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# Improving the Quality of Student Scientific Works through Mentoring and Similarity Software

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Students are required to write scientific papers in order to complete their studies at higher education institutions. However, some of the students are not able to write the papers appropriately and are potentially involved in plagiarism issues. Responding to such a condition, the Turnitin application is needed to improve the quality of the students' work. This study was carried out to determine effects of the Turnitin mentoring program on the improvement of student scientific works. Quasi-experimental design was employed involving a 153 sample of 153 students at undergraduate, master and doctoral levels of the State University of Malang, East Java, Indonesia. Data was analysed using a sample t test to compare the scientific work score of pre- and post-mentoring programs administered to the students. Results indicate that there is no increase in quality of papers written by both groups of the students. University leaders, especially course program coordinators, have to be concerned about this issue and provide intensive monitoring and improvements for fostering a positive academic writing culture. Future studies are expected involving wider targets to obtain more comprehensive conclusions.

**Key words:** *Mentoring Program, Turnitin, Scientific Works.*

## Introduction

The issues of plagiarism challenge scholars in higher education especially related to scientific paper writing as well as manuscripts for publication and lecture or class assignments. This phenomenon appears more widely along with advances of information technology (Anney &

Mosha, 2015; Greenberger et al., 2016; Hu & Sun, 2017; Pandoi et al., 2018; Shahabuddin, 2009; Wheeler & Anderson, 2012). Many plagiarism issues are reported by studies conducted by the University of Texas and Southwestern Medical Center. They claimed more than 70,000 abstract articles are very similar to other published works. Lila (2008) found 73 abstracts indicated as plagiarism violation (Lila, 2008). This supports the argument of Pandoi, Gaur, & Gupta (2018) that plagiarism has become a culture because no adequate penalties apply to the plagiarists.

Several activities included in the act of plagiarism are: (1) changing the work of others as one S own, (2) copying a sentence or idea without including credit, (3) failing to quote in quotation marks, (4) providing incorrect information about the source cited, (5) changing the sentence but copying the statement structure from a source without giving credit, and (6) copying sentences or ideas from a source that is able to change your entire work, with or without giving credit. The main causes of the papers identified in plagiarism detectors are twofold, namely, the lack of ability to paraphrase and errors in including sources or writing citations (Greenberger et al., 2016). Recently, several studies have been conducted to minimise the acts of plagiarism. Research conducted by (Pandoi et al., 2018) found that feelings of shame both internally and externally alike affected individuals to impede plagiarism. The dissimilarity is that when authors are internally ashamed, they are determined to discontinue the action and try to correct the behaviour. Conversely, when authors are internally ashamed, they are determined to end the action, but do not try to advance their behaviour. Vani & Gupta (2018) conducted an investigation related to the detection of plagiarism using Natural Language Processing techniques. Shahabuddin (2009) added that current technology makes it easier for universities to detect plagiarism from students. The trick is to operate certain programs, for example, Turnitin, on a computer, to check the students' articles.

The issue of plagiarism in scientific works is also greatly discussed in Indonesia, especially at the tertiary level. Students are required to write scientific papers as a result of their learning. It is regulated by the Director General of Higher Education No. 152/E/T/2012 concerning Publication of Scientific Works. The policy regulates that: (1) Bachelor's students are required to publish papers in scientific journals; (2) Master's students are required to write in national scientific journals, preferably accredited by the Directorate of Higher Education; and (3) Doctoral students are required to publish in reputable international journals. Given this policy, a myriad of higher education institutions in Indonesia are currently imposing this regulation on the students. State University of Malang, East Java, Indonesia, is no exception. Under the Rector Regulation Number 6 of 2015, several articles discuss the publication of academic works, including: (1) article 57 relating to understanding publication of academic works; (2) article 58 relateing to the status of publication of academic works; and (3) article 59 relateing to the publication of academic works. The previous rector's regulation was refined in the Rector's Regulation Number 17 in 2015 based on the academic guidelines of the 2015/2016

academic year at the State University of Malang. The regulation consistently includes articles related to the publication of scientific papers that are required for the students as a graduation requirement from undergraduate, to masters and doctoral levels. In this case, the students are required to write and produce works in the form of scientific works. Based on the chancellor's rules, each student is obliged to implement the provisions in accordance with the criteria at each level. The successful implementation of these regulations is expected by academics. One of the critical factors is the existence of a good academic culture. One of its characteristics is that the students are able to produce scientific works by utilising primary sources, ending the practice of plagiarism in scientific works both from lecture assignments and final projects.

