The goal of this study is to assess the quality of a training lesson on APA formatting and plagiarism by using plagiarism detection services to measure student outcomes in order to improve technical writing skills.

Research Questions and Hypotheses

The following research questions and hypotheses will be used to determine 1) the effectiveness of the lesson on APA formatting and plagiarism, 2) if there is any relationship between the research exam scores and the originality scores, and 3) determine if there is a difference between SafeAssign and Turnitin originality scores.

RQ1: Does the trained group have significantly different SafeAssign originality scores than the not-trained group?

H_{o1}: $\mu 1 = \mu 2$: There is no statistically significant difference in SafeAssign originality scores between the trained group and not-trained group.

H_{a1}: $\mu 1 \neq \mu 2$: There is a statistically significant difference in SafeAssign originality scores between the trained group and not-trained group.

RQ2: Does the trained group have significantly different Turnitin originality scores than the not-trained group?

H_{o2}: $\mu 1 = \mu 2$: There is no statistically significant difference in Turnitin originality scores between the trained group and not-trained group.

H_{a2}: $\mu 1 \neq \mu 2$: There is no statistically significant difference in Turnitin originality scores between the trained group and not-trained group.

RQ3: Is there a relationship between the trained group's research and writing exam scores and their SafeAssign originality scores?

H_{o3}: $\mu 1 = \mu 2$: There is no relationship between the research and writing exam scores and SafeAssign originality scores.

H_{a3}: $\mu 1 \neq \mu 2$: There is a relationship between the research and writing exam scores and SafeAssign originality scores.

RQ4: Is there a relationship between the trained group's research and writing exam scores and their Turnitin originality scores?

H_{o3}: $\mu 1 = \mu 2$: There is no relationship between the research and writing exam scores and Turnitin originality scores.

H_{a3}: $\mu 1 \neq \mu 2$: There is a relationship between the research and writing exam scores and Turnitin originality scores.

RQ5: Is there a statistically significant difference between the SafeAssign and Turnitin originality scores?

H_{o5}: $\mu 1 = \mu 2$: There is no statistically significant difference in originality scores between SafeAssign and Turnitin.

H_{a5}: $\mu 1 \neq \mu 2$: There is a statistically significant difference in originality scores between SafeAssign and Turnitin.

Population and Sample

The data for this study will be collected from historical student research papers from two selected classes, spanning from the summer semester 2014 to the fall semester 2015. Descriptions of the two courses involved in this study are described in Table 5. Only one class utilizes the formal instructor training and follow-up research and writing exam, with the aim of preventing plagiarism by educating students on how to avoid plagiarism. Throughout the process of determining the sample of papers utilized within this study, the following papers will be eliminated from the population as a possibility of being included in the sample: 1) any paper by a student in a not-trained class who has already completed the training class and 2) any student in the trained class that did not get a passing grade (i.e., 80%) on the research and writing quiz.

The sample of papers to be involved as part of this study consists of 25 papers from the trained group and 25 papers from the not-trained group. The students from the trained group without a passing grade were eliminated without a paper being reviewed, therefore, the trained group sample of papers does not include any papers from a student who did not pass the research and writing exam. The current revision of the APA student training manuscript, used for the

Table 5

Summary of the Course Descriptions

Course Description of the Trained and Not-Trained Group Classes
Trained Class: A survey of operations management in industry today. Industrial management principles and applications, management science, operations analysis and design, manufacturing processes, process life cycle, production inventory, and quality control are emphasized.
Not-Trained Class: Identify, discuss, and research current issues, trends, and technological changes affecting industry as related to corporate planning, decision making, and managing for the future.

trained group, is April 9th, 2014. Therefore, all training from that date to the date of this study remained unchanged. Within the population, there is the possibility of having students in later semesters of the not-trained groups who have already taken and completed the trained group course. This training could mean that a student in this situation would have a lower than otherwise originality score. Therefore, to avoid this situation of having a paper from a trained student in a not-trained class, the trained group will only consist of papers from the Sp2015, Su2015 and Fa2015 courses and the not-trained group will only consist of papers from the Su2014 and Fa2014 courses. As for determining the final sample size, the selected sample should be large enough to have a good chance of detecting an important effect in the population, yet not be so large as to result in statistical significance when the effect is small and unimportant (Minium, 1999). For this study, with a probability of .95, a difference as large as $d = 1.2$, and a significance of $\alpha = .05$, the sample size needed in each group to detect the specified effect at the designated power is a minimum of 19 papers (Minium, 1999).

The papers collected will be organized and prepared prior to submitting to both SafeAssign and Turnitin services. The preparation includes removing any and all student identifying information and categorizing each research paper with an identifier specific to this

research study. Therefore, no paper can be traced back to a student and papers will be easy to track during the entire study. The trained group of student papers will also include a research and writing exam score. This group is the only one that utilizes the research and writing exam and, therefore, will be the only group with those scores as data points. Papers will be submitted to SafeAssign and Turnitin, both through Blackboard.

Procedure for Gathering Research Papers and Exam Scores

1. The course sections for both the trained and not-trained groups are identified within Blackboard. Once they are identified the papers are downloaded to the researcher's computer from either the Discussion Board area or from the gradebook, depending on how they were submitted at the time the class took place.
2. Once the available research papers are identified for the trained group, the research and writing exam scores for each of those students are identified. Only those students who scored a 16 or better have their research papers considered to be a part of this study.
3. Before removing the student identifiers, the original student papers are copied into a separate folder for traceability. The reason for this is if there is a match for "Another Student's Paper" after submitting to SafeAssign, the researcher will need to determine if the paper had previously been submitted. It is possible that some of the research papers chosen for the sample have been previously submitted to SafeAssign by the student or instructor, therefore, the researcher must account for this, otherwise the originality score may not be valid.

Procedure for Removing Student Identifiers to Protect Confidentiality

1. Open the research paper document and identify all possible student identifiers within the document, including name, email, and student identification number.

2. Once all possible student identifiers are determined they are deleted from the document and the document is saved.
3. The title of each document is given a numerical case identifier. The trained group research papers are identified numerically with three-digit case numbers beginning with 100, 101, 102, 103, etc. The research papers from the not-trained group are identified numerically with three-digit case numbers beginning with 200, 201, 202, 203, etc.
4. The researcher shall keep track of the case identifier (i.e., 100, 101, 102, etc.) and the research and writing exam score associated with that student. The title of each document from the trained group has the exam score entered as part of the document title, for ease of association.
5. Only the research papers chosen to be a part of the sample and whose student identifiers have been removed, shall be submitted to SafeAssign and Turnitin.

SafeAssign Procedure for Gathering the Originality Scores

1. Navigate to the SafeAssign link under Course Tools and click on the Direct Submit link as shown below in Figure 1.

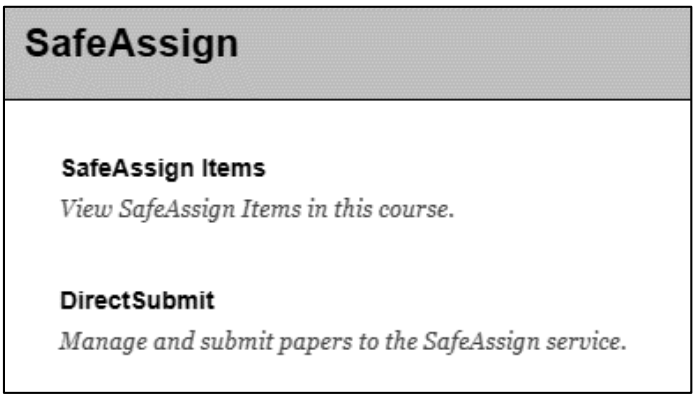

Figure 1. Link to SafeAssign Direct Submit.

2. Under Submission Options check Submit as draft. The files shall not be added to the Institutional Search Database. It is possible that some of the student papers used within

the research were previously submitted to SafeAssign, either by the student or by an instructor and there is no need to add these papers to the database.

3. Upload the file that will be submitted to SafeAssign as shown below in Figure 2.

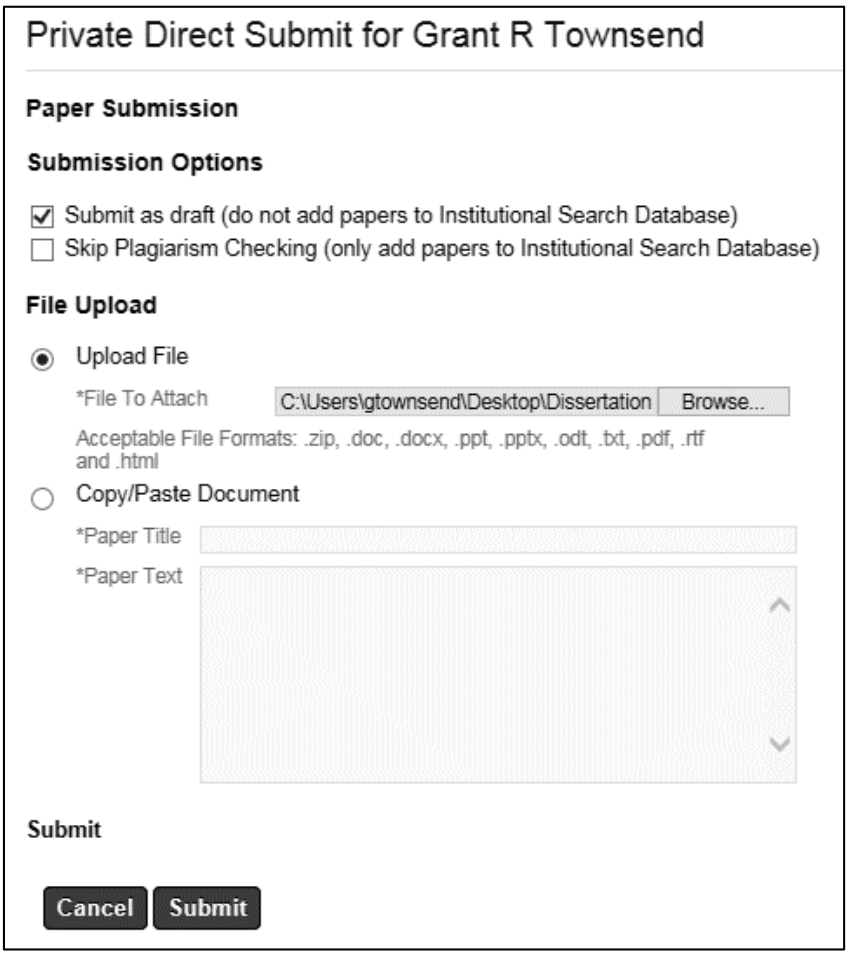

Figure 2. SafeAssign Submission Options.

4. Click Submit.
5. Review the returned report and uncheck any properly cited quotes and bibliography entries, and re-submit. Each paper is submitted to SafeAssign and reviewed a total of two times, with both reported originality score percentages recorded and used as variables within this study.

6. When a result comes up as “Another student’s paper” the submitted paper will be checked against the name of the student to verify if it is the same student with the paper having previously been submitted. If found to not be from the same student, then it is left checked as a possible plagiarized passaged.
7. Below in Figure 3 are the SafeAssign fields showing the file information and viewing options.

Figure 3. SafeAssign Status Fields.

Turnitin Procedure for Gathering the Originality Scores

1. Navigate to the Turnitin assignment and click on the View/Complete link as shown in Figure 4.

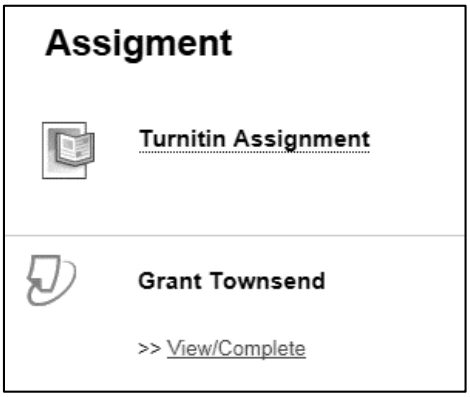

Figure 4. Link to Turnitin Assignment.

2. Click the Submit link as shown in Figure 5.

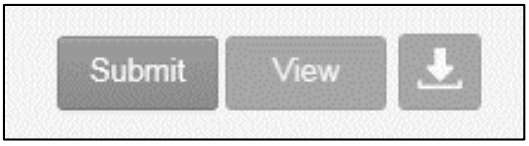

Figure 5. Turnitin Submit, View or Download File Options.

3. Upload the file to be submitted as shown in Figure 6.

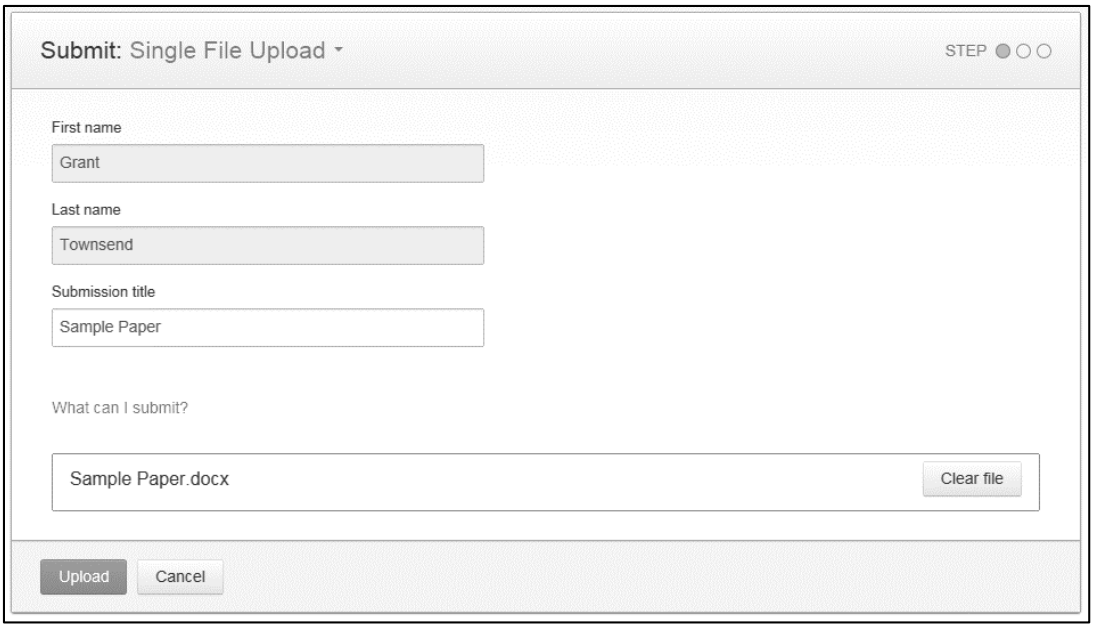

Figure 6. Turnitin File Upload Options.

4. The Confirmation page will appear with the file details. Click the Confirm link as shown below in Figure 7.

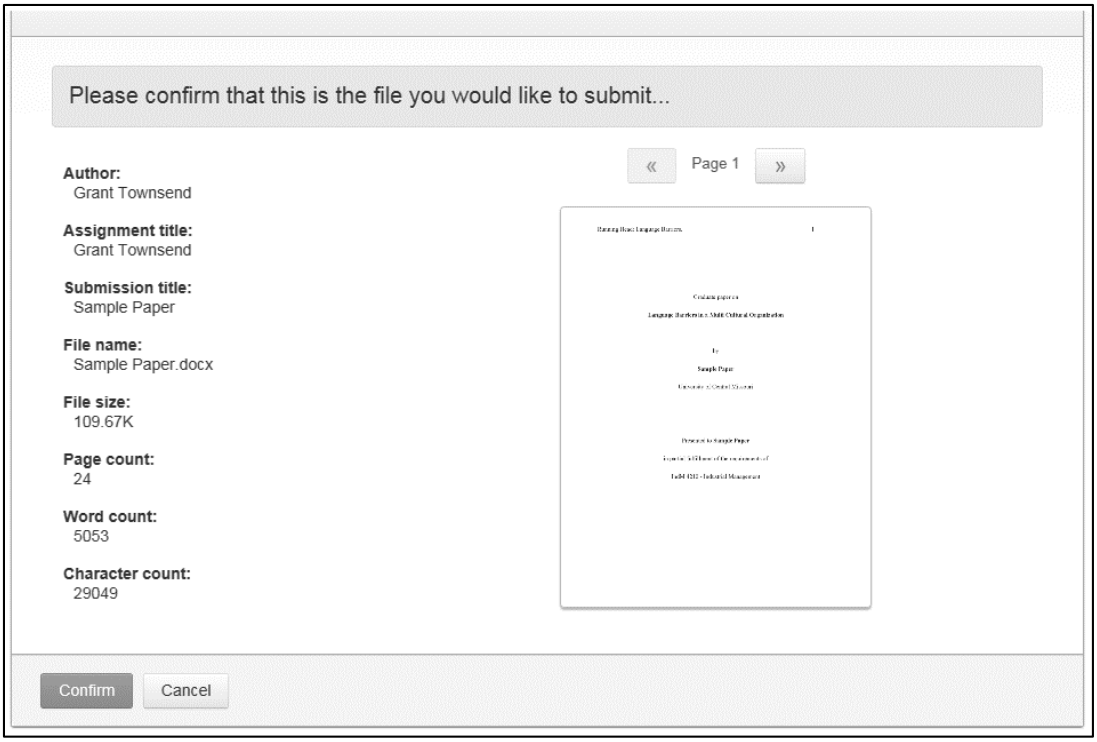

Figure 7. Turnitin Confirmation Page.

5. Once the Originality Report is available, click on the link shown in Figure 8.

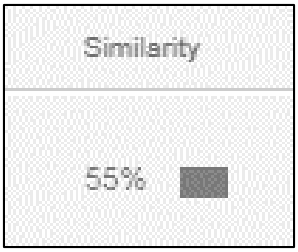

Figure 8. Turnitin Link to Originality Report.

6. Open the report and click on View/ edit filters and settings link. Select the Exclude Quotes and Exclude Bibliography options as shown in Figure 9 and apply the changes.

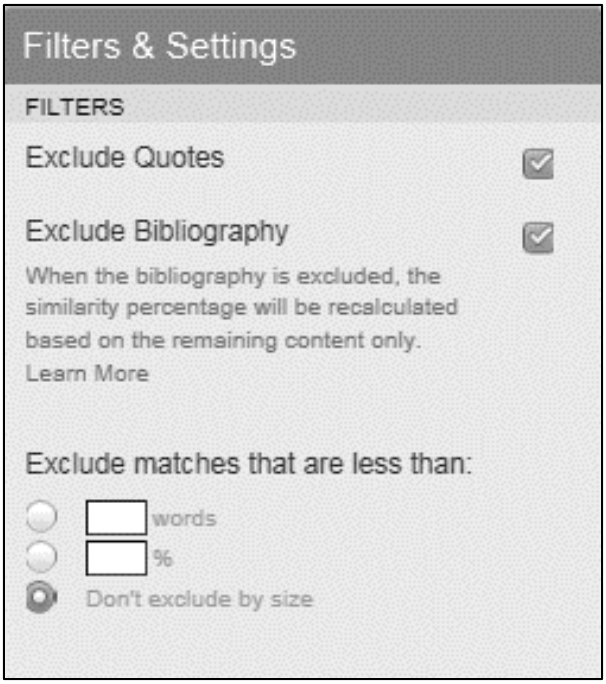

Figure 9. Turnitin Filters and Settings.

