ANALYSIS OF COMMON MISTAKE IN WRITING SCIENTIFIC ARTICLE IN "ENGINEERING" UNDERGRADUATE STUDENT

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Abstract

A scientific article is an article that contains and examines a particular problem using scientific principles. Scientific articles are the most important part of higher education, especially for students. However, there are still many errors and there are still many who do not know the structure of scientific articles. This study aims to analyze structural and language errors in scientific article writing. This study uses a quantitative approach with the number of respondents 35 students. Data were collected through pre-test, training in the online summer class program, and post-test. questionnaire to measure students' knowledge about writing scientific articles. The results of the pre-test showed that 91.50% had difficulty in writing scientific articles, and there were still errors in the title, abstract, keywords, introduction, method, results and discussion, conclusion, and bibliography sections. The results of the post-test carried out increased by 65.8. This study may be utilized as general guidelines for authors to apply when self-editing their manuscripts before sending them to journal editors.

Keywords: Analyse, Education, Structure scientific article, Student.

1. Introduction

The ability to write scientific articles is one of the fundamental talents that every lecturer and student at a university must possess [1-3]. For colleagues to create scientific understanding through scientific thinking techniques, this talent is critical [4, 5]. The capacity to solve and analyze a variety of issues within the framework of excellent and accurate scientific writing procedures is the nature and result of the writing talents of scientific papers [6]. Furthermore, scientific papers are the culmination of a sequence of concepts based on facts, events, and symptoms that may be correctly described [7].

The low cultural interest in writing scientific papers and scientific publishing of research results is an ongoing effort for lecturers and students [8]. The amount of research findings whose contribution has not been optimized in the form of scientific articles of research results for publishing exemplifies this problem [9, 10]. Efforts to improve the capacity and desire to write scientific articles resulting from research and community service that are ready to be published in recognized national and international scientific articles are still at an all-time low [11]. The development of literature and writing abilities is an immediate issue that must be resolved.

Based on the results of the field survey before the research action was carried out, it was obtained in addition, there are obstacles for students when writing scientific articles, there are still errors, namely, not realizing the essence of the components of scientific articles and using language properly and correctly [12, 13]. The components of scientific articles still have the most errors in the components of titles, abstracts, introductions, research methods, results and discussions, conclusions, and according to [14] how to search and manage citations of reference style. The language component that still has many errors is the use of grammar [15, 16]. Until now, discussions about common mistakes in writing scientific articles are still rarely discussed, therefore it is necessary to discuss common mistakes in writing scientific articles so that students are able and understand the ability to write scientific articles.

Based on these thoughts, the purpose of this study is to analyze common mistakes in writing scientific articles. The findings of this study are expected to be used as a guide for writers of scientific articles, especially engineering students because some of the subjects come from engineering, so as not to make the same mistakes. Furthermore, the findings of this study can be used as a general rule for authors to apply when writing their manuscripts before submitting them to the journal editor.

2. Method

The subject was 35 students who came from Asian countries with a background subject from engineering education postgraduate program, and the level of study of the students came from semesters 2, 3, 4, and 5. Experience in scientific writing students rarely wrote as evidenced by the data results filling out the questionnaires.

This study used a quantitative approach, and the data collection was carried out by using questionnaires made in Google Form. The question consists of 17 questions regarding the basic components and the use of language or grammar when writing scientific articles. The question is in the form of multiple-choice with

two answer choices "yes or no" according to the ability and understanding of students. The same question was used in both pre-test and post-test.

This study went through three stages to measure the level of student knowledge about writing scientific articles, namely, (i) Through the pretest filling stage on 05 September 2021, (ii) Organizing writing training in the online summer class program at the Indonesian Education University which was held in September-October 2021 (iii) Performing the post-test filling stage on 03 October 2021.

The summer class program carried out has methods and outputs, namely 1) online workshops in English, 2) Virtual trips, 3) Activities: material delivery, group discussions, question, and answer and script training, 4) Assignments: Resume, Manuscript for Indonesian Education University International Journals, Group Presentations, Poster Contests, Talent Shows, and 5) Other outputs: conversion credits, transcripts, e-certificates, publications at the end of the program. In addition, there are learning achievements from this summer class activity, namely 1) Adding insight and improving skills in writing scientific articles, 2) publishing articles in international journals, and 3) Developing vocational development.