**Table 1:** Similarity Levels of the Students' Scientific Works

| Author | Title | Similarity (%) | Paper ID | Date |
|---|---|---|---|---|
| Anonymous | Lesson Study at School | 29 | 876876807 | 09-Nov-2017 |
| Anonymous | Lesson Study of Development Model | 31 | 876868780 | 09-Nov-2017 |
| Anonymous | Education Reform in Developed Country | 36 | 884271100 | 23-Nov-2017 |
| Anonymous | Accreditation of Educational Institutions | 52 | 872892478 | 02-Nov-2017 |
| Anonymous | Educational Insight | 52 | 876743254 | 09-Nov-2017 |
| Anonymous | Education Reform-Educational Insight | 57 | 884271103 | 23-Nov-2017 |
| Anonymous | Education Reform in Development Country | 61 | 880667489 | 16-Nov-2017 |
| Anonymous | Educational Insight | 63 | 877068392 | 09-Nov-2017 |
| Anonymous | Educational Insight | 70 | 877068395 | 09-Nov-2017 |
| Anonymous | Long Life Education | 83 | 880310885 | 15-Nov-2017 |
| Anonymous | Continuous Professional Teacher Development | 84 | 881302682 | 17-Nov-2017 |

Table 1 presents an example output from Turnitin software. The first column shows the title of scientific works to be checked. The following column shows percentage of similarity from the students' scientific works. Plagiarism level can be known from this similarity score. We find several problems in the students' scientific works, such as: (1) high plagiarism from around 29% to 84%; (2) lack of critical reviews from the lecturers on the students' papers; (3) inappropriate citations; and (4) minimum use of resources.

This similarity checking serves as a catalyst for improving the quality of students' papers. This condition is extremely risky if the scientific work has been "successfully" published, but has later found indications of plagiarism. This has a negative impact on the students, supervisors, and institutions in the long run. To refine this condition, a study of a mentoring program to

improve the quality of students' scientific works was carried out. The results of this study have the potential to be implemented systematically by lecturers in higher education. The implementation of this model leads to betterment in writing scientific papers at the tertiary level.

Several previous works have been conducted in relation to this issue. For instance, in their study, Supriyanto et al., (2015) found that (1) institutions are ready to improve the quality of student scientific publications, but their implementation is not optimal; (2) supporting factors come from the elements of journal management; (3) the inhibiting factor comes from the elements of the leadership of the institution that has not been optimal in giving rewards; and (4) institutional strategy still requires students to publish scientific papers in required journals, including international journals. Supriyanto et al. recommended that university students need to be encouraged to publish their works in required journals more consistently. Two years later, Supriyanto & Sumarsono (2017) conducted further research, unveiling that the understanding, attitude, constraints and efforts of students in scholarly publications are considered in the medium category. Future research needs to focus on the quality aspects of the publication of scientific papers used as graduation requirements.

Based on the results of the two studies explained earlier in this paper, it can be illustrated that the quality of students' scientific work has not been optimal. Therefore, the scientific work of students needs to be improved in order to achieve optimal results. To do so, several possible steps are worth-doing, such as (1) applying Turnitin software to check the students' scientific works similarity levels (Carbone, 2011), (2) undertaking guidance or a mentoring program for the students, (3) aligning control reports on the progress of the students' scientific works, and (4) evaluating the scientific works based on the Guidelines for Writing Scientific Papers (PPKI, 2017). If done systematically, these endeavour to have the potential to refine the quality of the students' scientific works.

## Literature Review

### *Scientific Works*

Scientific work is a form of written report done from systematic studies, carried out individually or in team by observing and fulfilling applicable scientific principles and ethics. In particular, it can be construed that scientific work in tertiary institutions is a written work of arts, science, and technology written in accordance with the scientific agenda by following certain guidelines. The types of scientific work can take the form of a final project, thesis, dissertation, articles, papers and research reports (PPKI, 2017).