7. After selecting the filters, the similar percentage may change. With this sample paper, the similar percentage changed from 55% to 34%. Both originality score percentages are recorded and will be used as variables within this study. Below in Figure 10 are the Turnitin fields showing the file information and viewing options.

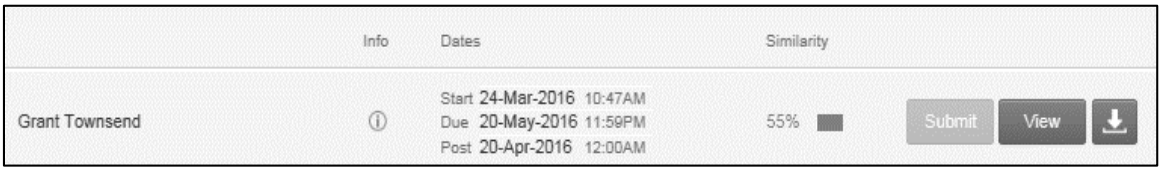

Figure 10. Turnitin Status Fields.

Research Design and Procedures

The following is a description of the procedures used to answer the research questions and their respective hypotheses, summarize in Table 6. This research study employs two different research methods, in order to analyze a total of three different variables, across five different research questions.

Table 6

Summary of Research Methods

Research Question	Method	Variables
Research Question #1	One-Way ANOVA	SafeAssign Originality Score
Research Question #2	One-Way ANOVA	Turnitin Originality Score
Research Question #3	Regression Analysis	Research & Writing Exam Score SafeAssign Originality Score
Research Question #4	Regression Analysis	Research & Writing Exam Score Turnitin Originality Score
Research Question #5	One-Way ANOVA	SafeAssign Originality Score Turnitin Originality Score

Research questions 1, 2 and 5 all involve two independent groups and each consider only one independent variable. The analysis of variance (ANOVA) technique compares the means of two independent groups (Minium, 1999). For research questions 3 and 4, this study intends to determine if there is a relationship between the variables, and if so, if the relationship is strong enough to predict performance. Because correlation does not imply causation (Minium, 1999) a regression analysis will be used to test these hypotheses.

Chapter Summary

The purpose of this chapter was to explain how the research should be conducted, including the specific procedures that are used for collecting data, analyzing the data, and interpreting the results. The study contains five research questions. The data for the study are collected from the Blackboard course management system. All five research questions are analyzed using one of two approaches, One-Way ANOVA or regression analysis. The following chapter provides a detailed report of the results of this study.

CHAPTER 4

RESULTS

Chapter Overview

The purpose of this chapter is to explain the results of the testing of the hypotheses. First, a review of the data collection is presented. The data collection includes a review of the variables and the method used to collection those variables. Second, the results of the testing of the hypotheses is presented. There are five different hypotheses tested, included are the descriptive and inferential results of the tests. Lastly, a summary of the research findings is presented in tabular format.

Data Collection

Data was collected from historical student research papers from two different classes on Blackboard, spanning summer 2014 to fall 2015. One of the two classes contains an APA in-text citations, formatting and reference list training lesson. The group defined as "Trained" had their research papers collected from the 2015 semesters, while the group defined as "Not Trained" had their research papers collected from the 2014 semesters. The APA lesson also includes a 20 point research and writing exam; only research papers from students who scored at least 16 out of 20 were downloaded as possible cases to be included. Once the trained group was designated as 2015 semesters only, and the not-trained group designated as 2014 semesters only, the result

was 25 papers from the trained group, and 25 papers from the not-trained group. As explained in Chapter 3, the sample size was calculated to be 25 papers from each group.

To prepare the student research papers for submission into SafeAssign and Turnitin plagiarism detection services, the papers first had any student-identifying information deleted from within them. All 25 trained group research papers and 25 not-trained group papers were then submitted to SafeAssign and Turnitin as described in Chapter 3. The resulting originality scores variables are as follows: SafeAssignRun1, SafeAssignRun2, TurnitinRun1 and TurnitinRun2. The Run1 variables are the raw originality scores that initially are reported back from the plagiarism detection service. The Run2 variables are the originality scores after the bibliography and citations, or properly referenced passages, are unchecked, and the research paper resubmitted for a new originality score. The Run2 originality scores were then subtracted from the Run1 originality scores in order the measure the difference, this difference is represented by the variables SafeAssignDiff and TurnitinDiff.

The last variable used in the study is the TrainingQuiz. As previously mentioned, each trained student takes a 20 point research and writing exam. The TrainingQuiz scores represent the scores of trained students on those exams. The 25 TrainingQuiz scores collected are of the 25 students whose research papers were randomly selected to be the sample.

It should be noted that both SafeAssign and Turnitin scores have a possible range from 0 to 100. An originality score of 0 means that the service found no matching passages and a score of 100 means that 100% of the paper is matching, therefore, a low score is desirable.

Results of Testing Research Hypotheses

Research Hypothesis 1

The first hypothesis states that there is no significant difference in SafeAssign originality scores between the trained and not-trained groups. A description of the variables used to test the first two hypotheses is shown in Table 7. Descriptive statistics for each of the group SafeAssignRun2 scores are shown in Table 8. The average originality score is 10.44 for the trained group and 5.36 for the not-trained group. As shown in Figure 11, the 95% confidence interval for the trained group overlaps the entirety of the lower and upper bounds of the not-trained group.

Table 7

Description of SPSS Variables for Hypotheses 1 and 2

Variable Name	Description
Group	Trained Not Trained
SafeAssignRun2	SafeAssign originality score (excluding bibliography & citations)
TurnitinRun2	Turnitin originality score (excluding bibliography & quotes)

A review of the data in Figure 12 shows that all, both trained and not-trained, SafeAssignRun2 scores combined have a positive skew, or are skewed to the right. The majority of originality scores appear to fall with the 0 to 10 percent range, around a mean value of 7.9. A boxplot of both trained and not-trained groups is shown in Figure 13. The boxplot shows that the trained group has one outlier and two extreme points, while the not-trained group has one outlier. All outliers and extreme points were verified as correct within the data set, none were eliminated.

Table 8

Descriptive Statistics of SafeAssignRun2 by Group

Group			Statistic	Std. Error
Trained				
	Mean		10.44	4.010
	95% Confidence Interval for Mean	Lower Bound	2.16	
		Upper Bound	18.72	
	5% Trimmed Mean		7.13	
	Median		2.00	
	Variance		402.007	
	Std. Deviation		20.050	
	Minimum		0	
	Maximum		91	
	Range		91	
	Interquartile Range		10	
	Skewness		3.113	.464
	Kurtosis		10.937	.902
Not Trained				
	Mean		5.36	1.288
	95% Confidence Interval for Mean	Lower Bound	2.70	
		Upper Bound	8.02	
	5% Trimmed Mean		4.61	
	Median		2.00	
	Variance		41.490	
	Std. Deviation		6.441	
	Minimum		0	
	Maximum		26	
	Range		26	
	Interquartile Range		8	
	Skewness		1.833	.464
	Kurtosis		3.234	.902

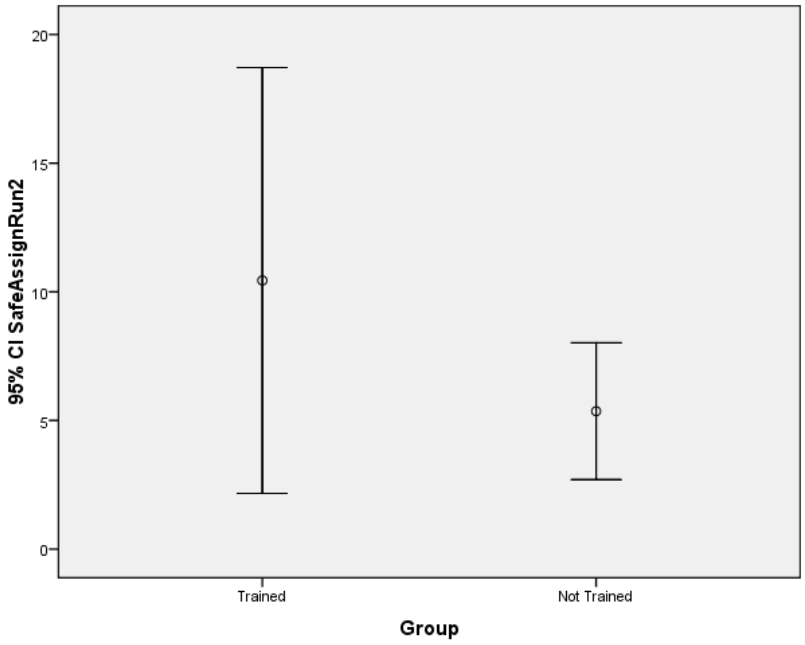

Figure 11. SafeAssignRun2 - Plot of Confidence Intervals.

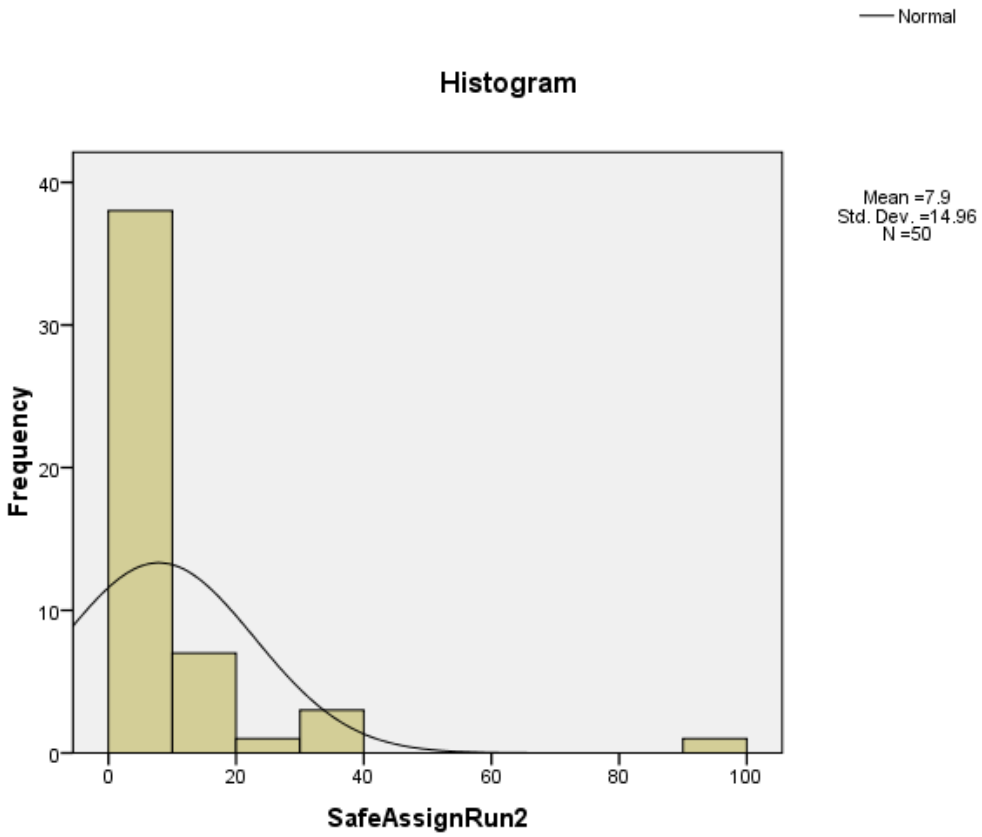

Figure 12. SafeAssignRun2 - Histogram.

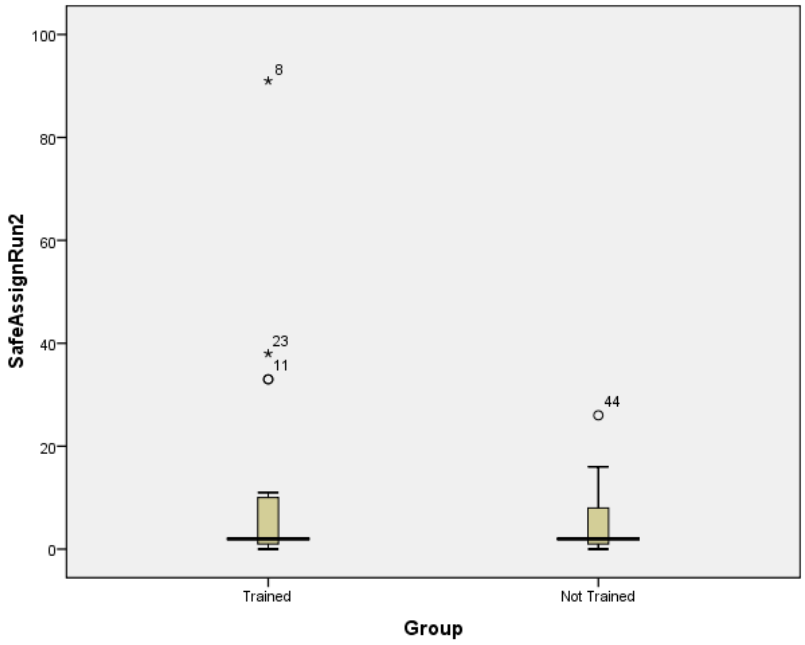

Figure 13. SafeAssignRun2 - Boxplot.

The assumption of normality was reviewed first by subtracting the group mean from each observation, and looking at the distribution of the differences, from the group means. The differences from the group means are called residuals, these are used because the data may be coming from populations with different means. The normal quantile plot of the SafeAssignRun2 originality scores, after group means are subtracted from the individual scores, is shown in Figure 14. The figure shows that only one data point falls on the line, therefore it is unlikely that the data is normally distributed. Furthermore, two commonly used tests for normality are shown in Table 9. Both tests assume that the data come from normal populations. Because both the Kolmogorov-Smirnov[a] and Shapiro-Wilk tests below have a significance value of p = .000, we can reject the null hypothesis at the .05 level that the data come from a normal population.

The assumption of equal variances is first tested using the Levene test, as shown below in Table 10. Because the Levene statistic has a significance value of p = .025, we would reject the null hypothesis at the .05 level of equal group means. Further testing for equal variances is using

the Welch and Brown-Forsythe tests shown in Table 11. The results of these tests disagree with the Levene statistic, with a significance value of p = .238. They do however, agree with the variance test of the hypothesis in Table 13.

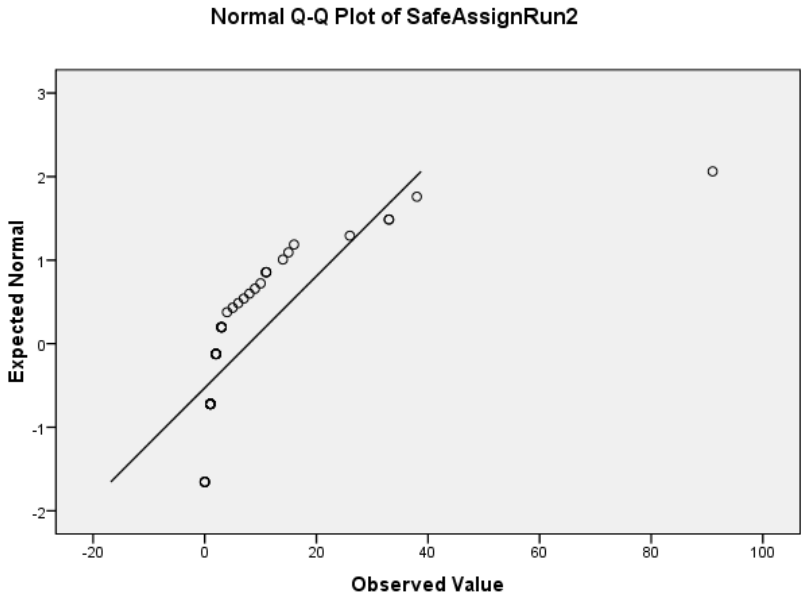

Figure 14. SafeAssignRun2 - Q-Q Plot of Residual Values.

Table 9

SafeAssignRun2 - Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SafeAssignRun2	.299	50	.000	.519	50	.000

a. Lilliefors Significance Correction

Table 10

SafeAssignRun2 - Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
5.320	1	48	.025

The hypothesis that there is no significant difference in SafeAssign originality scores between the trained and not-trained groups is first tested with an Independent Samples Test as shown in Table 12. The reason for the introduction of this test is because of the failure to meet the equal variance assumption per the Levene statistic. The results in Table 12 show a significance value of p = .238 when equal variances are not assumed. The results of the One-Way Analysis of Variance (ANOVA) test is shown in Table 13. The results show a significance value of p = .234 between groups. The results of the test lead the researcher to fail to reject the null hypothesis, at the .05 level, that there is no significant difference in SafeAssign originality scores, between the trained and not-trained groups.

Table 11

SafeAssignRun2 - Robust Tests of Equality of Means

	Statistic[a]	df1	df2	Sig.
Welch	1.455	1	28.902	.238
Brown-Forsythe	1.455	1	28.902	.238

a. Asymptotically F distributed.

Table 12

SafeAssignRun2 – Independent Samples Test

	t	df	Sig.	Mean Diff.	Std. Er. Diff.
Equal variances assumed	1.206	48	.234	5.080	4.212
Equal variances not assumed	1.206	28.902	.238	5.080	4.212

95% confidence interval of the difference, equal variances not assumed

Table 13

SafeAssignRun2 - ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	322.580	1	322.580	1.455	.234
Within Groups	10643.920	48	221.748		
Total	10966.500	49			

Research Hypothesis 2

The second hypothesis states that there is no significant difference in Turnitin originality scores among the trained and not-trained groups. Descriptive statistics for each of the group TurnitinRun2 scores are shown in Table 14. The average originality score is 11.24 for the trained group and 15.28 for the not-trained group.