Table 1 shows the summer class program activities for article writing training which were carried out covering 9 meetings, with each meeting lasting 4 hours. There are several subjects in this training, namely, the explanation of the cumulative point content of scientific papers, library quests, scientific papers and publications, introduction, literature review, "research methodology", research article", language review, finalization of draft articles. Outside of their summer class program, students are asked for independent learning to produce scientific articles that will be discussed at each predetermined meeting time.

Tabel 1. Activities summer class program.

No.	Date/Day	Time	Subject
1	05/09/2021	08.00-11.00	Explanation of the cumulative points of scientific papers
2	11/09/2021	09.00-12.00	Explanation of content "Library Quest"
3	12/09/2021	08.00-11.00	Explanation of content about scientific papers and publications
4	18/09/2021	09.00-12.00	Explanation of content "Introduction"
5	19/09/2021	08.00-11.00	Explanation of content "Literature Review"
6	25/09/2021	09.00-12.00	Explanation of content "Research Methodology"
7	26/09/2021	08.00-11.00	Explanation of content "Research Article"
8	02/09/2021	09.00-12.00	Review Language
9	03/10/2021	08.00-11.00	Finalization of draft article

The t-test method was calculated using Microsoft Excel with the type of t-test: paired two samples for means. T-test calculations were performed to compare whether there was a significant difference between the results of the pretest and posttest, by comparing the yes or no categories.

3. Results and Discussion

Introduction, Materials and Methods, Results, and Discussion (IMRAD) was developed by Farr as a framework for writing scientific journal articles [17]. According to Dubova et. al [18], the body of scientific writing text typically follows the IMRAD pattern, with the following lengths and percentages: introduction (10%), methods (15%), findings (35%), discussion (discussion or debate) (35%), and references (5%). The title, author's name, abstract and keywords, body, conclusions and suggestions, and bibliography are the most important elements of scientific publications [19]. After knowing IMRAD or the structure of scientific articles, students are expected to be able to apply them to lecture assignments regarding writing scientific articles.

3.1. Data Analysis

Table 2 shows the subjects in this study were 35 summer class students, followed by Asian countries, namely Indonesia amounting to 14 (39.2%), Malaysia totaling 6 (16.8%), Thailand amounting to 5 (14%), Vietnam amounting to 2 (5.6%), the Philippines is 2 (5.6%), India is 3 (8.4%), and China is 3 (8.4%). The majority of the subjects were female with 23 students (65.7%) and 12 students (34.3%). Meanwhile, there are 2 grades with 8 students, 3 grades with 6 students (17.4%), 4 grades with 5 students (14%), and 5 grades with 16 students (46.4%).

Table 2. Percentage of subjects based on demographic data.

Variable	Category	Frequency	Percentage (%)
Country	Indonesia	14	39.2
	Malaysia	6	16,8
	Thailand	5	14
	Vietnam	2	5,6
	Philippines	2	5,6
	India	3	8.4
	China	3	8.4
Gender	Female	23	65.7
	Male	12	34.3
Grade	2	8	22.2
	3	6	17.4
	4	5	14
	5	16	46.4

Table 3 shows the results of students' pre-test and post-test scores in scientific article writing knowledge before and after attending training in the online summer program class. From the observations of all the questions given the percentage value has increased. T-test was conducted to analyze whether there is a significant difference between the pretest and post-test scores. It was found that the t critical two-tailed value (2.10) was higher than the t statistic value (-5.84). Therefore, students' understanding can increase significantly if it is practiced directly.

This study discusses statistical analysis data regarding the knowledge of students' abilities which is carried out using a google form. In general, students before doing the training had difficulty writing scientific articles (91.5%), but after doing the training students did not experience difficulties when writing scientific

160

articles (74.3%). From these results, there was an increase in the training carried out which succeeded in making students understand how to write scientific articles.

