

*International Journal of Learning, Teaching and Educational Research*  
Vol. 19, No. 11, pp. 145-162, November 2020  
<https://doi.org/10.26803/ijlter.19.11.9>

## Use of Technology-Based Tools in Ensuring Quality of Publishable Journal Articles

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**Abstract.** Scientific publication is a pillar that gauges the human intellectual capital of countries in the global innovation index. This paper presents the effectiveness of using technology-based tools in ensuring the quality of articles for journal publication. It employed a pre-and post-test research design to determine the effectiveness of online technology-based tools before and after the intervention. It employed a descriptive presentation of the different online technology tools used in the 21 specimens of faculty research written in publishable article formats. It examined the quality of references, level of readability, writing quality, originality, and grammar of the papers before and after the review process and interventions. The study highlighted that using the online tools improved the quality of the documents on grammar and lexical rate, similarity index, readability index, number of references, number of correct bibliographic entries for submission in high impact journals. A higher level of a cleansing process using online technology

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tools ensures the quality of publishable articles. Implications of this study will facilitate the academic community's journal article writing skill to effectively disseminate research studies results with higher chances of being accepted in respected global databases to contribute to knowledge generation and development of the country.

**Keywords:** journal publication; research dissemination; online-technology tools

## 1. Introduction

Progress in the 21st century is impossible without research. Research is responsible for new products, new knowledge, and new ways of undertaking projects. The values of research to humanity are immeasurable. Research has proved to be an essential and powerful tool leading to human progress. The advent of the 21st century reoriented research towards good life with others to attain sustainable growth. This reorientation befitted universities around the world to be the first propellers of development in their respective countries. According to the European Commission Report (2003), there is a secure link between a scientific publication and national wealth. Within the tertiary education system, research universities play a critical role in training the professionals, high-level specialists, scientists, and researchers needed by the economy and in generating new knowledge in support of national innovation systems (Ardito et al., 2019; Dzimińska, Fijałkowska & Sułkowski, 2020). In this setting, it is the priority of countries worldwide to ensure that their premier universities are trailblazers of intellectual and scientific development (Salmi, 2009). The competitiveness for states' intellectual capital depends on the scientific publication, patents, and knowledge generated (Arhibugi et al., 2009; Bucheli, 2012; Larsen et al., 2010). Scientific publications in reputable journals are considered for the global University ranking, times university ranking, and Shanghai World University ranking (Campos-Varela, Villaverde-Castañeda & Ruano-Raviña, 2020; Morrison, 2017; Rauhvargers, 2011; van Nunen, Li, Reniers & Ponnet, 2018).

Scientific journals are essential media for the dissemination of scientific findings. Research journals are coined as the "lifeblood of living and evolving science" (Gevers et al., 2006). Writing and publishing scientific articles are the way of life in scientists' careers (Adams, Rogers, Smart & Szomszor, 2020; Ajami & Movehedi, 2013; Dangal, Hamal & Giri, 2017; Masters, 2013; McDowell & Liardét, 2019; Mohammadi et al., 2018). The publication forms the basis for new research and practical application of findings and results. It can affect the scientific community and the society at large (Wager & Kleinert, 2010), but what is lamenting is that many studies are never published and termed as the file-drawer problem (Dalton et al., 2012; Franco et al., 2014; Iwachiw, Button & Atlas, 2019; Lane et al., 2016; Simonsohn et al., 2014; Song et al., 2010).