Table 14

Descriptive Statistics of TurnitinRun2 by Group

Group			Statistic	Std. Error
Trained				
	Mean		11.24	2.465
	95% Confidence Interval for Mean	Lower Bound	6.15	
		Upper Bound	16.33	
	5% Trimmed Mean		9.71	
	Median		6.00	
	Variance		151.857	
	Std. Deviation		12.323	
	Minimum		0	
	Maximum		55	
	Range		55	
	Interquartile Range		16	
	Skewness		2.109	.464
	Kurtosis		5.646	.902
Not Trained				
	Mean		15.28	2.737
	95% Confidence Interval for Mean	Lower Bound	9.63	
		Upper Bound	20.93	
	5% Trimmed Mean		14.44	

Median	11.00	
Variance	187.293	
Std. Deviation	13.686	
Minimum	1	
Maximum	46	
Range	45	
Interquartile Range	24	
Skewness	.777	.464
Kurtosis	-.650	.902

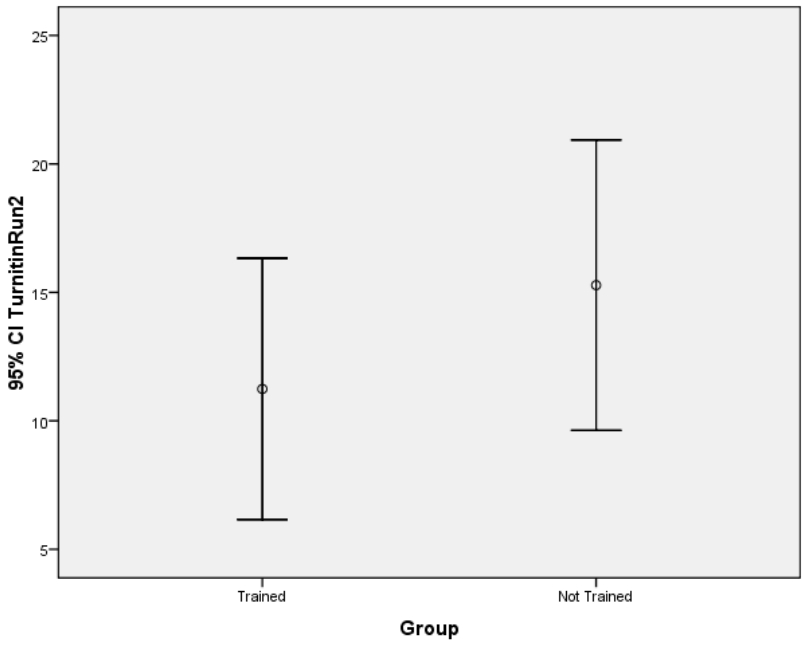

Figure 15. TurnitinRun2 - Plot of Confidence Intervals.

As shown in Figure 15, the 95% confidence intervals overlap from the values 9.63 to 16.33, according to the not-trained lower bound and the trained upper bound values found in Table 14. A review of the data in Figure 16 shows that all, both trained and not-trained TurnitinRun2 scores combined have a positive skew, or are skewed to the right. The majority of originality scores appear to fall within the 0 to 20 percent range, around a mean value of 13.26. A boxplot of both trained and not-trained groups is shown in Figure 17. The boxplot shows that

the trained group has one outlier, while the not-trained group does not have any outliers or extreme points. All outliers were verified as correct within the data set, none were eliminated.

As with the first hypothesis, the assumption of normality was reviewed first by subtracting the group mean from each observation and looking at the distribution of the differences from the group means; the residuals are used because the data may be coming from populations with different means. The normal quantile plot of the TurnitinRun2 originality scores, after group means are subtracted from the individual scores, is shown in Figure 18. Since the data points fall along the straight line, it is likely that the data is normally distributed.

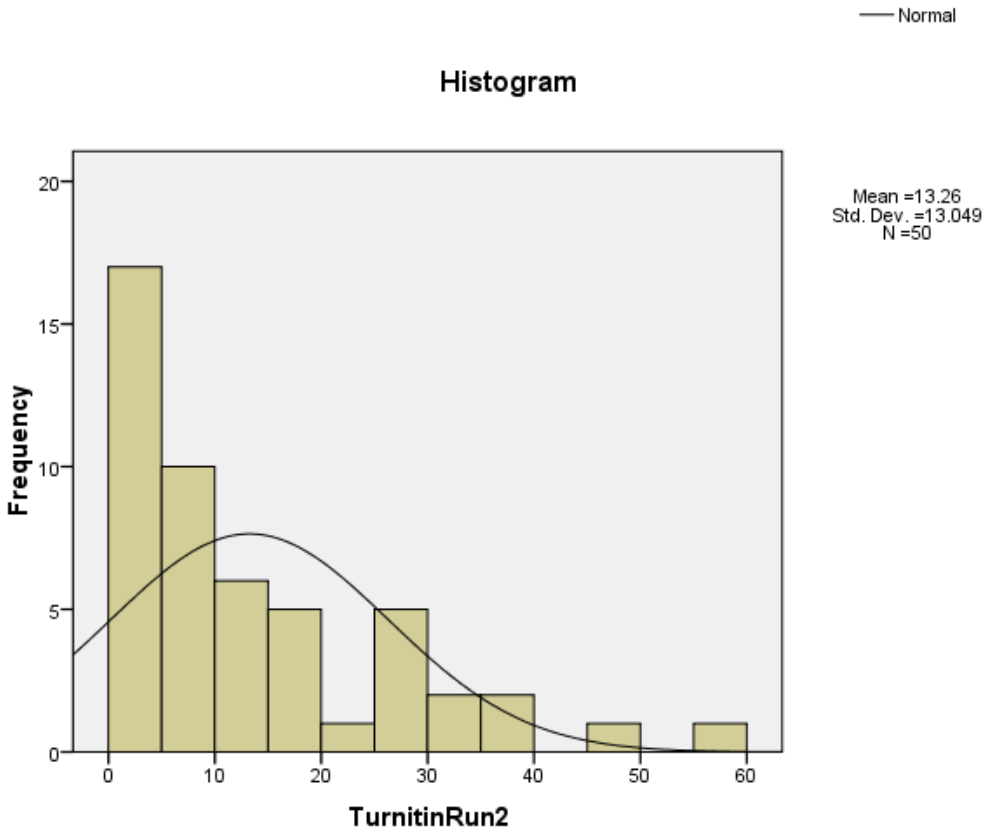

Figure 16. TurnitinRun2 - Histogram.

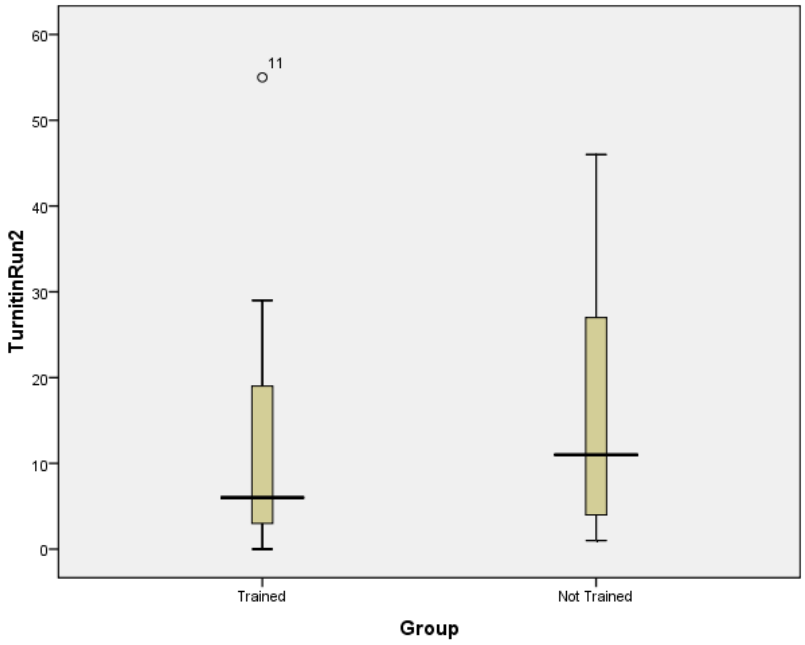

Figure 17. TurnitinRun2 - Boxplot.

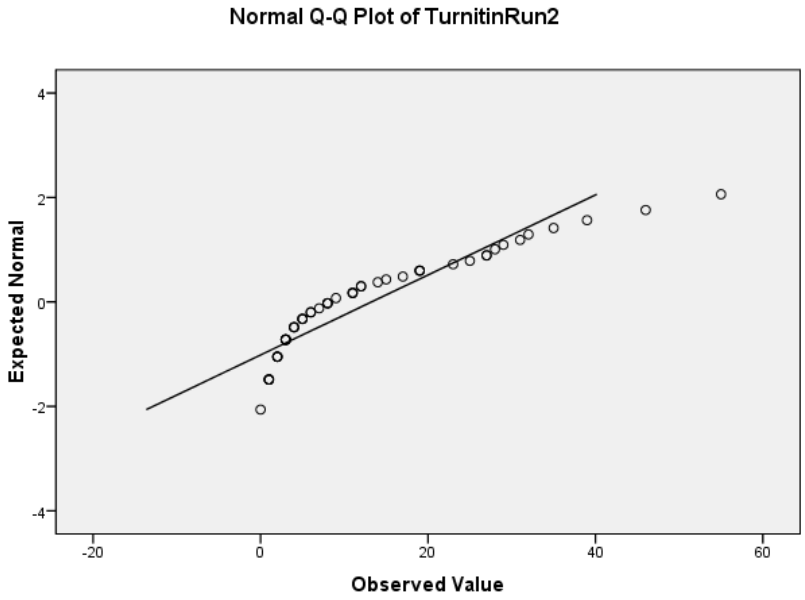

Figure 18. TurnitinRun2 - Q-Q Plot of Residual Values.

Furthermore, the Kolmogorov-Smirnov[a] and Shapiro-Wilk tests for normality are shown in Table 15. Both tests assume that the data come from normal populations. Because both the

Kolmogorov-Smirnov[a] and Shapiro-Wilk tests below have a significance value of p = .000 the researcher rejects the hypothesis, at the .05 level, that the data come from a normal population.

Table 15

TurnitinRun2 - Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
TurnitinRun2	.178	50	.000	.848	50	.000

a. Lilliefors Significance Correction

The assumption of equal variances is first tested using the Levene test, as shown below in Table 16. Because the Levene statistic has a significance value of p = .224 we would fail to reject the null hypothesis at the .05 level of equal group means. Further testing for equal variances is done with the Welch and Brown-Forsythe tests shown in Table 17. The results of these tests agree with the Levene statistic, with a significance value of p = .278. In addition, they agree with the variance test of the hypothesis in Table 19.

Table 16

TurnitinRun2 - Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
1.516	1	48	.224

Table 17

TurnitinRun2 - Robust Tests of Equality of Means

	Statistic[a]	df1	df2	Sig.
Welch	1.203	1	47.482	.278
Brown-Forsythe	1.203	1	47.482	.278

a. Asymptotically F distributed.

The hypothesis that there is no significant difference in Turnitin originality scores between the trained and not-trained groups is first tested with an Independent Samples Test as shown in Table 18. The Independent Samples Test results in Table 18 show a significance value of p = .278 when equal variances are assumed. The results of the One-Way Analysis of Variance (ANOVA) test are shown in Table 19. The results show a significance value of p = .278 between groups. The results of the test lead the researcher to fail to reject the null hypothesis at the .05 level that there is no significant difference in SafeAssign originality scores between the trained and not-trained groups.

Table 18

TurnitinRun2 – Independent Samples Test

	t	df	Sig.	Mean Diff.	Std. Er. Diff.
Equal variances assumed	-1.097	48	.278	-4.040	3.683
Equal variances not assumed	-1.097	47.482	.278	-4.040	3.683
95% confidence interval of the difference, equal variances not assumed					

Table 19

TurnitinRun2 - ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	204.020	1	204.020	1.203	.278
Within Groups	8139.600	48	169.575		
Total	8343.620	49			

Research Hypothesis 3

The third hypothesis states that there is no relationship between the research and writing exam scores of the trained group, and their resulting SafeAssign originality scores. A description of the variables used to test the third and fourth hypotheses is shown in Table 20. Descriptive

statistics for the TrainingQuiz scores are shown in Table 21. The average score is 16.96 out of a possible total of 20 points.

Table 20

Description of SPSS Variables for Hypotheses 3 and 4

Variable Name	Description
Group	Trained
TurnitinRun2	Turnitin originality score (excluding bibliography & quotes)
SafeAssignRun2	SafeAssign originality score (excluding bibliography & citations)
TrainingQuiz	Research and writing exam score (trained group only)

Table 21

Descriptive Statistics of the Research and Writing Exam Scores

Variable			Statistic	Std. Error
TrainingQuiz				
	Mean		16.96	.212
	95% Confidence Interval for Mean	Lower Bound	16.52	
		Upper Bound	17.40	
	5% Trimmed Mean		16.90	
	Median		17.00	
	Variance		1.123	
	Std. Deviation		1.060	
	Minimum		16	
	Maximum		19	
	Range		3	
	Interquartile Range		2	
	Skewness		.542	.464
	Kurtosis		-1.166	.902

A review of the data in Figure 19 shows that the scores for SafeAssignRun2 tend to decrease as the TrainingQuiz scores get closer to 20. A negative Pearson correlation coefficient value of -.132, as shown below in Table 22, means that as the values of the TrainingQuiz go up, the values of SafeAssignRun2 originality scores go down. The correlation coefficient shows how

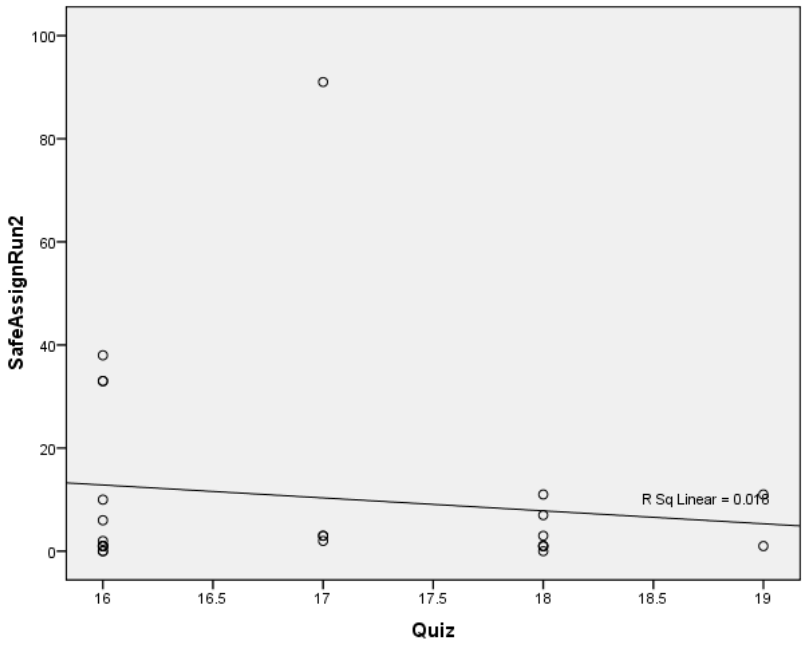

Figure 19. Scatterplot of SafeAssignRun2 Scores and Training Quiz Scores

closely the data points are related, but does not give the exact identify of the line for predicting the values of one variable from another. For this study, a bivariate linear regression was used to determine the line because there is only one independent variable (i.e., Can the TrainingQuiz score predict a future SafeAssignRun2 originality score?). The results of the Pearson correlation coefficient show a negative relationship, however not significant, therefore the regression line will not be significantly different from zero (i.e., the predicted values will be close to the mean).

Table 22

SafeAssignRun2 and TrainingQuiz - Correlation Matrix

		SafeAssignRun2	TrainingQuiz
SafeAssignRun2	Pearson Correlation	1	-.132
	Sig. (2-tailed)		.528
	N	50	25
TrainingQuiz	Pearson Correlation	-.132	1
	Sig. (2-tailed)	.528	
	N	25	25

Based on Table 24, a low R value of 0.100 leaves room for errors in prediction (e.g., when no relationship exists, R = 0; when a perfect relationship exists, R = 1). Furthermore, the low R^2 value of 0.010 means that only about 1.0% of the variability in SafeAssignRun2 scores can be explained by TrainingQuiz scores, further diminishing the relationship. Therefore, the prediction value should not be considered a significantly accurate measure of SafeAssignRun2 originality scores.

Based on the p = 0.528 value in Table 22 and a low R value in Table 24, we fail to reject the null hypothesis at the .05 level that there is no relationship between the SafeAssignRun2 scores and the TrainingQuiz scores. Had the null hypothesis stated a direction, that SafeAssignRun2 originality scores go down as TrainingQuiz scores go up (i.e., a Sig. (1-tailed) test), the subsequent p = .264 value at the .05 level would have also resulted in failing to reject the null hypothesis. To account for any violation of the normality assumption, the 2-tailed Spearman correlation coefficient was calculated with a value of -.013 at a significance value of p = .951.

Table 23

Regression Coefficients[a] for Predicting SafeAssignRun2 Scores.

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	10.024	13.997		.716	.481
TrainingQuiz	-.398	.824	-.100	-.483	.634

a. Dependent Variable: SafeAssignRun2

Table 24

SafeAssignRun2[b] – Regression Goodness-of-Fit Statistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.100[a]	.010	-.033	4.277

a. Predictors: (Constant), TrainingQuiz

b. Dependent Variable: SafeAssignRun2

Research Hypothesis 4

The fourth hypothesis states that there is no relationship between the research and writing exam scores of the trained group, and their resulting Turnitin originality scores. A review of the data in Figure 20 shows that the scores for TurnitinRun2 tend to decrease as the TrainingQuiz scores get closer to 20.

A negative Pearson correlation coefficient value of -.203, as shown below in Table 25, means that as the values of the TrainingQuiz go up, the values of TurnitinRun2 originality scores go down. A bivariate linear regression was used to determine the regression line. As with the SafeAssignRun2 results, the results of the TurnitinRun2 Pearson correlation coefficient show a very weak negative relationship, however not significant, therefore the regression line will not be significantly different from zero (i.e., the predicted values will be close to the mean).

Table 25

TurnitinRun2 and TrainingQuiz - Correlation Matrix

		TurnitinRun2	TrainingQuiz
TurnitinRun2	Pearson Correlation	1	-.203
	Sig. (2-tailed)		.329
	N	50	25
TrainingQuiz	Pearson Correlation	-.203	1
	Sig. (2-tailed)	.329	
	N	25	25

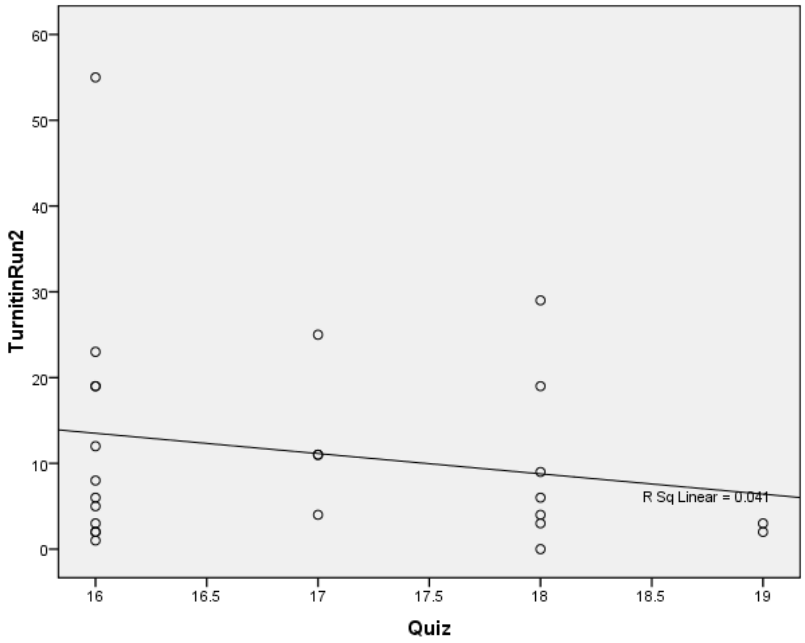

Figure 20. Scatterplot of TurnitinRun2 Scores and Training Quiz

Based on Table 27, a low R value of 0.203 leaves room for errors in prediction, furthermore, the low R^2 value of 0.041 means that 4.1% of the variability in TurnitinRun2 scores, can be explained by TrainingQuiz scores. Therefore, the prediction value should not be considered a significantly accurate measure of TurnitinRun2 originality scores.