Question 1 is aimed at evaluating students' experiences and abilities in writing scientific articles. The results of the pre-test data of students stated that they had never written a scientific article (54.3%). After participating in the summer class program, students have experience in writing scientific articles (100%). This is because starting from 05 September 2021-October 3, 2021, he has participated in training activities to write scientific articles (see Table 1).

Question 2 students have difficulty writing scientific articles (91.5%). After participating in the summer class program, students understand better and have no difficulty in how to write scientific articles (74.3%). This is because the summer class activities carried out consist of 9 stages of meetings with each predetermined time (see Table 1).

Question 3 regarding students' knowledge of the components of scientific article writing is still low (54.3%). Knowledge of the components of scientific article writing is very important so that the presentation of findings becomes systematic [20], efficient [21], and easily accessible by [22]. After participating in the online summer program, students know what the components are in article writing (85.7%) because of the training provided at the 1-3 meetings regarding the cumulative points of scientific work content, library quests, as well as scientific work and publication content (see Table 1). The scientific article component can help students in writing context, cognition, and content [23].

Question 4 is aimed at evaluating students' understanding of the components written in the title of scientific articles. The results showed that students' understanding of the components in the title was still low (62.8%) and increased after the online summer program class (85.7%), this is because students are given training at the 2nd and 3rd meetings regarding library quests, as well as scientific work and publication content (see Table 1). Students will be able to examine and recognize each article title, as well as what components are present in the paper they are looking for, with this training. Titles have two functions (1) to identify the main topic or the message of the paper and (2) to attract readers [24].

Question 5 is aimed at evaluating students' understanding of the importance of keyword components in abstracts that must be written in scientific articles. The results showed that students knew things about keywords (88.5%) and there was an increase (94.3%) after doing online summer program classes. Training at the 3rd meeting, students learned of content about scientific papers and publications (see Table 1), where before they read the entire contents of the paper, they read the abstract and keywords first so that it was easy to understand discussing anything in the paper. Given keywords, one can find analogical and/or similarly analyzed sphere articles [25].

Question 6 is aimed at evaluating students' understanding of the abstract component, which in the abstract section only needs to explain the objectives and results of the research. The results showed that students (85.7%) said "yes", the abstract only explained the objectives and results of the research. In fact, the most common mistake in writing an abstract is to not pay. The abstract should be a concise, stand-alone summary of the paper [26]. After doing the online summer program class, students' ability on abstract components increased (94.3%). At the

3rd training meeting on the explanation of scientific papers and publications (see Table 1), students need to understand the abstract component, because the abstract is an important part to make it easier for readers to understand the summary of the contents of the paper.

Question 7 is aimed at evaluating students' understanding of the introduction component, that in the introduction section it is just to explain the problem and the purpose of the research to be carried out. The results showed that students (45.7%) said "yes". A well-written introduction of a scientific paper provides relevant background knowledge to convince the readers about the rationale, importance, and novelty of the research [27]. After doing the online summer program class, students' ability regarding the introduction component increased (77.1 %) this is in accordance with the training conducted at the 4th meeting regarding the explanation contents of the introduction (see Table 1).

Question 8 is aimed at evaluating students' understanding of the method components, that in the method section there is no need to add any scientific definition. The results obtained (48.6%) said that in the method section it is necessary to add a scientific definition. In fact, the method generally explains the work procedures regarding the research carried out [28]. After doing the online summer program class, students' ability regarding the introduction component increased (91.4 %), this is in accordance with the training given to students at the 6th meeting regarding the explanation of the contents of research methodology (see Table 1).

Question 9 is aimed at evaluating the results and discussion components, and in this section, it is necessary to support references from previous studies. The results obtained 68.5% of students answered "No". In fact, giving citations to research results needs to be done to support an idea and provide reasons why it is so [29]. After participating in the training, students' knowledge about this increased (94.3%), which is in accordance with the training conducted at the 5th and 7th meetings regarding literature reviews and research articles (see Table 1). At the meeting, students study the results and discussions that need to be proven by previous research.