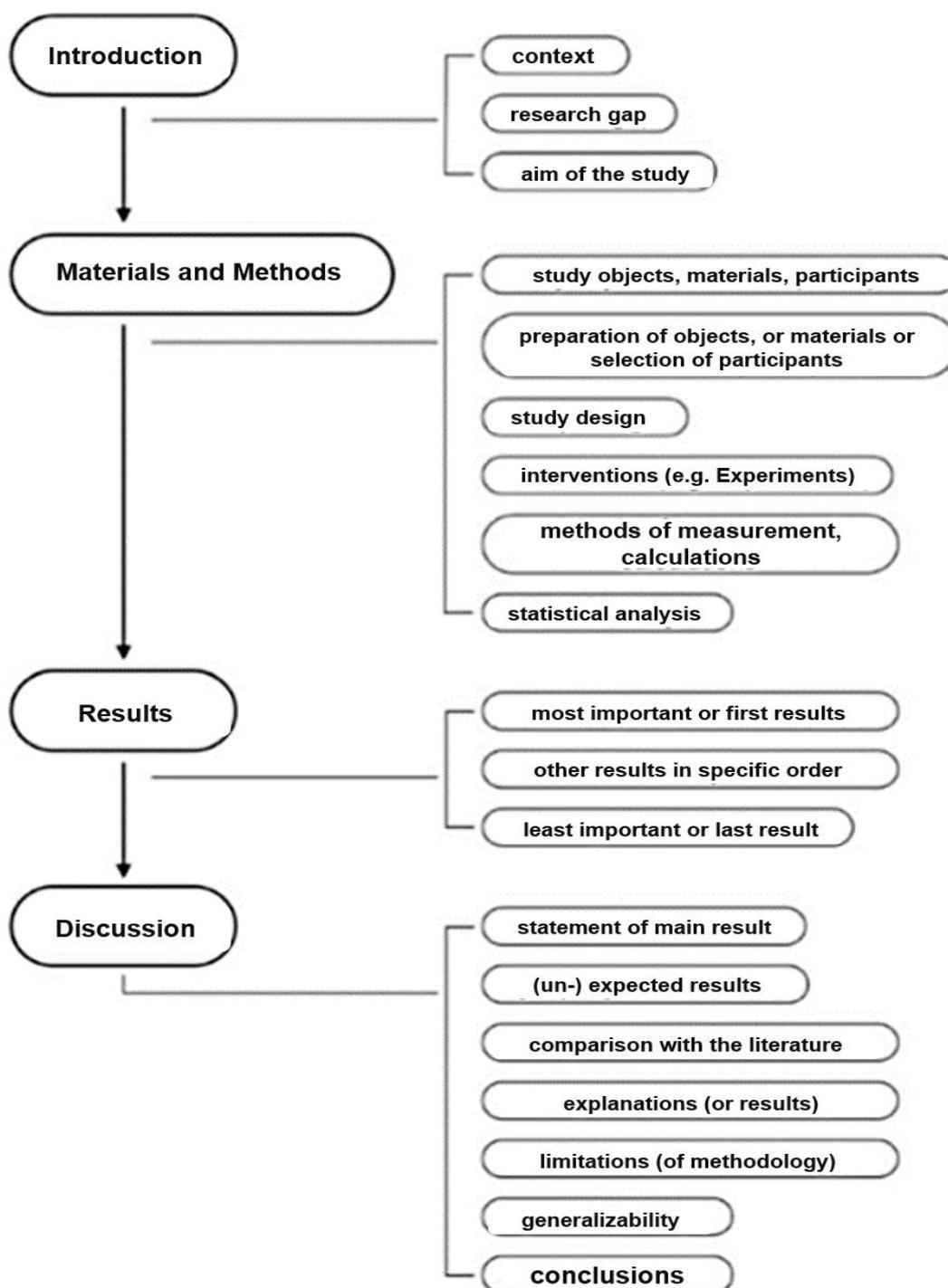
Academic researchers in many disciplines face difficulties in disseminating their research outputs beyond academia (Alwzinani, 2017; Dogra, 2011; Stout et al., 2006). Many academic disciplines have reported various barriers that sustain the

gaps between academic researchers and practitioners (Drury et al., 2013; Haddow, 2011; Lanamaki et al., 2011; Tincani & Travers, 2019). The literature shows that scholarly research outputs are buried deeply in reports and not transmitted into real practice (Waddel, 2002). Regrettably, many relevant research findings cannot reach their target audience with this kind of culture existing in the academic community (Singh & Mayer, 2014; Jeyaraj & Dwivedi, 2020). Many researchers are not aware of freely available online tools and guides. This paper expects to address the deplorable condition of low scientific publications among universities.