Based on the p = 0.329 value in Table 25 and a low R value in Table 27, the researcher fails to reject the null hypothesis at the .05 level that there is no relationship between the TurnitinRun2 scores and the TrainingQuiz scores. Had the null hypothesis stated a direction, that Turnitin2 originality scores go down as TrainingQuiz scores go up (i.e., a Sig. (1-tailed) test), the subsequent p = .159 value would have also resulted in failing to reject the null hypothesis of no significant difference. To account for any violation of the normality assumption, the 2-tailed Spearman correlation coefficient was calculated with a value of -.157 at a significance value of p = .454.

Table 26

Regression Coefficients[a] for Predicting TurnitinRun2 Scores.

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	51.350	40.333		1.273	.216
TrainingQuiz	-2.365	2.374	-.203	-.996	.329

a. Dependent Variable: TurnitinRun2

Table 27

TurnitinRun2[b] – Regression Goodness-of-Fit Statistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.203[a]	.041	.000	12.325

a. Predictors: (Constant), TrainingQuiz

b. Dependent Variable: TurnitinRun2

Research Hypothesis 5

The fifth hypothesis states that there is no statistically significant difference between the SafeAssign and Turnitin originality scores. Descriptive statistics for both the first and second runs of each plagiarism detection service, including the differences between each run, are shown in Table 29. The average total difference between Turnitin scores is a 3.38 reduction, while the average total difference in SafeAssign scores is a 2.88 reduction. A description of the variables used to test the fifth hypothesis is shown in Table 30. Descriptive statistics for those variables are shown in Table 31.

Table 28

Description of Variables for Percentage Point Differences in Runs

Variable Name	Description
Group	1 = Trained
	2 = Not Trained
TurnitinRun1	Turnitin originality score (including bibliography & quotes)
TurnitinRun2	Turnitin originality score (excluding bibliography & quotes)
TurnitinDiff	Percentage point difference between TurnitinRun1 and Run2
SafeAssignRun1	SafeAssign originality score (including bibliography & citations)
SafeAssignRun2	SafeAssign originality score (excluding bibliography & citations)
SafeAssignDiff	Percentage point difference between SafeAssignRun1 and Run2

Table 29

Descriptive Statistics for Comparison of Trained (1) and Not-Trained (2) Groups

	Group	N	Mean	Std. Dev.	Minimum	Maximum
TurnitinRun1	1	25	14.68	13.203	0	55
	2	25	18.60	13.121	2	48
TurnitinRun2	1	25	11.24	12.323	0	55
	2	25	15.28	13.686	1	46
TurnitinDiff	1	25	3.44	7.292	-1	36
	2	25	3.32	2.340	1	10
SafeAssignRun1	1	25	13.72	20.436	0	93
	2	25	7.84	7.081	1	30
SafeAssignRun2	1	25	10.44	20.050	0	91
	2	25	5.36	6.441	0	26
SafeAssignDiff	1	25	3.28	4.208	0	14
	2	25	2.48	2.044	0	8

Table 30

Description of SPSS Variables for Hypothesis 5

Variable Name	Description
SafeAssign	SafeAssign group of originality scores
Turnitin	Turnitin group of originality scores
ServiceRun1	Originality scores (including bibliography, quote & citations)

Table 31

Descriptive Statistics of SafeAssign and Turnitin Groups for ServiceRun1

Service			Statistic	Std. Error
Turnitin				
	Mean		16.64	1.863
	95% Confidence Interval for Mean	Lower Bound	12.90	
		Upper Bound	20.38	
	5% Trimmed Mean		15.63	
	Median		13.00	
	Variance		173.623	
	Std. Deviation		13.177	
	Minimum		0	
	Maximum		55	
	Range		55	
	Interquartile Range		18	
	Skewness		1.093	.337
	Kurtosis		.570	.662
SafeAssign				
	Mean		10.78	.2.181
	95% Confidence Interval for Mean	Lower Bound	6.40	
		Upper Bound	15.16	
	5% Trimmed Mean		8.58	
	Median		6.50	
	Variance		237.930	
	Std. Deviation		15.425	
	Minimum		0	
	Maximum		93	
	Range		93	
	Interquartile Range		12	
	Skewness		3.548	.337
	Kurtosis		16.277	.662

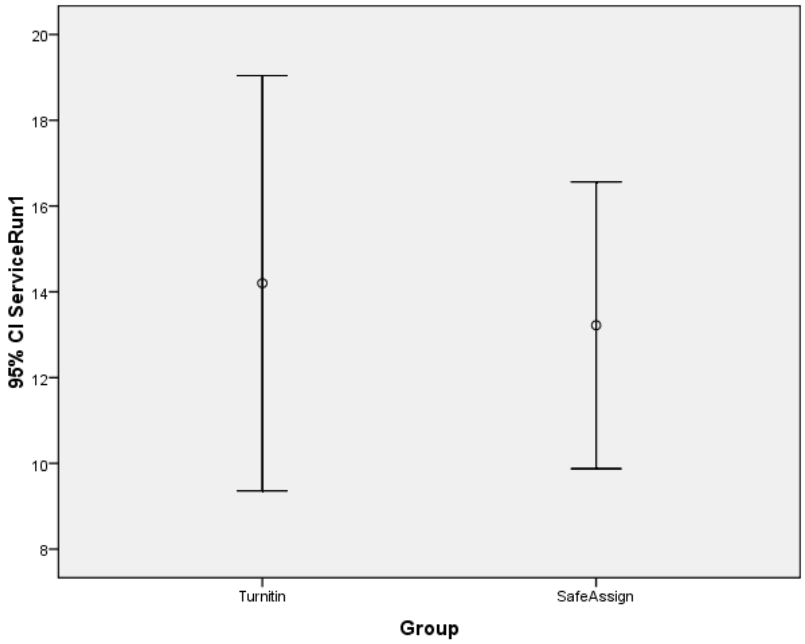

Figure 21. ServiceRun1 - Plot of Confidence Intervals.

A review of the data in Figure 22 shows that all, both SafeAssignRun1 and TurnitinRun1, scores combined have a positive skew, or are skewed to the right. The vast majority of originality scores appear to fall with the 0 to 20 percent range, around a mean value of 13.71. A boxplot of both first run groups is shown in Figure 23. The boxplot shows that the TurnitinRun1 group has one outlier, while the SafeAssignRun1 group has three outliers and one extreme point. All outliers and extreme points were verified as correct within the data set, none were eliminated.

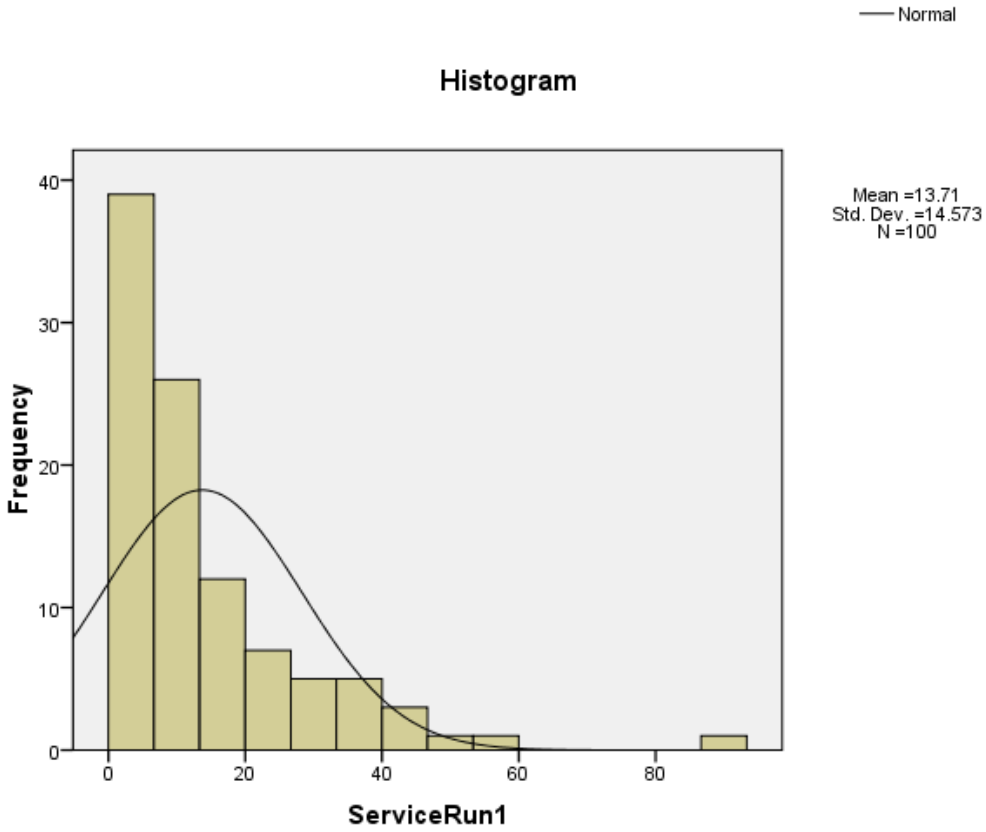

Figure 22. ServiceRun1 - Histogram.

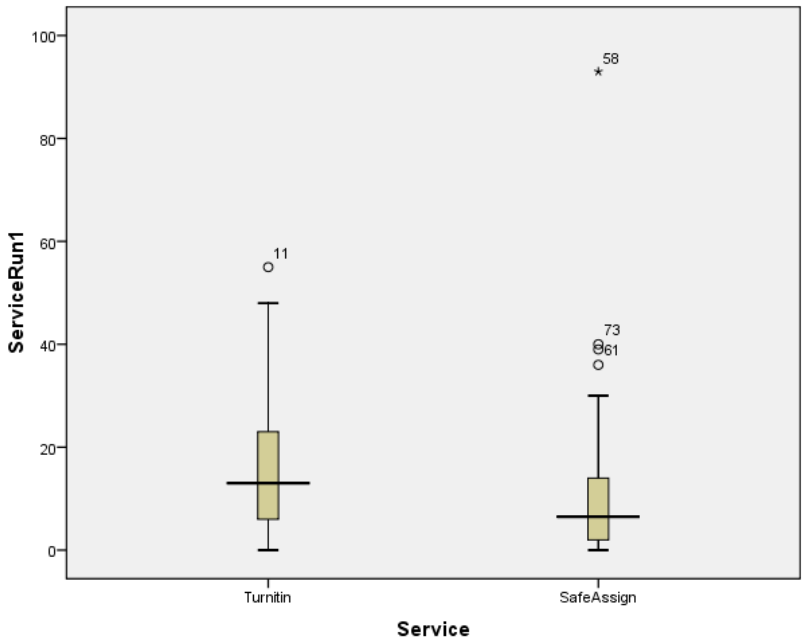

Figure 23. ServiceRun1 – Boxplot.

The assumption of normality was reviewed first by subtracting the group mean from each observation and looking at the distribution of the differences from the group means; the residuals are used because the data may be coming from populations with different means. The normal quantile plot of the ServiceRun1 originality scores, after group means are subtracted from the individual scores, is shown in Figure 24. Since the data points do not fall on the straight line, it is unlikely that the data is normally distributed.

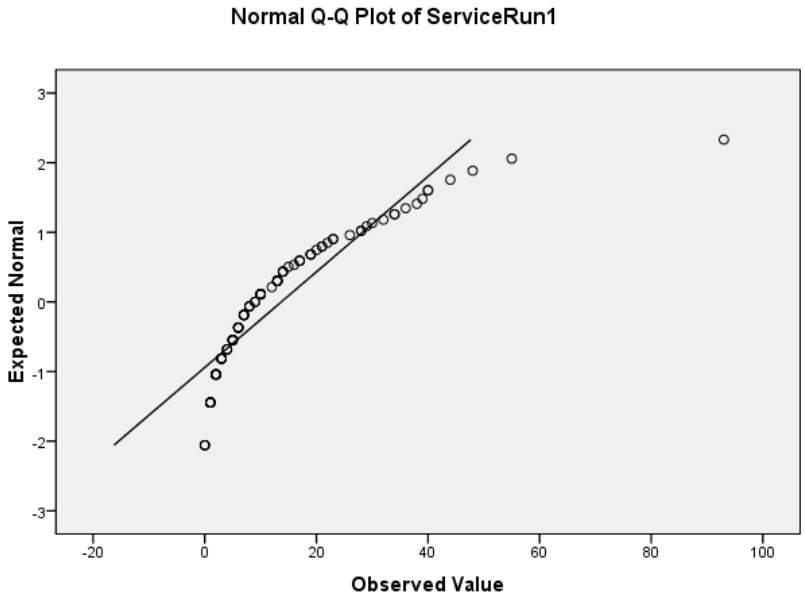

Figure 24. ServiceRun1 - Q-Q Plot of Residual Values.

Furthermore, the Kolmogorov-Smirnov[a] and Shapiro-Wilk tests for normality are shown in Table 32. Both tests assume that the data come from normal populations. Because both the Kolmogorov-Smirnov[a] and Shapiro-Wilk tests below have a significance value of p = .000 the researcher rejects the hypothesis at the .05 level that the data come from a normal population.

Table 32

ServiceRun1 - Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ServiceRun1	.182	100	.000	.779	100	.000

a. Lilliefors Significance Correction

The assumption of equal variances is first tested using the Levene test, as shown below in Table 33. Because the Levene statistic has a significance value of p = .534 the researcher would fail to reject the null hypothesis at the .05 level of equal group means. Further testing for equal variances is done with the Welch and Brown-Forsythe tests shown in Table 34. The results of these tests do not agree with the Levene statistic, with the Welch and Brown-Forsythe tests resulting in a significance value of p = .044. However, they do agree with the variance test of the hypothesis in Table 36.

Table 33

ServiceRun1 - Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
.390	1	98	.534

Table 34

ServiceRun1 - Robust Tests of Equality of Means

	Statistic[a]	df1	df2	Sig.
Welch	4.172	1	95.664	.044
Brown-Forsythe	4.172	1	95.664	.044

a. Asymptotically F distributed.

The hypothesis that there is no significant difference in Turnitin and SafeAssign originality scores is first tested with an Independent Samples Test as shown in Table 35. The

results in Table 35 show a significance value of p = .044 when equal variances are not assumed. The results of the One-Way Analysis of Variance (ANOVA) test is shown in Table 36. The results show a significance value of p = .044 between groups. The results of the test lead the researcher to reject the null hypothesis, at the .05 level, that there is no significant difference between SafeAssign and Turnitin originality scores.

Table 35

ServiceRun1 – Independent Samples Test

	t	df	Sig.	Mean Diff.	Std. Er. Diff.
Equal variances assumed	2.043	98	.044	5.860	2.869
Equal variances not Assumed	2.043	95.664	.044	5.860	2.869
95% confidence interval of the difference, equal variances not assumed					

Table 36

ServiceRun1- ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	858.490	1	858.490	4.172	.044
Within Groups	20166.100	98	205.777		
Total	21024.590	99			

Summary of Research Findings

A summary of the findings from Chapter 4 are summarize in the below table.

Table 37

Summary of Research Findings

Item	Description
Research Question #1	Does the trained group have significantly different SafeAssign originality scores than the not-trained group?
Null Hypothesis	There is no statistically significant difference in SafeAssign originality scores between the training and not-trained group.
Test	One-Way Analysis of Variance (ANOVA)

Findings	Fail to reject the null hypothesis, based on p = .234 at the .05 level
Research Question #2	Does the trained group have significantly different Turnitin originality scores than the not-trained group?
Null Hypothesis	There is no statistically significant difference in Turnitin originality scores between the training and not-trained group.
Test	One-Way Analysis of Variance (ANOVA)
Findings	Fail to reject the null hypothesis, based on p = .278 at the .05 level
Research Question #3	Is there a relationship between the trained group research and writing exam score and the SafeAssign originality score?
Null Hypothesis	There is no relationship between the research and writing exam score and the SafeAssign originality score.
Test	Pearson correlation, bivariate linear regression
Findings	Fail to reject the null hypothesis, based on p = .634 at the .05 level, R = -.100
Research Question #4	Is there a relationship between the trained group research and writing exam score and the Turnitin originality score?
Null Hypothesis	There is no relationship between the research and writing exam score and the Turnitin originality score.
Test	Pearson correlation, bivariate linear regression
Findings	Fail to reject the null hypothesis, based on p = .329 at the .05 level, R = -.203
Research Question #5	Is there a statistically significant difference between the SafeAssign and Turnitin originality scores?
Null Hypothesis	There is no statistically significant difference in originality scores between SafeAssign and Turnitin.
Test	One-Way Analysis of Variance (ANOVA)
Findings	Reject the null hypothesis, based on p = .044 at the .05 level

Chapter Summary

The data collected for this study came from downloading student research papers from Blackboard, and the resulting originality scores from submission of those papers to SafeAssign and Turnitin through Blackboard. Further data was collected for research and writing exam scores from the Blackboard gradebook. From the data, a random sample of 25 trained student papers and exam scores, plus 25 not-trained student papers were used within the study. Five research hypotheses were tested using the data, with one of the five null hypotheses rejected

because the p-value was below the selected level of significance, $p = .05$. As a result, there is no significant difference between the trained and not-trained group's originality scores, nor is there a relationship between the originality scores and the research and writing exam scores. There is however, a significant difference between the SafeAssign and Turnitin originality scores, regardless of whether or not the paper was submitted by a trained or not-trained student. The next chapter will discuss the conclusions based on the findings in Chapter 4, and also recommendations for future research.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Chapter Overview

The following chapter will review the findings of the study, including a discussion based on the researcher's observations, and present the contributions and recommendations for future research. The discussion on research hypotheses 1 and 2 will be combined because of their similarity, research hypotheses 3 and 4 will also be combined because of their similarity, and finally, research hypothesis 5 will be discussed on its own.

Discussion of the Results

The purpose of this study was to use plagiarism detection services to assess the effect of an APA formatting and plagiarism training lesson on the quality of student originality scores. Five research questions were used for this assessment, a discussion of the results follows.

Research Hypotheses 1 & 2

The purpose of both hypotheses 1 and 2 were to determine if there is a significant difference in originality scores between the trained and not-trained groups. The failure to reject the null hypothesis for both cases, leads the researcher to posit that there is no difference between the trained and not-trained groups. Why not? If students are formally trained on APA in-text citations, formatting and referencing, then why wouldn't they have significantly lower originality scores than not-trained groups? Appendix A contains the student manuscript guide

and a sample APA formatted paper for students to guide them in writing a research paper. How different are the papers from the trained group from what the manuscript guide teaches and what the sample papers looks like?

The characteristics of the sample research paper include the basic title page, abstract, introduction, review of literature, methodology, findings, the use of tables and figures, conclusion, a reference list and finally the appendices. With the exception of the methodology and findings sections, as the research papers from this class are primarily reviews of literature, the majority of papers are formatted very closely to the sample paper provided to them. This leads the researcher to assume that students, in general, are paying attention to the structure of their papers before submitting them.

Even though students may be paying close attention to the general APA format of the research paper, the problem may then lie more in the content, as this is what the plagiarism detection services are measuring against. If we look at the top three highest SafeAssign originality scores, as shown in Table 38 below, we can see that all three are from the trained group and all sources with flagged material is from the Another Student's Paper category.