The aim of scientific papers is to express thoughts or results of research in the form of scientific writing with systematic, methodological and scientific characteristics, and to build academic, scientific culture through the submission of the results of research correctly. Some of the benefits of writing scientific papers include (1) practicing effective reading skills; (2) practicing reading skills from various sources; (3) introducing library activities; (4) improving the organisation of facts or data clearly and systematically; (5) obtaining intellectual satisfaction; (6) expanding the horizons of science; and (7) serving as a reference for future research.

Quality in scientific work must meet the standards set by each institution. The format and writing arrangements are possible to vary from one another, so that each institution has a style of reporting the written manuscript. According to Glinz (2002), some criteria can be used to determine the quality of scientific work, such as (a) structure and content of the paper and (b) evaluation and presentation of results. The impact of scientific work on higher education makes for a good academic culture in the future (Burhanuddin et al., 2019; Gistituati & Ananda, 2019).

The structure and content of a good scientific work has the following arrangements: (1) an introduction that presents the background and context of the contribution, provides motivation, summarises the results in a few sentences, and provides a preview of the structure of the scientific work; (2) the main sections present new approaches, techniques, processes, tools, solutions and relevant results, and provide rationales for the basis of decision making, including the way the authors develop and formulate results; (3) conclusions that contain evaluation and discussion of results, reporting positive or negative findings, discussing limitations, referring to contextual problems as well as summarising statements for future work; and (4) references which list all publications that are cited to in the scientific work.

Evaluation and presentation of results (evaluation and presentation of results) should refer to the relevance of the results, especially when there are new results. The evaluation is carried out quantitatively and qualitatively as integrative. If all aspects are fulfilled as well as possible, it can be stated that the scientific work is classified as very good. In practice, criteria will be made in parallel to classify students' scientific works.

***Turnitin Software***

The quality of students' scientific work is influenced by other variables. These variables are plagiarism checkers using Turnitin software and mentoring programs for undergraduate, masters and doctoral students. Turnitin.com is a website that can be used by scholars to view and check a paper, in this case, the student's writing (Shahabuddin, 2009). The results of these checks can indicate the level of plagiarism or the level of similarity of the student scientific work. Turnitin can be used for checking the originality of a work, handling class management by the instructor, and evaluating a work digitally (Turnitin, 2017). Turnitin also can be used

for (1) originality check, namely, checking a scientific work obtained through matching a text with information that already exists on the web repository, (2) grade mark digital assessment, that is, checking a scientific work digitally, (3) peer mark, that is, the result of checking depends on the instructor's decision, and (4) grade book, that is, an online checking activity that allows instructors to mark the performance of a class or group of students (Nuzilah, 2013).

Turnitin has proven to be very accurate in detecting students' scientific work. After processing, the software produces an originality report that shows whether there is an indication of plagiarism or not from the author (Zimerman, 2012). The accuracy of these results can be known from the detailed detection results, starting from the words, sentences and data contained in softcopy documents and it will be known quickly and accurately if similarities occur. Sources that contain similarities can also be known from the results. Turnitin.com research documentation shows that this software is highly trusted by universities in improving the quality of student papers. Turnitin (2017) shows evidence that "Turnitin is trusted by over 15,000 higher education institutions in over 140 countries."

Based on this description, it is deemed necessary to examine scientific work among students with a mentoring program using Turnitin. This study aims to determine the effect of mentoring program based on the use of the Turnitin application on improving the quality of students' scientific works.

## Method

This study employed a quantitative approach with quasi-experimental research design. This design seeks to examine the possibility of a causal relationship in circumstances that do not allow any control, but obtained substitute information for situations with the control (PMPTK, 2008). In other words, this design does not allow for randomised controlled trials (Harris et al., 2006). The type of quasi-experiment design used in this study was the One-Group Pre-test-Post-test Design which functions to measure variables in one group before and after treatment, where the experimental group acts as a control group (Prahasto & Probandari, 2017; Scholar, 2006). The type of design can be seen in Figure 1. The analytical technique used is the paired t-test by calculating the difference between the results achieved in the quasi-experiment. The process, the quality score of the article, and the results of checking similarity using Turnitin were compared to the sample before and after the mentoring program in writing scientific papers.