The dissemination and impact of research outputs cannot happen without those outputs being communicated to target audiences/stakeholders. Many reasons are identified why journal articles are rejected. They arise from different flaws in the research design, manuscript organization, results and discussion, conclusion (Ahlstrom, 2012; Akhtar, 2008; Fischer et al., 2017; Holschuh, 1998; Johnson, Putnam Davis, & Bandy, 2020; Pimm, 2013; Stivers & Cramer, 2017; Sullivan, 2015). Ezeala Nweke & Ezeala (2013) studied the common errors in the manuscript submitted to medical science journals in Asia and Africa showed that out of 42 papers analyzed, they found crucial flaws in every section of the document. 68 % have problems in the introduction and results section, 86 % have deficiencies in the material and methods section while the 71 % is in the discussion section. Consequently, Kapp & Albertyn (2008) confirm that the rate of acceptance and rejection in journals are attributed to the common errors made by authors such as insufficient contextualization of the research, language style, referencing styles, date of references, originality of work, lack of focus, length of the manuscript, data analysis, plagiarism, and readability. The errors are manifold and various. Many researchers struggle to have their papers be published in high-impact journals. Uzuner (2008) also identifies problems commonly encountered in publication; among these are associated with language problems, divergence on the journal standards, parochialism, and relevance. Lamentably, despite the publication of manuscript guidelines in many high reputable journals, many manuscripts cannot meet the journal standards set and are ultimately being rejected and sent back to the author because of quality issues (Baron, 2006; ICMJE, 2010). A plethora of studies (Ezeale et al., 2013; Byrne, 2000; Bordage 2001; Person, 2004; Azer et al., 2014; Gasparyan et al., 2015; Baig et al., 2016; Hetermanet et al., 2018; Tunlid, Kristoffersson & Åström, 2020; Radianti, Majchrzak, Fromm & Wohlgenannt, 2020) has explored and analyzed the flaws of manuscripts why being rejected for publication in reputable high impact journals around the world.

Writing research articles for publication requires a recursive and step-by-step process coupled with useful feedback and evaluation. Outlining the structure of the material helps research writers to prepare manuscripts appropriately. The key to successful scientific writing is to start with the paper's form (IJQHC, 2004). A typical research article's basic structure follows the IMRAD sequence (Introduction, Methods, Results, and Discussion), where each of the significant components of the report addresses different aims. Figure 1 presents the

structural element of a publishable research article adapted from Zaiger (2000)



and Swales (1990) as a guide in the structure of the selected research articles.

**Figure 1: Structural Component of a publishable Research Article**  
(Swales, 1990; Zaiger; 2000)

This paper addresses problem among researchers by providing them information on the availability of free online tools to help establish quality journal articles. This study filled the gap to increase the acceptance rate of papers that will be submitted to respected journals. This research study's novelty fundamentally lies in the utilization and effectiveness of online technology tools in improving the quality of 21 original research studies conducted and written in the Philippines.

### **Research Purpose**

This research study's novelty fundamentally lies in the utilization and effectiveness of online technology tools in improving the quality of 21 original research studies conducted and written in the Philippines. The purpose of this study was to present the effectiveness of online technology tools in ensuring the quality of papers using the grammar checker, plagiarism scanner, online readability scanner, citation generator, and Google scholar reference manager in improving the quality of selected articles. The 21 research papers were the research outputs of faculty members who attended the university-wide training-write shop. The documents were packaged into IMRAD format (Introduction, Methods, Results, and Discussion). According to Nair and Nair (2014), most scientific papers should be prepared in an IMRAD format. The Introduction explains the scope and objective of the study in the light of current knowledge on the subject; the Materials and Methods describe how the research was conducted; the Results section reports what was found in the study, and the Discussion section explains meaning and significance of the results and provides suggestions for future directions of research. The manuscript must be prepared according to the Journal's instructions to authors.

## **2. Methodology**

### **Research Design**

The study fundamentally employed pre-and post-test design to determine the effectiveness of online technology-based tools before and after using technology tools. The quality indicators of the articles were measured before and after the usage of the technology tools. Salkind (2010) noted that the critical premise behind the use of pre-test -post-test design involves obtaining the pre-test measure of the outcome before administering the intervention, followed by a post-test of a similar effort after the intervention or treatment is implemented.