Table 38

Match Overview of the Three Highest SafeAssign Originality Scores

Case	Score	Group	Match Overview
108	91%	Trained	91% comes from Another Student's Paper
123	38%	Trained	38% comes from Another Student's Paper
120	33%	Trained	33% comes from Another Student's Paper

All three of those in Table 38 were verified as not belonging to the same student (i.e., not just the researcher submitting a paper twice), and each paper had instances of both directly copied passages, and passages with only a few words switched around. The below Table 39

shows the match overview for the three highest Turnitin originality scores. The top one is from the trained group and the next two are from the not-trained group. As opposed to the SafeAssign match overviews, with Turnitin we see that almost all of the flagged are Internet Sources, or generally free access websites on the Internet. No student shows up on both tables.

Table 39

Match Overview of the Three Highest Turnitin Originality Scores

Case	Score	Group	Match Overview
110	55%	Trained	54% comes from 34 different Internet Sources 1% comes from 1 Publication
215	46%	Not Trained	45% comes from 7 different Internet Sources 1% comes from 1 Publication
204	39%	Not Trained	39% comes from 3 different Internet Sources

Based on this general match overview, I would suggest further digging into the type of problems that students in these trained group classes are having. The Another Student's Paper category is hard to categorize as accidental plagiarism, however, the Internet Sources category could be either (i.e., on purpose or accidental). Depending on what could be determined, the trained group's APA lesson could be modified to focus more on the problem issues, such as avoiding the sharing of papers and how to properly use and cite internet sources.

The study by Chao, Wilhelm and Neureuther (2009) used the Turnitin service to compare a not-trained control group with two different trained groups of students (i.e., the level one group received minimal training while the level two group received extended formal training). They found a significant difference between the control group and the level two group, but no significant difference between the control group and the level one group nor the level one group compared with the level two group. While it is hard to compare the trained group from this research study with the level one and level two groups from Chao, et al., (2009) there is one

main difference evident. This study uses a mix of both traditional and online delivery, while the Chao, et al., (2009) study has an online class delivery as the control group, but both of the trained groups are traditional campus classes. The use of online and traditional approaches as variables in future research is discussed later in this chapter.

The study by Holt (2012) focused on the effect a plagiarism training and, instead using SafeAssign or Turnitin services, used a pre-treatment and post-treatment survey to measure the effects. Although the methodology for measuring the effectiveness of training is different, Holt (2012) still found a significant difference when formal training was given. Because similar studies have found significant differences when training was given, but not within this study, it is possible that the training itself is ineffective no matter what the measurement of effectiveness is. It is also possible that originality scores are not the most effective final measurement of training effectiveness. There are other ways to use SafeAssign and Turnitin, besides just measuring the final originality score of a paper at the end of a semester (i.e., use them throughout the semester as a paper is written, use the matching categories as part of the training, etc.) There is opportunity to build upon the current study, make improvements to the current training, include variable that account for the type of delivery, and also determining changes to the measures of training effectiveness.

A further reason for the lack of a significant difference is the mix of online and traditional classroom delivery methods used for the training classes. The external research discussed in Chapter 2 is a mix of results, showing either a difference between academic dishonesty between the two delivery methods, or no difference in academic dishonesty between the two delivery methods. Even though the empirical evidence is mixed, a researcher may still presume that there is a higher probability of academic dishonesty within online delivery classes. Future replications

of this study may include the delivery method as a variable in order to better control any effect that this may have.

Research Hypotheses 3 & 4

The purpose of both hypotheses 3 and 4 were to determine if there is a relationship between the originality scores and the research and writing exam scores. The failure to reject the null hypothesis for both cases, leads the researcher to posit that there is no relationship. A review of the exam questions in relation to the types of matching passages found by the SafeAssign service, may shed some light on why there was no relationship found. Obviously, the exam is not there solely to make sure a student gets a low originality score. The purpose of the exam is to make the students think critically about what they learned from the training, and hopefully they apply that knowledge when writing their research paper. The researcher found in failing to reject null hypothesis 1 and 2, that there is no difference between papers submitted by trained and not-trained students. Therefore, this only compounds the need for improvement.

To begin, I decided to look at which exam questions are missed the most by the trained students. Within this study, there were 25 trained cases, each having taken a 20 question exam. Table 40 below shows the questions that were missed the most frequently, accounting for 29% of all wrong answers. The value of this for the instructor, in knowing what questions students struggle with the most, is having the ability to focus some time in discussing these questions in depth, so that students can gain a better understanding.

When reviewing the questions answered wrong in Table 40, the question missed most often has a tongue-in-cheek type of question and answer. Some students may not get the humor behind the question and correct answer. This may be a good question to ask during a class

session in order to generate some discussion, but I would recommend removing it from the quiz to avoid confusion.

The next question on the list a student should get correct by process of elimination, but I'm not sure that I agree with saying that textbooks are low-quality sources. In my experience, textbooks are generally overviews of multiple peer-reviewed works, although not peer-reviewed itself. I don't know that I would categorize textbooks as low-quality information and I don't think that some instructors and students would either.

The third question on the list, it appears that, in one case a student answered incorrectly, but it was counted as answered correctly. The question feedback did not list the correct answer, but in fact a different wrong answer (i.e., the feedback given to this student says that choice B listed below is the correct answer when it is not). That same choice was made by other students and was correctly marked as a wrong answer by the system. I would suggest deleting this question as having a possible bug, which allows feedback to be incorrect.

The next question was involves using an in-text citation for Grayson. The correct answer on the exam is choice B below, and the majority of students who got it wrong chose answer A. I would argue that both A and B are correct answers. By choosing A, you are saying that Grayson authored the idea that Murzyski and Degelman wrote about in their source, and by choosing B, you are saying that you are writing about Grayson's idea through the Murzyski and Degelman source. I would suggest changing that question or list of possible answers in order to eliminate having two correct possible choices.

The final question assumes to be talking about an in-text citation, but does not specify if it is actually referring to an in-text citation or the reference list. Everyone who answered incorrectly, chose choice A, a publisher. I would suggest either updating the question to specify

that it is asking about an in-text citation, or devote some more time to how and when to provide the publisher information.

Table 40

Research and Writing Exam Questions Most Frequently Missed

Question Answered Wrong
If you find information that you want to use in your assignments but don't want to cite the source, you can: a. Paraphrase the information so the in-text citation is not needed.** b. Paraphrase the information and blend it with other sources so a citation is not needed.** c. Use your own words to support ideas you find elsewhere.** d. Hope the instructor doesn't notice your plagiarism, since they can then flunk you.*
The textbook used in courses are generally considered: a. The highest quality source of material you can use in your research. b. A fairly low quality source of material because it is not a peer a reviewed publication.* c. Source material that is considered unimpeachable in both quantity and quality. d. A peer reviewed publication that is often the basis for future academic research.**
If I use a document with six authors like "Payne, Bergin, Bielema, Jenkins, Smith and Jones" that was written in 1991, the first time it is used the in-text citation could look like this: a. (Payne et al., 1991).* b. Payne & al. (1991) said….* and ** c. Payne, Bergin, Bielema, Jenkins, Smith, & Jones (1991) said….** d. (Payne, Bergin, Bielema, Jenkins, Smith, & Jones, 1991).**
Why would you use an in-text citation like, "Grayson (as cited in Murzynski & Degelman, 1996) identified four components."? a. To show Grayson is the author of an idea that Murzyski and Degelman used.** b. To show you are citing Grayson although your source is Murzyski and Degelman's work.* c. To show that Grayson didn't publish his work and that this is a conversation he had with Murzyski and Degelman. d. To show Murzyski and Degelman got other people to do their research.**
If you quote something an author writes, you must provide their last name, year the article was published and: a. A publisher.** b. A page number.* c. Quotation marks around the authors name in the citation. d. Italicize the author's name.
* Correct answer ** Frequent wrong answer selected by students

Research Hypothesis 5

The purpose of hypothesis 5 was to determine if there is a statistically significant difference between the SafeAssign and Turnitin originality scores, regardless of coming from the trained or not-trained group. The rejection of the null hypothesis leads the researcher to posit that there is a statistically significant difference in originality scores between the two plagiarism detection services. The descriptive statistics from Table 31 show that the mean SafeAssign score was 10.78, where the mean Turnitin score was 16.64, a difference of nearly 6 percentage points.

The study by Hunt and Tompkins (2014) investigated the effectiveness of SafeAssign and Turnitin for detecting plagiarism on 284 college-level papers. As compared with the results of this study, Hunt and Tompkins (2014) found that the average SafeAssign score was 6.95% whereas this study found that the average SafeAssign score was 10.78%. Furthermore, Hunt and Tompkins (2014) found that the average Turnitin score was 7.64% whereas this study found that the average Turnitin score was 16.64%. Just as within this study, Hunt and Tomkins found no significant difference between the SafeAssign and Turnitin originality scores. One main difference between their study and this study is the population and sample from where the papers come from. Their study was comprised of papers from first-year college students, mainly enrolled in English composition, literature and religion courses where this study is comprised of students enrolled in 4000/5000 level courses dealing with industrial technology.

The study by Hill and Page (2009) also investigated and compared the effectiveness of SafeAssign and Turnitin services. Rather than use the reported originality scores, they calculated detection rates, where a score of 100% detection is considered most effective, therefore, the actual originality scores from their study are unknown. For their study, Hill and Page (2009) used a control group with no plagiarized material along with groups of papers that had

plagiarized material added to them, whereas this study only compared the raw originality scores and did not add plagiarized material to any papers in order to see if the plagiarized passages would be caught by SafeAssign or Turnitin. The last main difference between their study and this study is the population and sample from where the papers come from. Their study was comprised of 20 papers written by the two authors throughout their own studies, whereas this study pulled student papers from courses.

The studies by both Hunt and Tompkins (2014) and Hill and Page (2009) show that both SafeAssign and Turnitin may be used to detect varying levels of possible instances of plagiarism. They also show that the plagiarism detection services can be used for studies with differing populations and methodologies, as it really depends on what type of research questions are asked. Because this study is not a replication of either study mentioned, it is hard to draw a direct comparison. However, this study should add to the knowledge-base of literature for studies that compare both SafeAssign and Turnitin services.

From Table 38 and 41 above, none of the cases appeared in both the Turnitin and SafeAssign top three. To expand beyond Table 38, Table 41 shows the top ten highest Turnitin originality scores and the respective score of that case from SafeAssign. Conversely, Table 42

Table 41

Ten Highest Turnitin Originality Scores with SafeAssign Case Comparison

Case	Group	Turnitin Score	SafeAssign Score	Difference
111	Trained	55%	33%	40% lower
215	Not Trained	46%	2%	96% lower
204	Not Trained	39%	1%	97% lower
207	Not Trained	35%	2%	94% lower
221	Not Trained	32%	0%	100% lower
225	Not Trained	31%	9%	71% lower
103	Trained	29%	7%	76% lower
205	Not Trained	28%	16%	43% lower
224	Not Trained	27%	14%	48% lower
218	Not Trained	27%	2%	93% lower

shows the top ten highest SafeAssign originality scores and the respective score of that case from Turnitin. The Turnitin scores are altogether noticeably higher. The three scores that are found in both top ten tables are cases 111, 205 and 224. For future improvements, it may be valuable to deep dive into those three cases to see why they show up on both charts. What are those students doing, perhaps wrong, compared to other students? What Match Overview categories are showing up in the results of the originality scores of these papers, from both SafeAssign and Turnitin, and how can that information be used to improve the APA training lesson?

Table 42

Ten Highest SafeAssign Originality Scores with Turnitin Case Comparison

Case	Group	SafeAssign Score	Turnitin Score	Difference
108	Trained	91%	25%	73% lower
123	Trained	38%	6%	84% lower
111	Trained	33%	55%	67% higher
112	Trained	33%	19%	42% lower
219	Not Trained	26%	7%	73% higher
205	Not Trained	16%	28%	75% higher
208	Not Trained	15%	11%	27% lower
224	Not Trained	14%	27%	93% higher
223	Not Trained	11%	15%	36% higher
118	Trained	11%	9%	18% lower

Contributions

The researcher believes that this study will contribute to the knowledge-base of research on how to educate both instructors and students on the importance of preventing plagiarism, and strategies for measuring the originality of research papers. Educators with access to SafeAssign or Turnitin may be able to replicate this type of study within their own programs. Another contribution that this research provides is knowing that even if variables are not found to have statistically significant effects on each other or significant relationships, there is still opportunity to use plagiarism detection services to identify potential improvements to training related to

preventing plagiarism. The end goal is not to simply have a low originality score, the goal is to learn ways to properly format and cite references within student research papers. If an update to the current APA training lesson is made, a new study may replicate the methodology used here. The originality score data collected for this study may be used as a baseline within the university program, and used for measuring the effectiveness of future training.

Recommendations for Future Research

There may be opportunities to use plagiarism detection services in different ways as part of training. The researcher would recommend further study on the research papers, with a focus on the categories of matching sources (i.e., another student's paper, internet source, publication, etc.) as variables. SafeAssign sources include another student's paper, another user's paper, website and ProQuest document. Turnitin sources include internet source and publication. Those variables may be used to identify relationships with the APA training, and result in a more focused and effective training lesson for educators and students. There is also opportunity to use the plagiarism detection services early on in a semester rather than waiting until the final paper is turned in at the end of the semester. Another future research opportunity is to measure the effectiveness of the SafeAssign and Turnitin reference databases as they grow over time, possibly increasing the opportunity for false positives. Furthermore, other services beyond SafeAssign and Turnitin may be used, a few of these available include www.grammarly.com, en.writecheck.com, academicplagiarism.com, www.plagtracker.com, and plagiarismdetect.org. In all, future research related to this study may use the following variables: type of plagiarism detection service (i.e., in addition to SafeAssign and Turnitin), categories of matching sources, traditional classroom vs. online delivery of the training, and different measures of training effectiveness (i.e., instead of limiting it to originality scores).

Chapter Summary

This chapter reviewed the findings of the study, including a discussion over suggested improvements based on the researcher's observations. Out of the five research questions, only research question 5 was found to be statically significant and have the null hypothesis rejected. The researcher's observations will hopefully result in further actions to improve upon the current APA training lesson. After the discussion over the hypothesis testing results, recommendations for future research was reviewed. The recommendations for future research, if implemented, may assist in planning out and measuring improvements made to the APA training lesson.

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APPENDIX A: STUDENT MANUSCRIPT PREPARATION GUIDE

Revision 1.3

Student Manuscript Preparation Guide

[redacted]

NO PLAGIARISM

APA Style (6th edition)

- In-Text Citations
- Reference List
- General Format
- Example of article

The objective of this handbook is to assist students [redacted] to write research papers with proper in-text citations and reference lists according to the 6th edition of the APA style manual. The programs are now utilizing the Blackboard SafeAssign™ software to verify originality of work and also spot plagiarism. This manual is presented in six sections:

After reviewing this manual, if you have questions, please contact your course instructor. Note that this document is only a brief guide for writing citations, for more information refer to the Publication Manual of the American Psychological Association (APA), 6th edition, or visit the website (http://apastyle.apa.org/).

Revision 1.3

University Policy on Academic Dishonesty:

The University Handbook 2012-2013 explains "Academic Honesty."

Academic honesty is one of the most important qualities influencing the character and image of an educational institution. Students must be aware that the consequences of violating standards of academic honesty are extremely serious and costly and may result in the loss of academic and career opportunities. Students found to have committed violations against academic honesty face removal from University classes and degree programs, and/or suspension from the university, while remaining fully responsible for payment of current and any past due tuition and fees..

Students enrolling in [redacted] will find the 'statement of academic honesty (plagiarism)' in the course syllabus. Any instance of plagiarism, cheating, and academic dishonesty will result in a grade of "F" or "NO POINTS" for the assignment or test and could result in an "F" for the course.

A typical SafeAssign report generates a writing originality score. These are percentage measures of how much of a manuscript is paraphrased from other publications and the list of publications that should be cited. It should be noted that a document representing a "Review of Literature" may show very little original work. Also see [redacted] regarding conduct or the Student-Calendar/Handbook for further details on academic honesty policies.

As stated in the "Faculty Guide Section 3a Plagiarism Defining Offenses Against Academic Honesty" is defined as the borrowing of ideas, opinions, examples, key words, phrases, sentences, paragraphs, or even structure from another person's work, including work written or produced by others without proper acknowledgement. "Work" is defined as theses, drafts, completed essays, examinations, quizzes, projects, assignments, presentation, or any other form of communication, be it on the Internet or in any other medium or media. "Proper acknowledgment" is defined as the use of quotation marks or indenting plus documentation for directly quoted work and specific, clearly articulated citations for paraphrased or otherwise borrowed material.

[redacted] Writing Lab

The [redacted] Writing Lab is also a helpful resource and offers free services to any students who need assistance in reading/editing papers or checking on grammar and any forms of citation (e.g. APA, MLA,.....). The [redacted] Writing Lab is located in Hum 116, Monday through Friday; phone 660-543-4367, for more details on online writing assistance visit this website (http://[redacted].edu/ae/writing/owl.cfm).

Writing In-Text Citations and References

The [redacted] programs generally use APA 6th Edition publication formatting, undergraduate and graduate student should be very familiar with the proper way to cite and reference the sources. The *Publication Manual of the American Psychological Association,* 6th Edition provides a comprehensive reference guide to writing using APA style, organization, and content. The Technology, Industrial Management and Technology Management programs all use this manual as the source document for citing and referencing all research done for course work or publication. In

this guide, we emphasize the use of in-text citations and developing a list of references at the end of all written documents using research and have designed it for ease of use. Dr. Douglas Degelman and Dr. Martin Lorenzo Harris from Vanguard University of Southern California also provide a good guideline on writing citation and reference lists. To access it, go to their web site (http://www.vanguard.edu/faculty/ddegelman/detail.aspx? doc_id=796) for additional references or clarification.

Citing References in Text

In-text citations: Source material must be documented in the body of the paper by citing the last names of author(s) and the date(s) sources are published. The underlying principle is that the ideas and words of others must be formally acknowledged. The in-text citations inserted into the sentence structure not only signal that the ideas are more than the author's personal opinion but serve as markers that readers use to find the source of the information from a list of matching references at the end of the document. There are several variations that can be used for in-text citations though, as described below.

- When the names of the author(s) of a source are part of the normal structure of the sentence, the year of publication appears in parentheses immediately after the those names. Consider the following example:

  > Wirth and Mitchell (1994) found that although there was a reduction in insulin dosage over a period of two weeks in the treatment condition compared to the control condition, the difference was not statistically significant.
  >
  > **Note:** The word "*and*" is used when multiple authors are identified as part of the sentence structure. Compare this to the example in the following section.

- When the names of the author(s) of a source are *not* part of the normal sentence structure, both the author(s) names and year of publication appear in parentheses. Consider the following example:

  > Reviews of research on religion and health have concluded that some types of religious behavior are related to higher levels of physical and mental health (Gartner, Larson, & Allen, 1991; Koenig, 1990; Levin & Vanderpool, 1991; Maton & Pargament, 1987; Paloma & Pendleton, 1991; Payne, Bergin & Jenkins, 1991).
  >
  > **Note:** The "*&*" (ampersand) is used when multiple authors are identified in parenthetical material. Note also that when several sources are cited parenthetically, they are ordered alphabetically by the first author's surname and separated by semicolons.