**O1 X O2**

**Figure 1.** One-Group Pre-test-Post-test Design

In relation to this research, the O1 symbol represents a pre-test conducted on a group of students as a research subject. Symbol X is a treatment or mentoring program tfor the student group. The treatment in this study was the mentoring and checking of scientific papers using Turnitin on an ongoing basis. The O2 symbol represents a post-test conducted on a group of students after the mentoring.

The population in this study was 153 students consisting of (1) 99 students at the undergraduate level; (2) 36 at the masters level; and (3) 18 doctoral students. The sample was taken in total because the amount was not too large and taken purposively. The data collected was from scoring components of scientific articles, Turnitin score results, and mentoring programs. Components of scientific articles used for scoring included (1) title, with a maximum score of 10; (2) abstract and keywords, with a maximum score of 15; (3) introduction, with a maximum score of 15; (4) method, with a maximum score of 15; (5) results and discussion, with a maximum score of 20; (6) conclusions and suggestions, with a maximum score of 15; and (7) bibliography, with a maximum score of 10.

Several stages in this method were done: (1) Students were given the task of writing scientific articles within 30 days with reference to the applicable format; (2) Articles were then collected, scored, and checked with the Turnitin application; (3) The results of scoring and testing articles using the Turnitin application were the basis of the mentoring program; (4) The mentoring program was carried out systematically and was integrated with lectures, both offline and online; (5) The mentoring program related to article format, formulation of titles, abstracts, keywords, introduction (background, literature review, goals), methods, results and discussion, conclusions, suggestions, and reference lists; (6) After the mentoring, students improved their respective articles; and (7) The results of the improvement of the article were given a score and its similarity was checked by the Turnitin application. The data collection was done on an ongoing basis in a period of about four months. The data analysis technique employed a sample t test which was related to comparing mean value the scores of scientific works and based their similarity level in pre- and post-mentoring program.

## Results and Discussion

### *Analysis of Undergraduate Students' Scientific Works*

Table 2 displays the data analysis of undergraduate students' scientific works in the pre- and post-mentoring program using Turnitin.

**Table 2:** Analysis of Undergraduate Students' Scientific Works

| Component (Maximum Score) | Score (%) | | Improvement/Degradation (%) |
|---|---|---|---|
| | I | II | |
| Title (10) | 7.68 | 7.72 | 0.04 |
| Abstract & Keywords (15) | 12.20 | 12.80 | 0.60 |
| Introduction (15) | 12.31 | 12.60 | 0.28 |
| Method (15) | 11.58 | 11.58 | 0,00 |
| Results & Discussion (20) | 15.17 | 15.22 | 0.05 |
| Conclusion & Suggestion (15) | 11.97 | 12.00 | 0.03 |
| References (10) | 7.82 | 7.82 | 0,00 |
| **Total Score (100)** | **78.73** | **79.73** | **1.00 (Score <5, Not significant)** |
| **Similarity Level (%)** | **32.37** | **10.83** | **-21.55 (Score >20, Significant)** |

**Notes:**
**Score I:** Pre-mentoring program score
**Score II:** Post-mentoring program score

Table 2 presents analysis result of undergraduate students' scientific works. In the first column is the report score of component scientific works in the pre-mentoring program; the following column, is the report score of component scientific works in the post-mentoring program. Based on Table 2, we find an overall components' score between pre-mentoring and post-mentoring program increased, except for the components 'Method' and 'References' which didn't increase at all. In the last column, it shows the improvement between the pre-mentoring and post-mentoring program that was given to undergraduate students, which in the total scores' row known that total percentages of quality improvement students' scientific works less than 5 (1,00), so that means the improvement is not significant. In the next row, we find that total percentages of similarity level improvement -21.55 (the minus symbol is defined as decreased similarity). That means it's significant although the overall quality of the scientific works only increased 1%. Based on Table 2, we can conclude that the similarity level on undergraduates' scientific works decreased after the mentoring program.