To ensure the quality of the quality of the research articles, selection criteria were set, the papers: (1) must have been completed papers that were institutionally/ externally funded for the past three years (2016-2019); (2) must not have been submitted for paper publication or under consideration to journals. Manuscript authors' names were removed and replaced with codes to ensure confidentiality. The sample size of 21 was only based on availability during the study's time. The study protocol was reviewed and approved. The study's conduct lasted for three days during the publication training write shop conducted by the Knowledge and Technology Management Office of the Research, Development, and Extension Unit of one public higher education

institution in the Philippines. The three-phase implementation process was employed.

### **Sample and Data Collection**

#### **Phase 1. Before the Intervention**

Before starting the intervention, a university-wide publication training write shop was conducted for the faculty members who have completed research papers for three years. The publication write shop aims to package faculty researchers' reports in the University for higher chances of publication in Scopus and Thomson Reuters ISI. The participating faculty members were required to submit research articles in IMRAD format before the training. The participants were informed of the purpose of the activity. They were also told of the expected output for the publication training write shop. The 21 papers were scanned by the researcher using different technology tools such as a grammar checker, a plagiarism scanner, a readability test, several references, and correct bibliographic entries. Scores and percentages were recorded as the pre-calculated data.

#### **Phase 2. During the Intervention**

During the implementation phase, the researcher introduced different technology tools for publication. The participants were oriented to using grammar checkers, a plagiarism scanner, a readability test, several references, and correct bibliographic entries. They were provided a hands-on demonstration and walk-through sessions. The intervention period lasted for two days. The participants were provided with online links to different technology tools. The soft wares were installed on their personal computers. During the implementation period, the researcher instructed the participants to let their papers be processed using different online technology tools. The participants were requested to come up with the documents' necessary revisions based on the scores and percentages shown by the different technology tools. They were given one day to make the revisions.

#### **Phase 3. After the Intervention**

After implementing the different technology tools and necessary revisions of papers done by the participants, their writings were locally peer-reviewed by experts and researchers in the university with publications in reputable journals—the provided feedback for the improvement of the papers. After the peer review was documented, the author requested the articles to be scanned using the different technology tools. The researcher, as post-calculated data, recorded the post result of the documents.

### **Measurement and Analysis of Variables**

To analyze the gathered data from the research papers, descriptive statistics such as frequency count, mean, and percentage were used. Inferential statistics using the paired sample t-test was utilized to identify the difference between the pre-scores and post-scores of the 21 selected papers. Frequency count was used to analyzing the results of the grammar checker along with the contextual spelling, grammar punctuation, and sentence structure. The total number of

alerts were recorded. Meanwhile, a plagiarism scanner was utilized to get the percentage of similarity index. The rate of plagiarism is from 0% to 100%. The readability index of the paper was measured using an automatic readability checker having the following score of 0-100% with the following interpretation: 90-100 very easy; 80-89 % easy, 70-79 fairly easy; 60-69 standard; 50-59- moderate difficulty; 30-49- Difficult; 0-29- very confusing. As to the number of references and the number of bibliographic entries, the researcher manually counted errors. The pre-and post-scores were tabulated and subjected to appropriate statistical tools to arrive at the result's interpretation and discussion.

### 3. Results and Discussion

#### Technology-Based Tools in Writing Article for Publication

The adoption of online technology tools provided a better quality of the papers. Having adequate knowledge and skill in using the different online technology tools will eventually increase publication likelihood in reputable journals. Submitting articles for journal publication is a competitive race since many papers are being introduced to other journals. Therefore, only the best manuscripts being submitted get the editors' attention. This portion of the article presents the various online technology tools utilized in the study to ensure the manuscripts' quality standards. Table 1 shows the online links of the different technology tools, namely Google Scholar, Grammarly, Plagscan, online citation generator, and online readability tool.