- When a source with two authors is cited, both authors are included every time the source is cited.

- When a source with three, four, or five authors is cited, all authors are included the first time the source is cited. When that source is cited again, the first author's surname and "et al." are used. Consider the following example of the same source cited twice:

Reviews of research on religion and health have concluded that at least some types of religious behaviors are related to higher levels of physical and mental health (Payne, Bergin, Bielema, & Jenkins, 1991).

Payne et al. (1991) showed that...

- When a source that has six or more authors is cited, the first author's surname and "et al." are used every time the source is cited (including the first time).

- Every effort should be made to cite only sources that you have actually read. When it is necessary to cite a source that you have not read ("Grayson" in the following example) that is cited in a source that you have read ("Murzynski & Degelman" in the following example), use the following format for the text citation and list only the source you have read in the References list:

  Grayson (as cited in Murzynski & Degelman, 1996) identified four components of body language that were related to judgments of vulnerability.

- To cite a personal communication (including letters, emails, and telephone interviews), include initials, surname, and as exact a date as possible. Because a personal communication is not "recoverable" information, it is not included in the References section. For the text citation, use the following format:

  B. F. Skinner (personal communication, February 12, 1978) claimed...

- To cite a Web document, use the author-date format. If no author is identified, use the first few words of the title in place of the author. If no date is provided, use "n.d." in place of the date. Consider the following examples:

  Degelman and Harris (2000) provide guidelines for the use of APA writing style.

  Changes in Americans' views of gender status differences have been documented (*Gender and Society*, n.d.).

- To cite the Bible, provide the book, chapter, and verse. The first time the Bible is cited in the text, identify the version used. Consider the following example:

  "You are forgiving and good, O Lord, abounding in love to all who call to you" (Psalm 86:5, New International Version).

  Note: No entry in the References list is needed for the Bible.

Using direct quotations: When a direct quotation is used, always include the author, year, and the page number as part of the citation. When no page number is available, paragraph and chapter numbers may be used instead.

According to Jones (1998), "Students often had difficulty using APA style, especially when it was their first time" (p. 199).

Jones (1998) found "students often had difficulty using APA style" (p. 199); what implications does this have for teachers?

- A quotation of fewer than 40 words should be enclosed in double quotation marks and should be incorporated into the formal structure of the sentence. Example:

  > Patients receiving prayer had "less congestive heart failure, required less diuretic and antibiotic therapy, had fewer episodes of pneumonia, had fewer cardiac arrests, and were less frequently incubated and ventilated" (Byrd, 1988, p. 829).

- A lengthier quotation of 40 or more words should appear (without quotation marks) apart from the surrounding text, in block format, with each line indented five spaces from the left margin.

Formatting a Reference List

References: All sources included in the "References" section must be cited in the body of the paper as in-text citations (and all sources cited in the paper must be included in the "References" section).

A. *Pagination:* The References section begins on a new page. In other words, the first blank page after the end of the document will be used to start the "References" section.
B. *Heading:* The word "References" (centered on the first line below the manuscript page header, if one is used)
C. *Format:* The references (with hanging indents) begin on the line following the References heading. Entries are organized alphabetically by the surnames of authors. Most reference entries have three components:

   1. Authors: Authors are listed in the same order as specified in the source, using surnames and initials. Commas separate all authors. When there are seven or more authors, list the first six and then use "et al." for remaining authors. If no author is identified, the title of the document begins the reference.
   2. Year of Publication: In parentheses following authors, with a period following the closing parenthesis. If no publication date is identified, use "n.d." in parentheses following the authors.
   3. Source Reference: Includes title, journal, volume, pages (for journal article) or title, city of publication, publisher (for book). Italicize titles of books, titles of periodicals, and periodical volume numbers.

D. *Examples of sources.*

   1. **Journal article**

      Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. *Journal of Applied Social Psychology, 26,* 1617-1626.

Revision 1.3

2. **Book**

Paloutzian, R. F. (1996). *Invitation to the psychology of religion* (2nd ed.). Boston: Allyn and Bacon.

3. **Article or chapter in an edited book**

Shea, J. D. (1992). Religion and sexual adjustment. In J. F. Schumaker (Ed.), *Religion and mental health* (pp. 70-84). New York: Oxford University Press.

4. **Diagnostic and Statistical Manual of Mental Disorders**

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.

5. **Audiovisual Media**

Include motion pictures, audio or television broadcast (including podcast), and static objects such as maps, artwork, or photos. **For motion pictures this format is used**

Producer, A. A. (Producer), & Director, B. B. (Director). (Year). *Title of motion picture* [Motion picture]. Country of origin: Studio

For a music recording, use the following format

Writer, A. (Copyright year). Title of song [Recorded by B. B. Artist if different from writer]. *On Title of album* [Medium of recording: CD, record, cassette, etc.] Location: Label. (Date of recording if different from song copyright date)

Example of Video

American Psychological Association. (Producer). (2000). *Responding therapeutically to patient expressions of sexual attraction* [DVD]. Available from http://www.apa.org/videos/

6. **Meeting and Symposia**

When citing from contributions to a symposia or paper or poster, the following format is used

Symposium:

Contributor, A. A., Contributor, B. B., Contributor, C. C., & Contributor, D. D. (Year, Month). Title of contribution. In E. E. Chairperson (Chair), *Title of symposium*. Symposium conducted at the meeting of Organization Name, Location.

Revision 1.3

Paper presentation or poster session

Presenter, A. A. (Year, Month). *Title of paper or poster*. Paper or poster session presented at the meeting of Organization Name, Location.

7. **Magazine articles**

Chamberlin, J., Novotney, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. *Monitor on Psychology, 39(6)*, 26-29.

8. **Online magazine articles**

Clay, R. (2008, June). Science vs. ideology: Psychologist fight back about the misuse of research. *Monitor on Psychology, 39(6)*. Retrieved from http://www.apa.org/monitor/

9. **Newspaper article**

Schwartz, J. (1993, September 30). Obesity affects economic, social status. *The Washington Post*, pp A1, A4

10. **Article From an Online Periodical**

Author, A. A., & Author, B. B. (Date of publication). Title of article. Title of Online Periodical, volume number(issue number if available). Retrieved from http://www.someaddress.com/full/url/

Bernstein, M. (2002). 10 tips on writing the living Web. A List Apart: For People Who Make Websites, 149. Retrieved from http://www.alistapart.com/articles/writeliving

11. **Article From an Online Periodical with DOI Assigned**

Author, A. A., & Author, B. B. (Date of publication). Title of article. Title of Journal, volume number, page range. doi:0000000/000000000000 or http://dx.doi.org/10.0000/0000

Brownlie, D. (2007). Toward effective poster presentations: An annotated bibliography. European Journal of Marketing, 41, 1245-1283. doi:10.1108/03090560710821161

Wooldridge, M.B., & Shapka, J. (2012). Playing with technology: Mother-toddler interaction scores lower during play with electronic toys. Journal of Applied Developmental Psychology, 33(5), 211-218. http://dx.doi.org/10.1016/j.appdev.2012.05.005

12. **Article From an Online Periodical with no DOI Assigned**

Author, A. A., & Author, B. B. (Date of publication). Title of article. Title of Journal, volume number. Retrieved from http://www.journalhomepage.com/full/url/

Kenneth, I. A. (2000). A Buddhist response to the nature of human rights. Journal of Buddhist Ethics, 8. Retrieved from http://www.cac.psu.edu/jbe/twocont.html

13. **Article From a Database**

Author, A. A., & Author, B. B. (Date of publication). Title of article. Title of Journal, volume number, page range. Retrieved from http://www.someaddress.com/full/url/

Smyth, A. M., Parker, A. L., & Pease, D. L. (2002). A study of enjoyment of peas. Journal of Abnormal Eating, 8(3), 120-125. Retrieved from http://www.articlehomepage.com/full/url/

14. **Abstract**

Paterson, P. (2008). How well do young offenders with Asperger Syndrome cope in custody?: Two prison case studies [Abstract]. British Journal of Learning Disabilities, 36(1), 54-58.

Hendricks, J., Applebaum, R., & Kunkel, S. (2010). A world apart? Briding the gap between theory and applied social gerontology. Gerontologist, 50(3), 284-293. Abstract retrieved from Abstracts in Social Gerontology database. (Accession No. 50360869)

15. **Newspaper Article**

Author, A. A. (Year, Month Day). Title of article. Title of Newspaper. Retrieved from http://www.someaddress.com/full/url/

Parker-Pope, T. (2008, May 6). Psychiatry handbook linked to drug industry. The New York Times. Retrieved from http://well.blogs.nytimes.com

Hendricks, J., Applebaum, R., & Kunkel, S. (2010). A world apart? Briding the gap between theory and applied social gerontology. Gerontologist, 50(3), 284-293. Abstract retrieved from Abstracts in Social Gerontology database. (Accession No. 50360869)

16. **Electronic Books**

De Huff, E. W. (n.d.). Taytay's tales: Traditional Pueblo Indian tales. Retrieved from http://digital.library.upenn.edu/women/dehuff/taytay/taytay.html

Davis, J. (n.d.). Familiar birdsongs of the Northwest. Available from http://www.powells.com/cgi-bin/biblio?inkey=1-9780931686108-0

17. **Chapter/Section of a Web Document or Online Book Chapter**

Author, A. A., & Author, B. B. (Date of publication). Title of article. In Title of book or larger document (chapter or section number). Retrieved from http://www.someaddress.com/full/url/

Engelshcall, R. S. (1997). Module mod_rewrite: URL Rewriting Engine. In Apache HTTP Server Version 1.3 Documentation (Apache modules). Retrieved from http://httpd.apache.org/docs/1.3/mod/mod_rewrite.html

Peckinpaugh, J. (2003). Change in the Nineties. In J. S. Bough and G. B. DuBois (Eds.), A century of growth in America. Retrieved from GoldStar database.

18. **Online Book Reviews**

Zacharek, S. (2008, April 27). Natural women [Review of the book Girls like us]. The New York Times. Retrieved from http://www.nytimes.com/2008/04/27/books/review/Zachareck-t.html?pagewanted=2

Castle, G. (2007). New millennial Joyce [Review of the books Twenty-first Joyce, Joyce's critics: Transitions in reading and culture, and Joyce's messianism: Dante, negative existence, and the messianic self]. Modern Fiction Studies, 50(1), 163-173. Available from Project MUSE Web site: http://muse.jhu.edu/journals/modern_fiction_studies/toc/mfs52.1.html

19. **Dissertation/Thesis from a Database**

Biswas, S. (2008). Dopamine D3 receptor: A neuroprotective treatment target in Parkinson's disease. Retrieved from ProQuest Digital Dissertations. (AAT 3295214)

20. **Online Encyclopedias and Dictionaries**

Feminism. (n.d.). In Encyclopædia Britannica online. Retrieved from http://www.britannica.com/EBchecked/topic/724633/feminism

21. **Online Bibliographies and Annotated Bibliographies**

Jürgens, R. (2005). HIV/AIDS and HCV in Prisons: A Select Annotated Bibliography. Retrieved from http://www.hc-sc.gc.ca/ahc-asc/alt_formats/hpb-dgps/pdf/intactiv/hiv-vih-aids-sida-prison-carceral_e.pdf

Revision 1.3

22. **Data Sets**

United States Department of Housing and Urban Development. (2008). Indiana income limits [Data file]. Retrieved from http://www.huduser.org/Datasets/IL/IL08/in_fy2008.pdf

23. **Graphic Data (e.g. Interactive Maps and Other Graphic Representations of Data)**

Solar Radiation and Climate Experiment. (2007). [Graph illustration the SORCE Spectral Plot May 8, 2008]. Solar Spectral Data Access from the SIM, SOLSTICE, and XPS Instruments. Retrieved from http://lasp.colorado.edu/cgi-bin/ion-p?page=input_data_for_spectra.ion

24. **Qualitative Data and Online Interviews**

Butler, C. (Interviewer) & Stevenson, R. (Interviewee). (1999). Oral History 2 [Interview transcript]. Retrieved from Johnson Space Center Oral Histories Project Web site: http://www11.jsc.nasa.gov/history/oral_histories/oral_histories.htm

25. **Online Lecture Notes and Presentation Slides**

Hallam, A. Duality in consumer theory [PDF document]. Retrieved from Lecture Notes Online Web site: http://www.econ.iastate.edu/classes/econ501/Hallam/index.html

Roberts, K. F. (1998). Federal regulations of chemicals in the environment [PowerPoint slides]. Retrieved from http://siri.uvm.edu/ppt/40hrenv/index.html

26. **Nonperiodical Web Document, Web Page, or Report**

Author, A. A., & Author, B. B. (Date of publication). Title of document. Retrieved from http://Web address

Angeli, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M., Soderland, L., & Brizee, A. (2010, May 5). General format. Retrieved from http://owl.english.purdue.edu/owl/resource/560/01/

27. **Computer Software/Downloaded Software**

Ludwig, T. (2002). PsychInquiry [computer software]. New York: Worth.

Hayes, B., Tesar, B., & Zuraw, K. (2003). OTSoft: Optimality Theory Software (Version 2.1) [Software]. Available from http://www.linguistics.ucla.edu/people/hayes/otsoft/

Revision 1.3

28. **E-mail**

E-mails are not included in the list of references, though you parenthetically cite them in your main text: (E. Robbins, personal communication, January 4, 2001).

29. **Online Forum or Discussion Board Posting**

Frook, B. D. (1999, July 23). New inventions in the cyberworld of toylandia [Msg 25]. Message posted to http://groups.earthlink.com/forum/messages/00025.html

30. **Blog (Weblog) and Video Blog Post**

J Dean. (2008, May 7). When the self emerges: Is that me in the mirror? [Web log comment]. Retrieved from http://www.spring.org.uk/the1sttransport

Psychology Video Blog #3 [Video file]. Retrieved from http://www.youtube.com/watch?v=lqM90eQi5-M

31. **Wikis**

OLPC Peru/Arahuay. (n.d.). Retrieved April 29, 2011 from the OLPC Wiki: http://wiki.laptop. org/go/OLPC_Peru/Arahuay

Note: The APA Style Guide to Electronic References warns writers that wikis (like Wikipedia, for example) are collaborative projects that cannot guarantee the verifiability or expertise of their entries.

32. **Audio Podcast**

Bell, T., & Phillips, T. (2008, May 6). A solar flare. Science @ NASA Podcast. Podcast retrieved from http://science.nasa.gov/podcast.htm

33. **Video Podcasts**

Scott, D. (Producer). (2007, January 5). The community college classroom [Episode 7]. Adventures in Education. Podcast retrieved from http://www.adveeducation.com

Revision 1.3

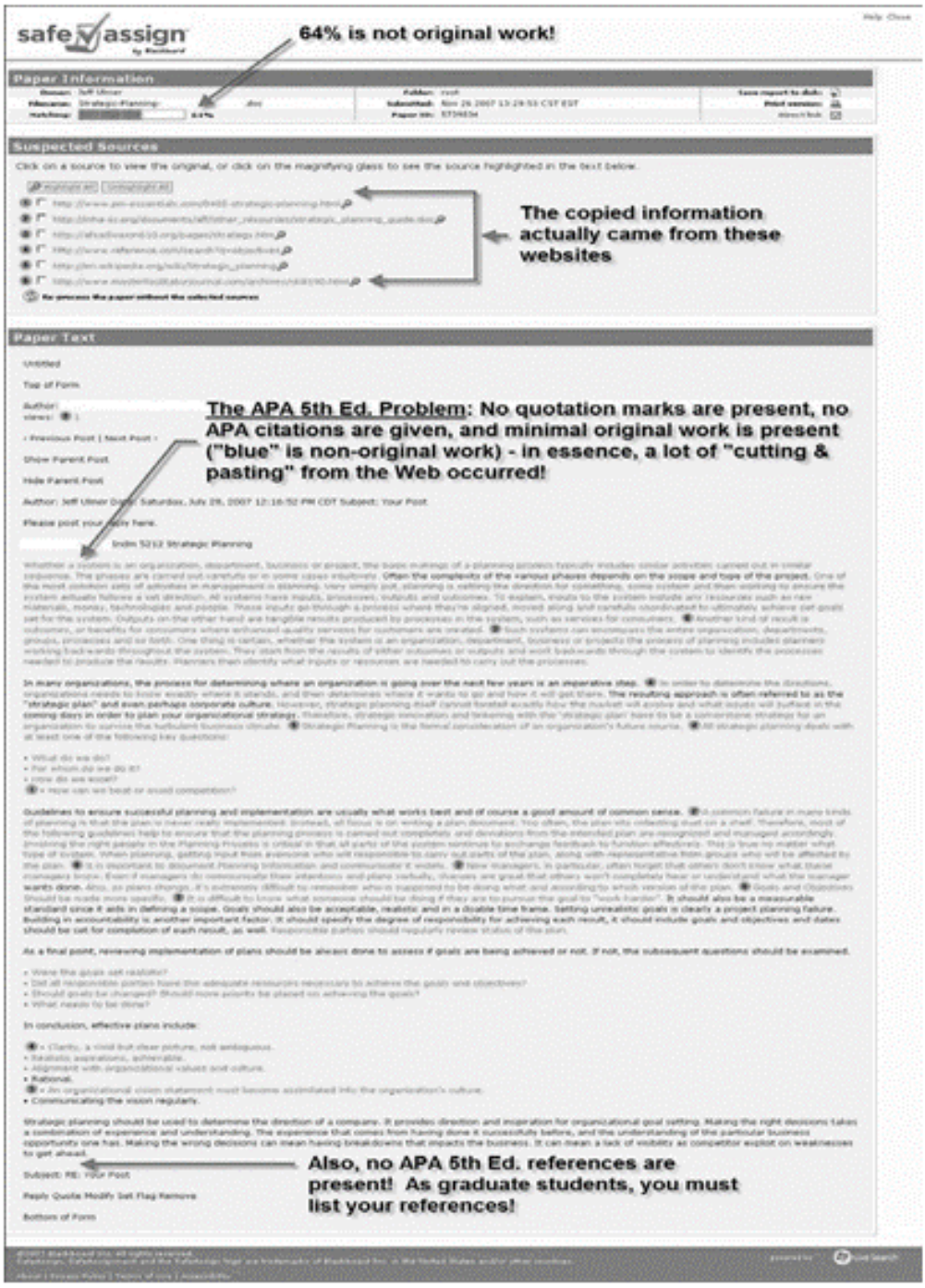
Reference:

Angeli, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M., Soderlund, L., & Brizee, A. (2010, May 5). *General format*. Retrieved from http://owl.english.purdue.edu/owl/resource/560/01/ http://owl.english.purdue.edu/owl/resource/560/10/

Revision 1.3

SafeAssign – Detecting Plagiarism

The [redacted] instructors use SafeAssign™ software to verify originality of work by spotting plagiarism. Any papers that students turn in will be checked by this software which will define the unoriginal work. It also highlights the sentences/paragraphs that students may have copied and pasted without citation. See an example of how SafeAssign spots plagiarism.