However, based on the results of article writing, in general, the students have difficulties in the selection of titles, determination of research methods, and are not consistent in the formulation of titles, methods, discussions, and conclusions. Since many topics are not related with the study area, these suggest that the faculty have to improve academic writing skills of the students through the mentoring process. The development of the paragraphs and discussions also did not show significant improvements. Evidence and description of the results of the study does not show many fundamental significant changes. The way, how the students present their arguments and explanation is so monotone. The method section is not well developed. How the study or research is conducted is not described in detail. The ability to write conclusions also needs to be improved. Many conclusions were not written without connecting them with

the main theme and ideas discussed. So, the results of the conclusions and suggestions presented were not comprehensive enough. The reference list before and after the plagiarism check is an increase in terms of number, and the relation of the reference list to the material discussed. Although there are some articles that have a list of references that are less up to date but quite relevant to the purpose of the aspects discussed. Adequacy and quality of references used are quite adequate, although the references are mostly not from articles in journals and most do not have an international reputation.

### *Analysis of Masters Students' Scientific Works*

Table 3 shows data analysis of masters students' scientific works in pre- and post-mentoring programs using Turnitin. Table 3 presents the analysis result of master students' scientific works. The first column shows the score of component scientific works in the pre-mentoring program; and the following column shows the score of component scientific works in the post-mentoring program.

**Table 3:** Analysis of Master Students' Scientific Works

| **Component (Maximum Score)** | **Score (%)** | | **Improvement/Degradation (%)** |
|---|---|---|---|
| | **I** | **II** | |
| Title (10) | 7.22 | 7.22 | 0.00 |
| Abstract & Keywords (15) | 12.00 | 12.17 | 0.17 |
| Introduction (15) | 12.36 | 13.47 | 1.11 |
| Method (15) | 11.19 | 13.14 | 1.94 |
| Results & Discussion (20) | 13.47 | 14.69 | 1.22 |
| Conclusion & Suggestion (15) | 11.36 | 13.03 | 1.67 |
| References (10) | 7.44 | 7.44 | 0.00 |
| **Total Score (100)** | **75.06** | **81.17** | **6.11(Score >5, Significant)** |
| **Similarity Level (%)** | **34.14** | **23.89** | **-10.25 (Score >10, Significant)** |

**Notes:**
**Score I:** Pre-mentoring program score
**Score II:** Post-mentoring program score

We find an overall components' score between pre-mentoring and post-mentoring program has increased, except for the components 'Title' and 'References' which didn't increase at all. The last column shows the improvement between pre-mentoring and post-mentoring programs given to master students, which in the total scores' row known that total percentages of quality improvement of students' scientific works more than 5 (6.11), so that means the improvement is significant enough. In the next row, we find that total percentages of improvement of a similarity level of more than 10 (-10.25), meaning it is significant, which mean there is a

decrease in the similarity level of masters' scientific works between pre-mentoring and post-mentoring programs.

In terms of writing the title of the article and conclusions, as well as suggestions, the score is still low. The ability to formulate titles and write conclusions and suggestions must be improved in quality. Plagiarism test results in the second stage generally succeed in reducing the value of the percentage level of similarity. This means that the writers succeeded in developing more varied writing. The method and discussion components show that on average many articles are appropriate. Many discussion components have comprehensively reviewed the appropriateness of the title and content of the article. The language style chosen is good and the arguments that have been prepared have developed. Conclusions and recommendations for the most part have not undergone significant improvements and changes. That is, it tends to be the same as that used in the article before being revised. The list of centres used before and after the plagiarism check is quite relevant to the objectives of the aspects discussed, but in terms of adequacy and the quality of the references used are relatively inadequate. The references referenced are mostly not from Scopus indexed journals, and most do not have an international reputation. Based on the analysis of the data, it shows that the scientific work in the group of master's students has significantly improved the quality of scientific work.

### *Analysis of Doctoral Students' Scientific Works*

Table 4 presents the analysis result of doctoral students' scientific works. The first column the report score of component scientific works in the pre-mentoring program; the following column shows the score of component scientific works in the post-mentoring program. We find an overall components' score between pre-mentoring and post-mentoring program increased.