**Table 1. Online- Technology Tools**

Technology-Based Tools	Online Links
1. Google Scholar	<a href="https://scholar.google.com.ph/">https://scholar.google.com.ph/</a>
2. Grammarly	<a href="https://www.grammarly.com">https://www.grammarly.com</a>
3. PlagScan	<a href="https://smallseotools.com/plagiarism-checker/">https://smallseotools.com/plagiarism-checker/</a>
4. Online Citation Generator	<a href="http://www.citationmachine.net/">http://www.citationmachine.net/</a>
5. Automatic readability Tool	<a href="http://www.readabilityformulas.com/free-readability-formula-tests.php">http://www.readabilityformulas.com/free-readability-formula-tests.php</a>

Google Scholar is a freely accessible search engine for scholarly literature. It contains articles, theses, abstracts, books, and court opinions from various sources such as online repositories, academic publishers, universities, professional societies, and other web sites. Such software provides scholarly works across the world. The Google scholar also effectively explores citations, related works, publications, and authors. It locates the original links of the documents. It also has the advantage of keeping recent developments in the different research areas while one can cite publications and make a Google scholar author profile. MacEachen (2016) recommends using Google Scholar for

literature in evidence-based dentistry searching, highlighting seven effective techniques and features in using it.

Grammarly is a cloud-based software developed by Grammarly Inc. It is an English-language writing-enhancement platform that was released in 2009 intended for checking manuscript write-ups. It is also equipped with a plagiarism-detection tool and proofreading resources with more than 250 rules in the grammar. This online software automatically detects errors in grammar, word choice, punctuation, spelling, and writing style. It is equipped with algorithms, flag issues that suggest auto-corrections for grammar, style, spelling, punctuation, wordiness, and plagiarism (Moore, 2018; Pawlak, 2020; Chen, Xie & Hwang, 2020).

Google Online Citation is a free search engine for Google scholar. It guides researchers to properly cite a book, magazines, news, website, Journal, case studies, synthesis papers, methodical articles, trade publications, etc., using APA, MLA, Chicago, and more. Having proper citations in the reference section of the report allows the researcher to give credit to the scholarly works of other researchers in the field as well making the readers of the article distinguish which ideas are personally owned and borrowed by the researcher guiding the readers to trace the philosophical ideas being presented (Bradley, 2011). The field of specialization of the writer also requires them to follow citation styles.

The online readability tool calculates the words, syllables, number of sentences, and other characters in the article. This tool allows the writer to identify the reading level of the text. It also provides feedback if the possible audience can read the material well. The tool is useful since it makes the paper to be easily understood by scientific and non-science people, which is an offshoot of article impact. The readability of a journal article is an essential component of scientific reading. The readability describes the easiness with which a research article can be read. Plavén-Sigray et al. (2017) confirm that in scientific reporting, clear and accurate reporting is an essential part of the scientific process. Clarity of written text can be easily quantified using readability formulas to estimate the articles (Flesh, 1948; DuBay, 2004; Stajner et al., 2012).

### **Quality Indicators of the Papers before and After the Coaching Interventions using the Technology Tools**

The utilization of the different technology-based tools before and after the intervention shows the following quality indicators of the papers, namely: Grammar and lexical quality, similarity index, readability index, number of references, number of correct bibliographic entries.

### **Effectiveness of Online Grammar Checker**

Table 2 shows the difference in the grammar errors of the 21 papers before and after the intervention. The data shows that before implementing the intervention, the 21 documents obtained 132.85 errors along with misspelled words, incorrect punctuation, and lexical errors. After the intervention, there were only 21.28 grammar errors shown. The result showed a significant

difference in the scores before and after the grammar checker's utilization as presented with the computed t value of 12.986 and p-value of 0.000, which is lower than the alpha value of 0.01.

**Table 2. The difference in the grammar quality of the manuscripts using grammar checker before and after the intervention**

	Mean Score (n=21)	SD	Mean Diff	t-value	df	P value
Before	132.85	42.17	111.57	12.968	20	0.00**
After	21.28	9.10				

*Sig. (2-tailed)*

*\*\* (significant at 0.01 alpha level)*

It presents that after using the online grammar checker, the papers obtained a significantly lower number of errors in the manuscript. This, however, shows that using an online proofreading checker will help facilitate a better quality of papers for publication. As an online proofreading tool, it scanned the articles for grammar errors and mistook, increasing the articles' writing quality. The writing quality of papers in the scientific publications has been one of the critical issues why high impact journals reject the paper for publication. Correct spelling, grammar, and punctuation are predictors of writing success (Daffern, Mackenzie & Hemmings, 2017; Rozovskaya and Roth, 2010; Tetreault and Chodorow, 2008). In the scientific publication, it is essential to note that it is the author's responsibility to have the correct language of the manuscript, making it in the best possible form that would relate to the concord of grammar and spelling (Griffies et al., 2013). Grammarly tools help to prevent mistakes and improve writing skills (Sing & Mayer, 2014). Mungra & Webber (2010) investigated the peer review process in medical research found out that lexical and grammatical mistakes, clarity, and word counts are the frequent comments and criticism of peer reviewers.