Revision 1.3

APPENDIX A

Sample Publication (APA 6th Ed. Paper)

Developing a Graduate Certificate Program in Lean Concepts for Industry and Technology Managers

By

[redacted]

Abstract

An online Graduate Lean Certificate Program in higher education meets an industrially identified need in the areas of Lean Techniques, Quality Systems, Production and Operations Management, Advanced Strategic Quality and Standards, and Lean Implementation. Through training in Lean Concepts and Thinking, prospective graduate students are exposed to five three-hour graduate-level courses earning them a Lean Certificate from a major university and preparation to take either the Lean certification examination from the Society of Manufacturing Engineers (SME) and/or the Manager of Quality / Organizational Excellence certification examination from the American Society for Quality (ASQ). Furthermore, students wishing to pursue a graduate degree may matriculate the same five courses into an established graduate degree program.

Keywords:

Graduate Certification, Curriculum, Distance Learning, Lean Manufacturing, Six Sigma

Introduction

Several large corporations, such as Whirlpool, Xantrex Technology, Gorton, agree that Lean processes help in lowering inventories, reducing waste, minimizing lead-time and facilitating improvement in the quality of products. Lean manufacturing principles eliminating waste by focusing production on specific customer needs (Kroll, 2004). The main topics of Lean concepts include defining value added, mapping the value stream, creating a pull system, analyzing failure modes, and Lean tools and techniques (Five S's, Kanbans, Total Productive Maintenance, Kaizen, and Lean Metrics).

Currently, most industrial personnel are trained in Lean concepts through in-house training programs, out-of-house Lean consultants, or college courses that only touch upon Lean principles. With the certificate program being developed, students would be exposed to five Lean manufacturing courses in an online format. Through the development of an accredited Lean Systems certificate, graduates will be better equipped to find and implement cost savings for their respective companies.

There has been a remarkable growth in the numbers and kinds of certificate programs resulting in enormous growth in higher education (Patterson, 2001). Certificate programs play an important role for the graduate student in permitting a "modular" path to graduate study that may seem less intimidating to the entering student. According to Science and Engineering Indicators 2006, certificate programs from colleges, universities, and various forms of industrial learning centers play a small but growing role in Science and Engineering (S&E) higher education. Certificate programs have become a popular means for students to gain particular skills, for universities to be flexible in a changing environment, and for industry to upgrade the skills of its workers in emerging and rapidly changing fields. In 2002, about 22,300 S&E certificates were

awarded in U.S. colleges and universities, up from about 4,100 in 1983 (National Science Foundation, 2006).

Significance, Purpose of the Study

As industry and business confront the current economic crisis, and the financial challenges, technologists and managers need a practical strategic method to guide cost reduction while increasing productivity of organizations. Lean concepts are a top strategy for industrial managers that have been around for a long period of time and incorporate many methods of waste removal and quality improvement. The purpose of this study is to review the Lean certificate programs in today's market and to develop a graduate curriculum of Lean Thinking in Manufacturing Management. This study organizes and synthesizes the current body of research related to Lean methodologies, with a survey of selected individuals in a variety of management levels in organizations. The results of this study will guide the development of goals and outcomes for a certificate program in Lean systems and provide systematic tools applicable in a variety of managerial settings.

Defining Certificate Program and Lean Concepts

Graduate Certificate Program

A graduate certificate program (GCP) is not defined as a degree by the University of Central Missouri's Graduate School. It is a linked series of credit bearing graduate-level academic courses that are designed to enhance the particular skills and knowledge of graduate students. The program is designed by an academic department and taken for credits by Extended Campus students and/or current degree program students. Furthermore, a graduate lean certificate program in the School of Technology at UCM can be served as a stand-alone graduate

certificate program for non-degree graduate students and as a graduate certificate program integrated with a graduate degree program.

Lean Systems/Concepts

A Lean system emphasizes the prevention of waste: any extra time, labor, or material spent producing a product or service that doesn't add value to it. The goals include: 1) improve quality, 2) eliminate waste, 3) reduce lead time, and 4) reduce total costs (MacInnes, 2002). Tools and techniques of the Lean System include value stream mapping, visual management, error proofing, quick changeover, standard operations, the Kanban System, Lean Metrics and Total Productive Maintenance. The characteristics of Lean Systems are pull methods of work flow, consistent quality at the source, small lot sizes, uniform workstation loads, standardized components and work methods, close supplier ties, flexible workforce, line flows, automation, 5S practices (sort, straighten, shine, standardize, and sustain), and preventive maintenance (Krajewski, Ritzman, and Malhotra, 2005).

Methodology

The study collected data into two avenues. First was to review current literature on market-accepted Lean Certificate Programs and the statistical number of certificate program in the higher education. Secondly, survey the panel of experts in manufacturing and industry regarding the topics of Lean systems/concepts.

Literature Review

There are a number of Lean Certificate Programs that are offered throughout the universities, colleges, and other private for profit and non-profit institutions. The study selected the top ten Google search Lean Certificate Programs in the United States. Furthermore, the study gathered data from the National Science Foundation (NSF) regarding the number of students

who completed higher education certificate programs in Science and Engineering. Statistical numbers obtained helped in analysis of certificate program growth in the United States at the higher education level.

Survey Data

The study collected data from the panel of experts in manufacturing and industry. Experts consisted of Advisory Board Members for the School of Technology (SOT) at Central Missouri State University. Through an Advisory Board meeting with SOT professors and staff on March 2, 2006, educators learned what industrial people expected from the graduate level Lean certification.

Advisory Board Members were presented a questionnaire based on Lean Certification – Body of Knowledge Rubric Version 1.0 from Society of Manufacturing Engineers (SME) which offers 3 levels of Lean Certificates: Lean Bronze, Lean Silver, and Lean Gold. There were 15 production managers, engineers, Lean practitioners, and quality supervisors in the manufacturing and industry areas responding to this questionnaire. Data from the 15 respondents were entered into an Excel Spreadsheet for mathematic computation and summarization.

Findings

From the literature review and survey data, the study established a guideline for curriculum development of a Lean Graduate Certificate Program. The findings were organized into two sections: 1) Characteristics of Lean Certificate Programs and 2) Topics for Lean Systems Curriculum.

Characteristics of Lean Certificate Program

Most Lean Certificate Programs were designed to provide technical knowledge in Lean Systems to students and to assist manufacturers with the challenge of implementing and

maintaining production and service improvement. This study summarized the main characteristics of eight selected Lean Certificate Programs in the United States. The following details the institutes and the name of programs.

1) Rhode Island Manufacturer's Extension Services is a partner with CCRI (CCRI/RIMES) – Lean Graduate Certificate Program
2) Institute for Public Service at University of Tennessee (IPS) - Lean Certificate Program
3) Canadian Manufacturing & Exporters (CME) – Foundations of Lean Certificate Program
4) Nebraska Business Development Center at University of Omaha, Nebraska (MBDC/MEP) - Lean Enterprise Certification
5) Institute of Industrial Engineers (IIE) – Online Lean Certificate Program in Supply Chain Management
6) The California State University, East Bay - Lean Mastery Certificate
7) The Ohio State University, Fisher College of Business – Lean Manager Certificate Program (LMAC)
8) Northwest Wisconsin Manufacturing Outreach Center at Stout University of Wisconsin is a partner with Wisconsin Technical College System – Lean Certificate Program.

These eight institutes providing Lean Certificate Programs can be summarized and analyzed into four characteristics: delivery method, costs of study, course offered, and credit counted. Appendix A presents characteristics of Lean Certificate Program in the eight institutes identified.

Delivery Methods.

Delivery methods of Lean Certificate programs consist of a workshop, online delivery, and classroom learning. Workshops are composed of five-workshop sessions, 56-hour workshops, or a seven-day workshop at a company. Online delivery can be conducted through nine modules over 12 weeks or one graduate course (6 credits) in a semester. Classroom instruction can be accomplished through a single weeklong session (Monday through Friday) or five days each week for four weeks.

Costs of Study.

Most institutes have costs ranging between $1,000-$1,700. For a comprehensive 20-day program, costs accumulated to $15,000.

Courses Offered.

Several institutes reviewed emphasized Lean principles, elements, tools and techniques (e.g. Value Stream Mapping, 5S, Kanban, TPM, and so on). Some institutes required company Lean project implementation. One institute required students to take assessment testing in Math and English, prior to involvement in Lean training courses.

Credits Toward the Degree.

Some institutes provided credits applicable towards a graduate degree or to Continued Education Units. See Appendix A for more information.

Topics for Lean Systems Curriculum

The Advisory Board survey results present Lean concept areas of knowledge, making it possible to differentiate topics of highest importance in order to refine coverage areas needed in a Lean Certificate Program. Table 1 ranked areas of knowledge in Lean concepts from high to low in 32 areas of knowledge. Survey respondents agreed that delivery and customer service

(ranking 96 points) is the most important area included in Lean curriculum. Figure 1 is a bar chart dividing these 32 areas into 3 groups of A, B, and C.

Table 1

Area of knowledge in Lean concepts, ranking high-low

No.	Topics	Pts	No.	Topics	Pts
1	Delivery and customer service	96	17	Quick changeover and single minute	88
2	Employee training and development	95	18	Workstation design and flow racks	88
3	Cost and productivity Improvement	95	19	Suppliers relationship development	88
4	Waste identification and elimination	93	20	Long and short-term planning	85
5	Mistake/Error proofing	93	21	Pull systems, material control and Kanban	83
6	Quality & quality improvement	93	22	lean corporate culture	81
7	5S and workplace management	92	23	Principles of empowerment	81
8	Customer satisfaction/feedback	92	24	Just-in-time (JIT) operations	81
9	Quality Tools, e.g. PDCA, …	91	25	Standard work methods	79
10	Problem solving	91	26	Total productive maintenance (TPM)	79
11	Value stream mapping	89	27	LEAN office	79
12	Leading a Kaizen (cont. improvement)	89	28	Market share	73
13	Value stream profitability	89	29	Suggestion/feedback/appraisal systems	72
14	Business vision, mission, strategies	88	30	Employee turnover and compensation	68
15	Principles of lean leadership	88	31	Visual management	67
16	Teamwork	88	32	Respect for humanity and social res.	65

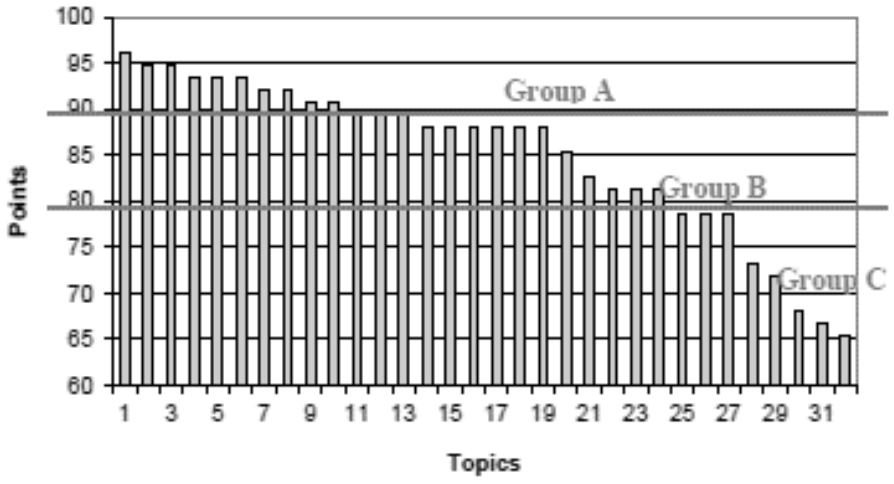


Figure 1. Areas of Lean Knowledge in Groups A, B, and C

Topics one through ten are above 90 points; these are categorized into Group A. The respondents agreed that topics 1 through 10 are highly important for a Lean Certificate Program. Group B contains topics 11 through 21, at 80-90 points. Group C contains topics 22 through 32 and are all at less than 80 points. This means that topics in Group B are more important to Lean Certificate Program than topics in Group C.

Establishing Lean Graduate Certificate Program

Benefits on Lean Certification Program

Lean Certification Programs can help students to acquire a new, or better, job and become more professional and productive in their chosen field. The curriculum is designed to tie Lean principles and concepts with successful Lean implementation. Through certificate training, participants will be able to utilize Lean principles to discover wasteful activities and optimize value-added activities in manufacturing and services.

Lean Graduate Certificate Program

After reviewing the body of knowledge from SME, the curriculum from other Lean certificate programs, and survey results from the Advisory Board, the researchers proposed the curriculum for Lean Graduate Certificate program including program description, program objectives, program requirement and core courses.

Program Description.

The proposed certificate program is designed for industrial professionals seeking insight to Lean System techniques and for preparation for Lean Certification by the Society of Manufacturing Engineers (SME), and/or through the Manager of Quality/Organizational Excellence Certification from the American Society for Quality (ASQ). While this certificate

program is not for a degree, courses completed may be included in a program of study leading to a Master of Sciences degree.

Program Objectives.

Students will gain the most recent skills and knowledge in Lean systems, Six Sigma, quality tools, and quality management principles while preparing for certification exams. Specific objectives include:

- Applying Lean concepts in various industrial settings to eliminate waste and maximize quality.
- Utilization of statistical tools and quality techniques to problem solve a given industrial scenario.
- Developing a continuous improvement plan using quality standards criteria established by the International Standards Organization series and Malcolm Baldrige Awards program.
- Preparation for Lean certification by the Society of Manufacturing Engineers (SME) and/or the Manager of Quality/Organizational Excellence Certification from the American Society for Quality (ASQ).

Program Requirements.

Students in this certificate program will complete fifteen semester hours of graduate credit or five three-hour courses and maintain a minimum grade point average of 3.0. Of these five courses, two are already developed and being taught in the Master of Science in Industrial Management program since 2001. The certificate can be completed in one calendar year. The School of Technology graduate coordinator will advise students and confirm completion of certificate requirements. The five courses include IndM 5222 – Lean Techniques, MMgt 4580 –

Quality Systems, IndM 5212 – Production and Operations Management, IndM 6580 – Advanced Strategic Quality and Standards, and IndM 5232 – Seminar in Lean Implementation. Reference Appendix B for additional course descriptions.

Summary and Conclusions

Lean is here to stay. If companies are to remain profitable, higher education must be quick to address the technological needs of our national workforce. Through the investment in a Lean training certificate, work associates and companies will acquire a method for systematic identification and reduction of waste; ultimately resulting in higher profits and an optimally employed workforce.

There is also information indicating that older students will find certificate programs more attractive and accessible than traditional graduate programs. And once an older student completes the certificate program, would be more inclined to take on the fulfillment of a graduate degree. It seems clear that certificate programs fulfill an important need, whether it is to provide needed opportunities in one's professional development, or to provide the path towards a desired graduate degree (Patterson, 2001). Through a Lean Certificate Program and ultimate completion of a graduate education, students will be enabled to meet their professional goals.

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Appendix A

Institutes	Delivery Method	Courses	Costs	Note
CCIR/RIMES	Five-workshop series: - five one-day workshop - take individual workshops	1) Assessment testing: Math and English 2) Lean training 3) Req. courses; Math, English, and Business	Each workshop vary: $175, $200, or $250 between: $1,000-$1,200	15 credits apply towards Associates' degree
IPS U. of Tennessee	Mon-Fri, 5days Hands-on learning and classroom instruction	Practical Lean manufacturing tools	$1,325	Units: 4.0 CEUs
CME	1 full day for each course, classroom	4 courses in Lean tools and techniques	Each course vary Non-member: $450	
NBDC	6 Workshops: 56 hrs 1-2 days for each workshop	Workshop in Lean tools and techniques	$1,700 each workshop	Units: 5.6 CEUs (continuing education unit)
IIE Online	9 modules with 12 weeks	Lean tools and techniques Supply chain management	Non-member: $1,345	Units: 2.1 CEUs
CSU Online	1 course online self-paced, 1 semester	Lean theory, Lean elements and rules, value stream mapping, TPM and DFMA	$1,495	
LMAC - Ohio	four non-consecutive weeks, 5 days a week	Lean concepts, tools, and implementation	$15,000	Certified: - 4-week training - 2 hrs exam - project implementation
NWMOC	7 full-days on-site company	Lean concepts, tools, and implementation		4 Associate degree credits from WI Technical College

Appendix B

- **IndM 5222 - Lean Techniques.** A survey of theory, goals, and applications of Lean principles and strategies in industrial organizations. Applying Lean concepts to business strategy, product design, and tools for finding and eliminating waste and for continuous improvement. Mapping the value stream, error proofing, failure analysis, and the Lean metrics are covered.
- **MMgt 4580 Quality Systems.** The principles and practices of Total Quality and Six Sigma, and the decision making tools and techniques utilized by professional in today's successful industries. Emphasis on Statistical Process Control (SPC) to reduce variation.
- **IndM 5212 Production and Operations Management**. Production/operations concepts with emphasis upon systems, systems design and analysis, strategies, productivity, planning, forecasting, deterministic and stochastic inventory control, MRP scheduling, and project planning.
- **IndM 6580 Advanced Strategic Quality and Standards.** An investigation of advanced quality techniques for production/quality managers, global standards criteria (ISO series and Malcolm Baldrige Award), and standard certification training for quality managers and professionals.
- **IndM 5232 Seminar in Lean Implementation**. Individual research directly related to Lean implementation in an industrial enterprise. Preparation for the Lean Certification and Manager of Quality Certification exams.

APPENDIX B: TRAINED GROUP RESEARCH AND WRITING EXAM

Description:
Total questions in the test bank: 68
Total questions given to each student: 20
Total points possible: 20
Passing grade: 80% or 16 out of 20

Questions from the test bank:

1. Citations and references in written work turned in for courses all use the _____ style of writing.

a. MLA, 7th edition
b. APA, 6th edition
c. Chicago, 15th edition
d. Turabian, 6th edition

2. Plagiarism is defined as:

a. A medical condition in which someone is infected with and carries any type of plague or disease.
b. The inability to recognize work contributed from various sources by inadvertently including it in papers.
c. Borrowing of ideas, opinions, or work written or produced by others without proper acknowledgement.
d. Allowing other people to use your work as a reference for their own assignments or exams.

3. SafeAssign is:

a. Software which will define unoriginal work and highlight sentences/paragraphs that students may have copied and pasted without citation.
b. Software which will ensure that assignments can't be copied from Blackboard into word processors.
c. Software which prevents one student from looking at someone work from another student that they turned in for a group project.
d. A security program that prevents hackers from entering Blackboard and taking courses.

4. Academic honesty is:

a. A concept developed by the university to justify any actions it determines to be in the best interest of the student.
b. An outdated concept that is not applicable to classrooms now that we offer courses online and have no need to personally take responsibility for classroom actions.
c. The idea that instructors at the university treat each and every student with respect and fairly grade their work, without reference to gender, race or religion.
d. One of the most important qualities influencing the character and image of an educational institution.

5. The consequences for violating the standards of academic honesty include:

a. Public flogging, ridicule and contempt before mandatory expulsion.
b. Removal from university classes and degree programs.
c. One year of mandatory counseling and enrollment in an ethics course.
d. Nothing the first time, possible counseling and grade review if done a second time.