**Table 4:** Analysis of Doctoral Students' Scientific Works

| **Component (Maximum Score)** | **Score (%)** | | **Improvement/Degradation (%)** |
|---|---|---|---|
| | **I** | **II** | |
| Title (10) | 6.89 | 7.31 | 0.42 |
| Abstract & Keywords (15) | 10.14 | 11.94 | 1.79 |
| Introduction (15) | 9.89 | 11.76 | 1.88 |
| Method (15) | 11.00 | 11.63 | 0.63 |
| Results & Discussion (20) | 11.17 | 13.18 | 2.01 |
| Conclusion & Suggestion (15) | 11.06 | 13.31 | 2.25 |
| References (10) | 6.50 | 7.06 | 0.56 |
| **Total Score (100)** | **55.22** | **68.12** | **12.90 (Score >5, Significant)** |
| **Similarity Level (%)** | **54.44** | **19.29** | **-35.16 (Score >20, Significant)** |

**Notes:**
**Score I:** Pre-mentoring program score
**Score II:** Post-mentoring program score

The last column shows the improvement between the pre-mentoring and post-mentoring programs given to master students, which in the total scores' row known that total percentages of quality improvement of students' scientific works more than 5 (12,90), so that means the improvement is significant. In the next row, we find that the total percentage of improvement of similarity level is more than 20 (-35.16), meaning it is significant. The minus symbol shows that there is a decrease in similarity level on doctoral students' scientific works, which confirms that there is a decrease in the rate of plagiarism.

In general, there is no fundamental change between pre- and post-mentoring programs in terms of writing tiles and abstracts. Plagiarism test results in the second stage generally succeed in reducing the value of the percentage level of similarity. This means that writers have succeeded in developing more varied writing editors, so that they can help writers avoid plagiarism. The discussion component in most articles does not show a significant improvement despite the similarity index impairment. The quality of the descriptions in the discussion components of the two articles is the same. Exposure to the discussion of results is not supported by the development of adequate arguments and evidence from the results of studies and research. The language style and information exposure discussed is less argumentative, and there are a number of articles that do not have method descriptions. The conclusions and recommendations of most of the articles did not undergo significant improvements and changes, meaning that they tend to be the same as those used in the article before being revised. The list of references used before and after the plagiarism check is relatively the same. Although it is quite relevant to the objectives of the aspects discussed, in terms of adequacy and the quality, the references used are relatively inadequate. The references referenced are mostly not from Scopus indexed journals and do not have an international reputation.

***Comparison of Quality of Students' Scientific Works Using Turnitin at Undergraduate, Masters, and Doctoral Levels***

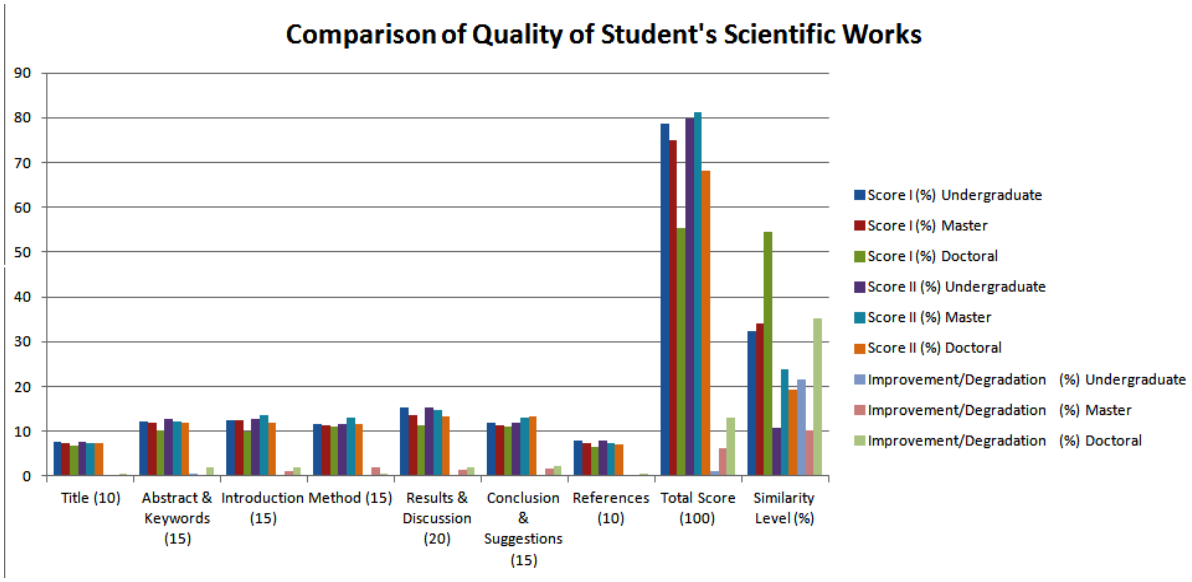
Based on the previous analysis, there is a comparison of the effect of mentoring programs based on Turnitin on the quality of the students' scientific works at the undergraduate, masters and doctoral levels. Table 5, also illustrated in Graph 1, compares the overall students' scientific works between pre-mentoring and post-mentoring programs.