### **Effectiveness of Online Plagiarism Scanner**

Table 3 reveals the similarity index of the papers before and after the use of a plagiarism scanner. The data shows that before implementing the technology, a mean of 60.04 % of the similarity index was found. After the implementation, only 20.71 % of a similar index of the papers was found, showing an acceptable paper publication rate. The lower level of similarity index increases the likelihood of an article published in respected journals. The intervention provided the participants to reduce the percentage of similarity index.

**Table 3. The difference in Similarity Index Before and after the intervention**

	Mean Score (n=21)	SD	Mean Diff	t-value	df	P value
Before	60.04	14.12	39.33	11.503	20	0.00**
After	20.71	4.80				

*Sig. (2-tailed)*

*\*\* (significant at 0.01 alpha level)*

Plagiarism detection software already predicts scientific articles' quality for publication (Bazdaric, 2012; Martin, 2005; Naik, Landge, & Mahender, 2015). Tools that detect plagiarism are useful for the academic and scientific community. Since scientific publication is an ultimate output of scientists, they are obliged to adhere to the ethical, legal, and moral standards acceptable for the scientific community (Masic, 2011 & Masic et al., 2004). Fraudulent results and plagiarized text corrupt scientific literature's essence (Sharma & Singh, 2011; Lykkesfeldt, 2016). In the study of Stretton et al. (2012), papers are being retracted because of misconduct and plagiarism.

### Effectiveness of Online Readability Tool

Table 4 presents the readability index of the papers before and after using an online readability tool. It can be seen from the data that before the implementation of the intervention, an average score of 30.47 % showing a problematic level of readability among the selected articles. After the implementation, a standard level of 60 readability index was found, making a better quality of the papers. The readability of articles increases the chance of acceptance in journal publication. The readability of the article constitutes its style and comprehensiveness to bring its scientific essence to the world.

**Table 4. The difference in Readability Index before and after the intervention**

	Mean Score (n=21)	SD	Mean Diff	t-value	df	P value
Before	37.47	12.56	-22.38	-6.636	20	0.00**
After	60.00	9.07				

*Sig. (2-tailed)*

*\*\* (significant at 0.01 alpha level)*

Journal articles should keep practitioners informed on the current trend and development in their field of specialization. A well-published report should be easily understood by others to effectively and completely comprehend its content (Lee & French, 2011; Otto et al., 2010; Garcia-Merino et al., 2009). Likewise, Gyasi (2017) affirmed that academic journals are vehicles of information in which the research findings are presented. In the study of Severance and Cohen (2015), they examined the readability of medical journals found out that the difficulty level of reading abstract medical journals raised issues on the accessibility of medical research to reach the wider audience. Therefore, readability is a metric that successfully brings information to large groups of people (Ojha et al., 2018; Brtka et al., 2016).

### Effectiveness of Google Scholar Reference Manager

As presented in Table 5, it shows that before implementing Google scholar referencing a mean count of 21.42 showing a limited number of references in the articles, an average of 41.80 references is seen after the performance. This implies a significant difference in the number of concerns before and after the intervention with the computed p-value of 0.00. The intervention increased the number of credible references in the articles of the participants significantly. The

number and quality of connections cited to increase the likelihood of journal article accepted for publication.