Question 10 is about examining the theoretical framework, and references from earlier works are required in this part. Students responded "No" (54.3%) of the cases. In fact, citing scientific evidence is required to back up a claim and explain why it is true [29]. Students' understanding of this expanded (94.3%) after participating in the training, which is consistent with the training done at the 5th and 7th meetings about literature reviews and research papers (see Table 1). During the conference, students examine the findings and discussions that must be supported by past research.

Question 11 was aimed at evaluating the conclusion component, and in that section a rewritten summary of the results and research was rewritten. The results showed that students already knew the components in the conclusion, but some students still did not know it (14.3%). After participating in the training, students' knowledge about this increased (94.3%), this is in accordance with the training conducted at the 3rd and 7th meetings regarding, the content of papers and publications, and research articles (see Table 1). The training learns about the conclusion which is part of the conclusion from the results of the research conducted. The conclusion section of the scientific article contains a summary of the results of the research that has been carried out [30].

Questions 12, 13, and 14 are aimed at evaluating the components of the APA type of reference style and the type of citation by numbering and name, as well as the calling of the author's name when citing must be the same as in scientific references. The results obtained that students' knowledge was low with the answer "No" regarding the reference component (57.2%), citation (82.8), compatible in-text citation with reference (60%). Knowledge of the style of reference and citation types is very important to know, this aims to avoid plagiarism by including the quote in the statement used and writing down the source of scientific reference in the reference [13]. After participating in the online summer program, students' understanding of the components of reference style (97.1%), types of citation in text (88.6%), and compatibility in-text citation with reference (91.4%). This is in accordance with the training conducted at the 3rd and 7th meetings regarding the content of papers and publications and research articles (see Table 1) because students were introduced to how to manage references in Google Scholar, the types and styles of references used, how to manage references in Google Scholar, and how to in-text citation by name and numbering.

Questions 15 and 16 are aimed at evaluating the rules for calling extras, tables, and equations in the text. The results showed that students stated that there was no need to call/refer to tables and figures in scientific article writing (42.8%), and equations (68.6%). In fact, figures, tables, and equations need to be called into the text to avoid ambiguity when referring to the figures and tables. After participating in the summer program online class activities, students' understanding of this has increased (94.3%) this is in accordance with the training at the 3rd meeting on the content of papers and publications (see Table 1).

Question 17 is intended to evaluate the repeat sentences or paragraphs many times in the manuscript. The results obtained that students stated "Yes" there may be sentence redundancies (74.3%). Sentences need to be concise and concise to avoid redundant sentences in scientific article writing [31, 32]. After participating in the online summer program, students' understanding of sentence redundancy has increased (88.6%), this is in accordance with the 8th training meeting regarding language review (see Table 1). Common mistakes for students in paragraph preparation are the absence of topic development, the existence of several topics in one paragraph, and the separation of explanatory sentences in two paragraphs. Therefore, students are not allowed to use excessive repetition of sentences in paragraphs and use convoluted sentences.
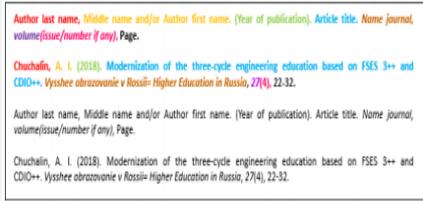
Question 18 is aimed at evaluating the use of scientific articles. The results showed that students' knowledge of this material was still low (65.7%). After joining the online summer program, students' understanding increased (97.1%), this is in accordance with the 8th training meeting regarding language review (see Table 1). Common mistakes for students in grammar writing are a sentence without a subject, a sentence without a predicate, and a sentence without an object. Students are not allowed to use sentences that are not important, such as repetition of the subject or the use of unnecessary synonyms. The use of good and correct grammar needs to be applied to the writing of scientific articles; it is intended that information can be conveyed clearly [33].

Question 19 is aimed at evaluating the use of spelling properly in scientific articles. The results showed that students' knowledge of this matter was still low (60%). After participating in the online summer program, students' understanding

increased (94.3%), this is in accordance with the 8th training meeting regarding language review (see Table 1). Students frequently utilize incorrect terminology and make language translation mistakes that go unnoticed. Common mistakes word writing that is often experienced by students when writing are capital letters and writing abbreviations, in addition, errors in using punctuation marks in the form of errors in using commas, periods, and hyphens. When writing scientific publications, proper and correct language should be used to ensure that information is delivered correctly [34].