**Table 5:** Comparison of Quality of Students' Scientific Works at the Undergraduate, Master, and Doctoral Levels

| Component (Maximum Score) | Score (%) | | | | | | Improvement/Degradation (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | I | | | II | | | | | |
| | Und | Mas | Doc | Und | Mas | Doc | Und | Mas | Doc |
| Title (10) | 7.68 | 7.22 | 6.89 | 7.72 | 7.22 | 7.31 | 0.04 | 0.00 | 0.42 |
| Abstract & Keywords (15) | 12.20 | 12.00 | 10.14 | 12.8 | 12.17 | 11.94 | 0.60 | 0.17 | 1.79 |
| Introduction (15) | 12.31 | 12.36 | 9.89 | 12.6 | 13.47 | 11.76 | 0.28 | 1.11 | 1.88 |
| Method (15) | 11.58 | 11.19 | 11.00 | 11.58 | 13.14 | 11.63 | 0.00 | 1.94 | 0.63 |
| Results & Discussion (20) | 15.17 | 13.47 | 11.17 | 15.22 | 14.69 | 13.18 | 0.05 | 1.22 | 2.01 |
| Conclusion & Suggestion (15) | 11.97 | 11.36 | 11.06 | 12.00 | 13.03 | 13.31 | 0.03 | 1.67 | 2.25 |
| References (10) | 7.82 | 7.44 | 6.50 | 7.82 | 7.44 | 7.06 | 0.00 | 0.00 | 0.56 |
| **Total Score (100)** | **78.73** | **75.06** | **55.22** | **79.73** | **81.17** | **68.12** | **1.00** | **6.11** | **12.90** |
| **Similarity Level (%)** | **32.37** | **34.14** | **54.44** | **10.83** | **23.89** | **19.29** | **-21.55** | **-10.25** | **-35.16** |

**Notes:**
**Score I:** Pre-mentoring program score
**Score II:** Post-mentoring program score

**Graph 1.** Comparison of Quality of Students' Scientific Works at Undergraduate, Master's and Doctoral Levels in Pre- and Post-Mentoring program




Based on Table 5, we find that the mentoring program has an effect on the quality of students' scientific works. As shown in Table 5 and depicted in Graph 1, components' score of students' scientific works increases in the post-mentoring program. As confirmed earlier, if there is an increase in components' score in the post-mentoring program, it's also means there is an

increase in the quality of their scientific works. Based on Table 5, it can be seen that the improvement of the quality of scientific writing at the undergraduate level is at the lowest percentage (1.00%) when compared to the master's level (6.11%) and doctoral level (12.90%).

Unlike the similarity levels' score, a minus symbol in improvement/degradation score means that there is a decrease in similarity level after the mentoring program. In other words, whenever the similarity levels' score decrease, it means that there is a decrease in the plagiarism rate. Judging from the decrease in similarity, it shows a positive level of significance, namely a decrease of 21.55% at undergraduate level, 10.25% at the masters level, and 35.16% at the doctoral level.

**Discussion**

In general, the results of the analysis indicated that the mentoring program using Turnitin to improve the quality of students' scientific works was effective, in terms of the title selection, method, discussion and conclusion sections.

Students at undergraduate level are found to have issues in the selections of words used in the body texts. But the quality of the reference list used is quite relevant. Although a number of articles use old references, they are still relevant with the main topics of the articles. Besides, the references are as reliable high in terms of the quality.