**Table 5. The difference in the number of references before and after the intervention**

	Mean Score (n=21)	SD	Mean Diff	t-value	df	P value
Before	21.42	9.36	-20.38	-7.804	20	0.00**
After	41.80	10.75				

*Sig. (2-tailed)*

*\*\* (significant at 0.01 alpha level)*

The use of Google scholar reference manager improved the quality of the articles in its reference section. Google Scholar is a powerful online tool for searching the scientific literature. It allows for quick search and access to the materials for specific fields, journals, date of publication, authors, keywords, related literature, abstract, and citations. Google Scholar is a web-based search engine cataloging millions of records coming from academic and grey literature. It collated results on the internet, which is free of use. Haddaway et al. (2015) found that GS search results have a high level of transparency and capacity to update and provide critical systemic reviews since the literature search is an integral component of the research endeavor. It is capable of delivering literature for a specific study. As a search engine, Google scholar is used to searching synthesis papers, methodical articles, original articles, trade publications, case studies, online books, commentaries, patents, etc. (Reed et al., 2015; Hughes et al., 2014; Roe et al., 2014). Gehanno et al. (2013) studied the sufficiency of Google scholar for systematic reviews in medicine found that it is an excellent bibliographic database for systematic reviews. Researchers should use online references to look for relevant reviews of related studies and literature. The quality of papers being submitted for publication depends on the quality and number of references cited to establish the paper's scientific grounding.

### **Effectiveness of Citation Generator**

Table 6 shows the effectiveness of an online citation generator on the quality of the articles. Before the intervention, an average of 6.33 bibliographic errors was traced. After the use of a citation generator, only 0.85 errors were left. It is showing a p-value of 0.000. It means that it significantly improved the bibliographic entries of the papers. Proper citation is a good quality indicator of an article for publication.

**Table 6. The difference between the Number of Correct Bibliographic Entries before and after the intervention**

	Mean Score (n=21)	SD	Mean Diff	t-value	df	P value
Before	6.33	0.96	5.476	16.68	20	0.00**
After	0.85	0.91				

*Sig. (2-tailed)*

*\*\* (significant at 0.01 alpha level)*

Google scholar effectively provides citations for articles. It gives APA, MLA, Chicago, Vancouver, or Turabian as referencing styles depending on what the Journal requires the author to use. The quote shown in the Google Scholar search results will easily allow the researchers to get an accurate citation of papers included in the bibliographic entries. The citation is the list of formal references to online, print, published, or unpolished sources that the author obtained while writing it (Labaree, 2009). A proper way of citation will allow the audience to find the materials used by the author. An effective technique to locate relevant and useful sources for a research topic is to follow the references coming from credible sources. It suggests that researchers must determine the facts, theories, laws, concepts, and ideas derived from others. Errors in paper citation hinder scholarly communication's effectiveness, creating an adverse effect on the academic and scientific communities (Setyawan et al., 2020; Madhusudhan, 2016; Faunce & Job, 2001, Lee & Lin, 2013). Conrad, Leonard & Somerville (2015) examined the effectiveness of citation generation tools concluded that they provided efficient and effective research practices among researchers.

#### **4. Conclusion**

This paper suggests using online technology tools to facilitate the quality of articles to be submitted for publication. Research publication as global scholar merchandise requires authors to write well-prepared manuscripts that will be read by a broad audience. This paper assessed the effectiveness of using online technology tools to ensure quality standards of the documents and grammar, referencing, citation, and originality. Using a pre-post experimental design, 21 full-length research articles were selected. The study highlighted that using the online grammar checker, a plagiarism scanner, online readability scanner, citation generator, and Google scholar reference manager improved the quality of the papers on grammar and lexical quality, similarity index, readability index, number of references, number of correct bibliographic entries for submission in high impact journals. Implications of this study will further develop the research writing competence of the academic community to creatively and effectively disseminate the results of their research studies with higher chances of being accepted in respected global databases as their contribution to knowledge generation and development of the country in terms of scientific publication as the measurement of human intellectual capital.

#### **5. Limitations and implications**

Limitation of the present study: A small number of articles were only considered and only limited to a short period. As future research directions, another analysis may be conducted using the online technology tools and track how many papers will be accepted in an actual journal submission. Notwithstanding the limitations, this study highlights researchers' necessary actions to encourage them to utilize free available quality assurance tools to establish a higher quality of their papers, promoting a robust research culture of universities. This study could serve as a useful reference to improve manuscript preparation and organization. Additionally, other available software tools ensure the quality of research articles and improve the article's quality. Nevertheless, the technology

tools utilized in the study must not be seen as the mandatory regulations in which researchers and students must use for scientific writing. They are still encouraged to opt for possible best strategies which suit their interest and habits.

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