6. Plagiarism, cheating, and academic dishonesty will result in:

a. A better grade if you can get away with it, because ethics is a silly concept, only meant to keep the chattering masses inline and has nothing to do with actual reality.
b. Great practice for the corporate or public sector because in those places ethics is a real anchor when doing what is needed to get ahead.
c. A grade of "F" or "NO POINTS" for the assignment or test and could result in an "F" for the course.
d. Proof that nice guys finish last since those who cheat – win!

7. The Publication Manual of the American Psychological Association, 6th Edition provides:

a. A comprehensive reference guide to writing using APA style, organization, and content.
b. References for students looking for research in courses related to psychology.
c. A great source for developing theory on management themes based on historical analysis.
d. Excellent reference materials is a pocket sized book known for its ease of use.

8. In-text citations are:

a. Bits of information taken from written sources whether online or on paper.
b. Data or facts taken from the textbook(s) of the courses being studied.
c. A method of integrating facts into documents so opinions are supported.
d. Sources documented in the body of a paper by citing the author and date.

9. If you find information that you want to use in your assignments but don’t want to cite the source, you can:

a. Paraphrase the information so the in-text citation is not needed.
b. Paraphrase the information and blend it with other sources so a citation is not needed.
c. Use your own words to support ideas you find elsewhere.
d. Hope the instructor doesn't notice your plagiarism, since they can then flunk you.

10. Is the sentence, "Wirth and Mitchell (1994) found that although there was a reduction in insulin dosage over a period of two weeks in the treatment condition…" properly cited?

a. No, the in-text citation should read "Wirth & Mitchell (1994)".
b. No, the in-text citation must have a page number in the citation as well.
c. Yes, but only because Wirth and Mitchell are cited as part of the sentence structure.
d. Yes, but only because the document is off the internet rather than a book so no page number is needed.

11. Is the sentence, "Reviews of research on religion and health have concluded that at least some types of religious behaviors are related to higher levels of physical and mental health. (Gartner, Larson, & Allen, 1991; Koenig, 1990; Levin & Vanderpool, 1991)" properly cited?

a. No, the "&" symbol used with the in-text citations should be spelled out as "and".
b. No, the period at the end of the sentence should be used after the last parenthesis mark.
c. No, the semicolon between the two separate sets of authors should be a colon instead.
d. No, citing two separate documents in one sentence is not allowed by APA rules.

12. If I use an in-text citation like "(Payne, Bergin, Bielema, & Jenkins, 1991)" at the end of one sentence, which of the following citations is acceptable in a sentence if I cite the same document again?

a. (Payne, Bergin, Bielema, & Jenkins, 1991).
b. Payne, Bergin, Bielema, & Jenkins (1991) said that.
c. In 1991, Payne, Bergin, Bielema, & Jenkins said that…
d. Payne et al. (1991) said that...

13. If I use an in-text citation like "(Payne, Bergin, Bielema, & Jenkins, 1991)" at the end of one sentence, which of the following citations is acceptable in a sentence if I cite the same document again?

a. (Payne et al., 1991).
b. (Payne, 1991).
c. (Payne, Bergin, Bielema, & Jenkins, 1991).
d. Payne, Bergin, Bielema, & Jenkins (1991) said that…

14. If I use an in-text citation like "(Levin & Vanderpool, 1991)." at the end of one sentence, which of the following citations is acceptable in a sentence if I cite the same document again?

a. (Levin & Vanderpool, 1991).
b. (Levin, 1991).

c. (Levin et al., 1991).
d. Levin et al. (1991) said that…

15. If I use an in-text citation like "Levin and Vanderpool (1991).said" at the beginning of one sentence, which of the following citations is acceptable in a sentence if I cite the same document again?

a. (Levin and Vanderpool, 1991).
b. (Levin & Vanderpool, 1991).
c. (Levin et al., 1991).
d. (Levin, 1991).

16. If I use a document with six authors like "Payne, Bergin, Bielema, Jenkins, Smith and Jones" that was written in 1991, the first time that it is cited in-text, the citation could look like this:

a. (Payne, Bergin, Bielema, Jenkins, Smith, and Jones, 1991).
b. (Payne, Bergin, Bielema, Jenkins, Smith, & Jones, 1991).
c. Payne, Bergin, Bielema, Jenkins, Smith, and Jones (1991) said…
d. Payne et al. (1991) said….

17. If I use a document with six authors like "Payne, Bergin, Bielema, Jenkins, Smith and Jones" that was written in 1991, the first time it is used the in-text citation could look like this:

e. (Payne et al., 1991).
f. Payne & al. (1991) said….
g. Payne, Bergin, Bielema, Jenkins, Smith, & Jones (1991) said….
h. (Payne, Bergin, Bielema, Jenkins, Smith, & Jones, 1991).

18. A document you've read cites another document with a quote that you want to use but you're unable to find a copy of that other document; what should you do?

a. Pretend the document you've read is the source of the data and cite it.
b. Forget it and move on to another document since Google will provide thousands.
c. Cite the document you've read but add the words "as cited in" to indicate that it is not the original source.
d. Paraphrase the quote instead of using a direct quote to make it into your own words.

19. Why would you use an in-text citation like, "Grayson (as cited in Murzynski & Degelman, 1996) identified four components."?

e. To show Grayson is the author of an idea that Murzyski and Degelman used.
f. To show you are citing Grayson although your source is Murzyski and Degelman's work.
g. To show that Grayson didn't publish his work and that this is a conversation he had with Murzyski and Degelman.
h. To show Murzyski and Degelman got other people to do their research.

20. If you have a conversation with someone you want to quote in a document, your in-text citation will look like:

a. B. F. Skinner (personal communication, February 12, 1978) claimed...
b. B. F. Skinner (conversation, February 12, 1978) claimed...
c. B. F. Skinner (personal communication, 1978) claimed...
d. B. F. Skinner (1978) claimed...

21. If you find an article that you want to cite but that lists no author, you should:

a. Probably find a better article.
b. See if you can figure out who the author is before citing them.
c. Use the first few words of the title in place of the author.
d. All the above.

22. You find an article online that the author of your textbook wrote for a magazine that makes a powerful argument to support your latest assignment but no date is provided. For the in-text citation you should:

a. Probably find a better article.
b. Just use the author's last name and ignore the date part.
c. Use the initials "n.d." where the date should go.
d. Provide your best guess as to when the author wrote it.

23. If you quote something an author writes, you must provide their last name, year the article was published and:

e. A publisher.
f. A page number.
g. Quotation marks around the authors name in the citation.
h. Italicize the author's name.

24. If you paraphrase something an author writes, it is strongly recommended that you use an in-text citation that:

a. Cites page numbers in addition to the author's name and date of publication.
b. Italicizes the author's name(s).
c. Uses quotation marks around the author's name(s) in the in-text citation.
d. Uses single quotation marks around the author's name(s).

25. If an author is quoted in your work:

a. You must use quotation marks around the quote.
b. You must use single quotation marks around the quote.
c. You must start and end the sentence in quotation marks, even if only part of it is a quote.

d. You must start and end the sentence in single quotation marks, even if only part of it is a quote.

26. Quotes larger than 40 words:
    a. Use quotation marks, just like smaller quotes.
    b. Do not use quotation marks but are indented on the first line.
    c. Do not use quotation marks but indent every line of the quote.
    d. Are not used under APA guidelines.

27. If in-text citations from a textbook are used five times in a document (more than any other), the references section at the end of the document:

    a. Includes a reference for each citation in the references section (so the textbook is listed five times in the back of the document).
    b. Has a single reference for the textbook in the references section of the document even though it was cited five times.
    c. Adds the number "5" in the references section at the end of my document to indicate the number of times the reference was used.
    d. Lists that reference first because references are listed in order of number of times used.

28. Reference sections, at the end of your documents:

    a. Start on the first line (double spaced) after the closing paragraph of your work.
    b. Are left hand justified at the top of the next page after the conclusion of your work.
    c. Start with the heading "References" left justified at the top of a page.
    d. Start with the heading "References" centered at the top of the first blank page at the end of your work.

29. References listed at the end of a document should be listed in:

    a. The order in which the in-text citations appear in the document.
    b. Alphabetical order.
    c. The order of quality (e.g. peer review journals then, dissertations/thesis, books, magazines, newspaper, internet sites, corporate web sites, Wikipedia, blog sites, etc.)
    d. Numerical order.

30. References listed at the end of your documents use:

    a. Hanging indentation.
    b. First line indentations.
    c. Only indented lines.
    d. No indentation.

31. When listing the authors of a single document cited in your work, they are listed in:

    a. Alphabetical order.

b. Any order, as long as all are listed.
c. Order by first name, middle initial and last or surnames.
d. Order listed (given) in the cited document.

32. When listing the authors of a single document in-text in your work:

a. Listing first names and initials is optional.
b. Listing first names and initials is mandatory.
c. Listing last or surnames only is mandatory.
d. Listing only surnames and initials is mandatory.

33. When listing the authors of a single document in the references section of your work:

a. Listing first names and initials is optional.
b. Listing only surnames and initials is mandatory.
c. Listing first names and initials is mandatory.
d. Listing last or surnames only is mandatory.

34. If you saw these names listed as part of a reference in the references section, Murzynski, J., & Degelman, D. they would:

a. Be fine as they are.
b. Require both sets of initials to be listed before they can be used.
c. Need the first names spelled out.
d. Need Degelman's name listed first so they are alphabetically ordered.

35. An author's name in the references section lists:

a. First name, middle initial, and last name.
b. Last name first, then first name and middle initial.
c. Last name first, then initials for the first and optionally middle name.
d. Initials for the first and middle names and then spells out the last name.

36. Which of the following would be a correct listing of names in the references section:

a. Degelman, D. & Murzynski, J.
b. Murzynski, J., and Degelman, D.
c. Murzynski, J. & Degelman, D.
d. Murzynski, J., & Degelman, D.

37. You are citing a high quality journal article in a publication that comes out quarterly in the spring, summer, fall and winter. Which of the dates below is formatted correctly for a journal listing in your references section?

a. (2005).

b. (2005, Spring).
c. (2005, quarterly).
d. (2005, January 23).

38. Which of the dates below is formatted correctly for a book listing in your references section?

a. (2005.).
b. (2005).
c. (2005, January 23).
d. 2005.

39. Which of the dates below is formatted correctly for a magazine listing in your references section?

a. (2010, Jan).
b. (2010/01/23).
c. (2010, January).
d. (2010, Jan., 23).

40. Which of the dates below is formatted correctly for a newspaper listing in your references section?

a. (2010, Jan).
b. (2010/01/23).
c. (2010, Jan., 23).
d. (2010, January 23).

41. Which of the titles below is formatted correctly for a journal listing in your references section?

a. Body language of women and judgments of vulnerability to sexual assault in Texas.
b. Body language of women and judgments of vulnerability to sexual assault in texas.
c. Body language of women and judgments of vulnerability to sexual assault in Texas.
d. Body language of women and judgments of vulnerability to sexual assault in Texas.

42. Which of the titles below is formatted correctly for a book listing in your references section?

a. Body language of women and judgments of vulnerability to sexual assault in Texas.
b. Body language of women and judgments of vulnerability to sexual assault in texas.
c. Body language of women and judgments of vulnerability to sexual assault in Texas.
d. Body language of women and judgments of vulnerability to sexual assault in Texas.

43. Which of the titles below is formatted correctly for a magazine listing in your references section?

a. Body language of women and judgments of vulnerability to sexual assault in texas.

b. Body language of women and judgments of vulnerability to sexual assault in Texas.
c. Body language of women and judgments of vulnerability to sexual assault in Texas.
d. Body language of women and judgments of vulnerability to sexual assault in Texas.

44. Which of the titles below is formatted correctly for a newspaper listing in your references section?

a. Body language of women and judgments of vulnerability to sexual assault in texas.
b. Body language of women and judgments of vulnerability to sexual assault in Texas.
c. Body language of women and judgments of vulnerability to sexual assault in Texas.
d. Body language of women and judgments of vulnerability to sexual assault in Texas.

45. For a journal article, the only part in the reference section that will be shown in italics is:

a. The name(s) of the author(s).
b. The title of the article.
c. The name of the journal.
d. The name of the journal and volume number.

46. For a book, the only part in the reference section that will be shown in italics is:

a. The name(s) of the author(s).
b. The title of the book.
c. The name of the publisher.
d. The name of the publisher and area published in.

47. For a magazine, the only part in the reference section that will be shown in italics is:

a. The name(s) of the author(s).
b. The title of the article.
c. The name of the magazine and volume number.
d. The name of the magazine.

48. For a newspaper, the only part in the reference section that will be shown in italics is:

a. The name of the newspaper.
b. The name of the newspaper and section number.
c. The name(s) of the author(s).
d. The title of the article.

49. For a journal article, the only part in the reference section that will be shown in italics is:

a. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626.

b. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626.
c. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626.
d. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626.

50. For a book, the only part in the reference section that will be shown in italics is:

a. DuBrin, A. J. (2012). Essentials of management. (9th ed.). Mason, OH: South-Western Cengage Learning.
b. DuBrin, A. J. (2012). Essentials of management. (9th ed.). Mason, OH: South-Western Cengage Learning.
c. DuBrin, A. J. (2012). Essentials of management. (9th ed.). Mason, OH: South-Western Cengage Learning.
d. DuBrin, A. J. (2012). Essentials of management. (9th ed.). Mason, OH: South-Western Cengage Learning.

51. For a magazine, the only part in the reference section that will be shown in italics is:

a. Chamberlin, J., Novotney, A., Packard, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5), 26—29.
b. Chamberlin, J., Novotney, A., Packard, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5), 26—29.
c. Chamberlin, J., Novotney, A., Packard, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5), 26—29.
d. Chamberlin, J., Novotney, A., Packard, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5), 26—29.

52. For a newspaper, the only part in the reference section that will be shown in italics is:

a. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, p. B-1.
b. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, p. B-1.
c. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, p. B-1.
d. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, p. B-1.

53. For an online journal document, the reference section, minus hanging indents, will look exactly like:

a. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626. Retrieved from http://psycnet.apa. org/journals/apl/98/4/559/

b. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626. Retrieved from http://psycnet.apa. org/journals/apl/98/4/559/ .
c. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626. Retrieved from http://psycnet.apa. org/journals/apl/98/4/559/
d. Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626. Retrieved from http://psycnet. apa. org/journals/apl/98/4/559/

54. For an electronic book, the reference section, minus hanging indents, will look exactly like:

a. O'Keefe, E. (n.d.). Egoism & the crisis in Western values. Retrieved from http://www.onlineoriginals. com/showitem.asp?itemID=135
b. O'Keefe, E. (n.d.). Egoism & the crisis in Western values. Retrieved from http://www.onlineoriginals. com/showitem.asp?itemID=135
c. O'Keefe, E. (n.d.). Egoism & the crisis in Western values. Retrieved from http://www.onlineoriginals. com/showitem.asp?itemID=135.
d. O'Keefe, E. (n.d.). Egoism & the crisis in Western values. Retrieved from http://www.onlineoriginals. com/showitem.asp?itemID=135

55. For an electronic magazine, the reference section, minus hanging indents, will look exactly like:

a. Chamberlin, J., Novotney, A., Packard, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5). Retrieved from http:// www.apa.org/monitor/2013/07-08/index.aspx
b. Chamberlin, J., Novotney, A., Packard, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5). Retrieved from http://www.apa.org/monitor/2013/07-08/index.aspx
c. Chamberlin, J., Novotney, A., Packard, E., & Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5). Retrieved from http://www.apa.org/monitor/2013/07-08/index.aspx
d. Chamberlin, J., Novotney, A., Packard, E., and Price, M. (2008, May). Enhancing worker well-being: Occupational health psychologists convene to share their research on work, stress, and health. Monitor on Psychology, 39(5). Retrieved from http://www.apa.org/monitor/2013/07-08/index.aspx

56. For an online newspaper, the reference section, minus hanging indents, will look exactly like:

a. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, Retrieved from http://www. washingtonpost.com/blogs/wp/2012/06/03/ideal_management

b. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, Retrieved from http://www. washingtonpost.com/blogs/wp/2012/06/03/ideal_management
c. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, Retrieved from http:// www.washingtonpost.com/blogs/wp/2012/06/03/ideal_management
d. DuBrin, A. J. (2012, June 3). Ideal management. The Washington Post, Retrieved from http://www. washingtonpost.com/blogs/wp/2012/06/03/ideal_management

57. If you use a search engine like Google, there may be problems. What are they?

a. Thousands of listings and finding the best ones may be time consuming and consist of mostly low quality sources.
b. Google is designed to search in areas that reflect user search patterns which may not always reflect academic oriented results.
c. Often academically oriented and other high quality materials are not on Google and must be accessed through databases that charge fees for access.
d. All the above are true and should be considered when quality materials are needed as reference sources.

58. Quality research should not include multiple blog sites because:

a. They are difficult to find and research.
b. Blog sites are ideal references for serious and academically oriented student.
c. The instructor expects you to take an assignment seriously and blog sites count as opinions.
d. When you cite Wikipedia, it will seem like you really put in some effort.

59. If you find something in Wikipedia and it has a link to the source for that information, reference or cite:

a. Wikipedia, its credentials are generally highly regarded in academia and business.
b. The original source if you still find it credible after review.
c. Wikipedia, but the in-text citation for the work should indicate that the original source is not Wikipedia but a secondary source.
d. The original source and Wikipedia so that you get two references for the price of the effort of researching one.

60. Company web sites are generally great sources to find out:

a. The names of founders and dates the company was founded in.
b. General policies related to generic company issues.
c. What kind of products and services a company offers.
d. All the above even though these issues are rarely the kind of research needed for assignments.

61. Magazines and newspapers, whether in print or online, are:

a. Generally the lowest quality source for references you'll want to cite for a class.
b. Very high quality sources of information that can also be timely.
c. Generally too generic in their focus to be of any value.
d. Widely available through a variety of sources and considered top quality sources.

62. The textbook used in courses are generally considered:

e. The highest quality source of material you can use in your research.
f. A fairly low quality source of material because it is not a peer a reviewed publication.
g. Source material that is considered unimpeachable in both quantity and quality.
h. A peer reviewed publication that is often the basis for future academic research.

63 Harvard Business Review is categorized as:

a. A magazine on roughly the same level of quality as Time or BusinessWeek.
b. A journal full of bias against magazines not associated with a university.
c. The highest quality source of information, the peer review article, roughly on a par with the academic dissertation.
d. Primarily a source of information on business and economics like the Wall Street Journal.

64. Students can access many types of high quality research material through:

a. Publications kept in the Grinstead office building on campus for checkout by students.
b. Publications kept in the T.R. Gaines building on campus for checkout by students.
c. Publications kept on file and available during the hours the library is open on campus to the student body.
d. Publications kept online in massive databases available through the library and available anytime, 24/7.

65. Students citing research using rules derived from the APA style guide will:

a. Find it an easy to use reference manual.
b. Generally find the "Student Manuscript Preparation Guide" an easier reference for most APA style questions.
c. Need to purchase the APA style guide.
d. Frequently lose sleep over the mind numbing complexity involved.

66. Every time you use someone else's work in the text of your document you must:

a. Use in-text citations to tell the instructor where that information came from.
b. Reference the work at the end of your document in a references section.
c. Both answer a. and answer b. are true.
d. Cite the work if it is a direct quote.