This is consistent with the results of research showing that the ability of students to write scientific papers from aspects of developing the contents of scientific work arrangements, the use of terms and vocabulary, the use of language, and techniques of writing scientific papers is relatively good (Persadha, 2016). Adelia et al., (2018) also found that the complexities encountered by the students in writing scientific papers is because of lacking references and suggestions form lecturers. These difficulties in writing scientific papers are also reasonable because basically academic writing is not easy for them (Kraus, 2019). Careful attention and longer hours of work should be more encouraged for the students in writing their papers (Faber, 2017).

At the masters level, with a sample of three classes in the Education Management Study Program, the quality of scientific writing of students refers to the ability to reconstruct the suitability of the article content comprehensively supported by a relevant reference list. However, the ability to write a good title and conclusion is worth encouraging.

It is evident that the masters students can write better than the undergraduate students after the mentoring program. Personal experience also affects the quality of the students' scientific works. Several methods in writing a good abstract (Plakhotnik, 2017) are (1) the abstract should

be written after the manuscript has been fully written, following journal guidelines, relating to the title, and keywords (Hartley, 2000), and by including the most essential words (American Psychological Association, 2015). Writing the contents of other scientific works must follow the journal regulations.

At the doctoral level, in terms of writing titles and abstracts, the discussion section, and conclusions as well as suggestions are considered exemplary, even though the discussion component does not show significant improvement. The quality of the descriptions in the discussion section of the two articles is the same. Exposure to the discussion of results is not supported by the development of adequate arguments and evidence from the results of studies. The language style and information exposure discussed is less argumentative. Although it is quite relevant to the objectives of the aspects discussed, in terms of adequacy and the quality of the references used, this section is relatively inadequate. The references cited mostly excluded from Scopus indexed journals.

The improvement in the quality of scientific work of the doctoral students shows a higher percentage compared to the levels of both undergraduate and masters students. This higher quality improvement score is relatively excellent when seen from the aspect of students' insights in writing scientific papers. This condition is extremely central for students in writing scientific papers because they are required to get published in reputable international journals. These journals entail standard requirements for authors. The criteria are strong goals and reasons, clear research questions, explicit and clear research hypotheses, theoretical framework and data collected, data analysis, informative literature, study synthesis, include sources credible and relevant international research literature, coherent theoretical frameworks, instruments, data collection and data analysis, interpretation of findings, literature review that links and supports theoretical frameworks, and clear research methods (NCTM, 2019). Several other aspects that can be done in the mentoring program should focus on several characteristics, namely, critical analysis of the manuscript, giving feedback which contains the strength of the manuscript and the improvement of the manuscript as well as the use of relevant literature (Janke et al., 2017).

Comparison of similarity scores using Turnitin on the scientific work of students in stage I (before the program) and stage II (after the program) showed a decrease in similarity percentage scores. This indicates that the students have succeeded in increasing the ability to paraphrase and develop more varied descriptions. The improvement of the students' abilities is caused by the mentoring program. This program used Turnitin to improve the quality of scientific work of undergraduate, masters and doctoral students at the State University of Malang, East Java, Indonesia. These results are consistent with the previous studies conducted by Yuwono et al., (2017), contending that such programs assist students in the learning process and encourages them to enter further education as well as develop their confidence.

The use of Turnitin has also been proven to be helpful in increasing the writing of scientific papers by detecting texts that are similar to other sources (Mann, 2016; Sutherland-Smith & Carr, 2005). Although the use of this software will not prevent students from plagiarising, it can still make students afraid to plagiarise (Khoza, 2015). Mentoring programs by using Turnitin are necessary to improve and maintain the quality of the students' scientific works. This is important to prevent the students from plagiarising. The formation of positive student attitudes in writing scientific papers is still necessary. The role of lecturers, additionally, is also pivotal to avoid acts of plagiarism (Hu & Sun, 2017; Mwai, 2002).

## Conclusion

The results of this study indicate that the mentoring program activity using Turnitin is found to have a positive effect on the enhanced quality of students' scientific work. This success requires mentoring to be carried out seriously and increased engagement of students in preparing scientific works based on the results of the mentoring program. Mentoring programs are important for the students to produce high quality scientific works as one of the requirements to complete a study program in tertiary institutions.

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