Table 3. The students' pre-test and post-test results.

No.	Question	Pre-test (%) Category		Post-test (%) Category	
		Yes	No	Yes	No
1	Have you ever written a scientific article?	45. 7	54.3	100	0
2	Do you have difficulties in writing scientific articles?	91.5	8.5	25.7	74.3
3	Do you know the components in the preparation of scientific articles?	45.7	54.3	100	0
4	Do you know what components must be presented in making a scientific article title?	37.2	62.8	85.7	14.3
5	Do the keywords that are mandatory in the abstract need to be written?	88.5	11.5	94.3	5.7
6	Do you know that the structure of the abstract is sufficient to explain the aims and results of the research conducted?	85.7	14.3	5.7	94.3
7	Do you know that writing in the introduction does not need to use references from previous research? Is it enough just to explain the problem and the purpose of the research to be carried out?	45.7	54.3	22.9	77.1
8	Do you know in the method section, we need to describe only the work process and there is no need to add definitions?	48.6	51.4	91.4	8.6
9	Do you know that the results and discussion section require references to support the results of the research conducted?	31.5	68.5	94.3	5.7
10	Do you know which parts of the theoretical framework in each paragraph require references?	45.7	54.3	94.3	5.7
11	Do you know the conclusion is a rewritten summary of the results and research?	85.7	14.3	94.3	5.7

#	Question				
12	Do you know what type of reference style is in the figure? Image adapted from reference [14]	42.8	57.2	97.1	2.9
13	In writing citations, there are generally two types of citations with names and citations with numbers. Do you know how to write the site?	17.2	82.8	88.6	11.4
14	Do you use in-text citations (citation in the text) and references when writing scientific articles?	40	60	91.4	8.6
15	Do you know that it is enough to write figures and tables with descriptions (caption) and there is no need to call figures and tables in the text/manuscript?	42.8	57.2	5.7	94.3
16	Do you know if we have the equation, we need to call/refer in the text/manuscript?	31.4	68.6	94.3	5.7
17	Can we repeat sentences or paragraphs many times in the manuscript?	74.3	25.7	11.4	88.6
18	Do you write scientific articles with correct grammar?	34.3	65.7	97.1	2.9
19	Do you know how to use spelling properly and correctly to write the scientific article?	40	60	94.3	5.7

3.2. Common mistake structural in scientific articles

This structural mistake manifests itself in the absence of key components in scientific articles, the failure to recognize the substance of scientific article components.

(i) Title

The title should be short and informative about the research being carried out and should be of interest to the reader. The title must contain a subject, object, and variable. ideally, the title is no more than 13-14 words [35]. Common mistakes were made during training regarding the title component is that there is no subject or object to be studied so that it confuses the reader.

(ii) Abstract

The abstract is a summary of the contents of an article that is intended to help a reader to quickly and easily see the purpose of an article. This is so that the author can understand the contents of the article without reading the entire contents of the article. The abstract is realized in one paragraph consisting of about 150-250 words

which contain the background of the research, objectives, methods, results, and discussion, and impact [36]. Common mistakes were made when making abstracts is the use of unimportant sentences that should be, the abstract is made concisely, and clearly.

(iii) Keyword

Keywords are a choice of meaningful words from a document that can be used to index its contents. Keywords are deliberately presented to help readers who are looking for articles related to the problems they face [25], therefore giving keywords is very useful. Generally, a row of keywords was presented below the abstract. The number of keywords presented generally consists of 3-5 words (which can be arranged in short phrases). Common mistakes are forgetting when entering keywords, but most of them already know the keywords. Those who do not know keywords, do not know what words can be used as keywords, in this case, keywords can be created by taking words from the title or from the focus of the discussion that is most often noticed.

(iii) Introduction

All background information must be quoted according to the selected scientific reference. The content of the introduction needs title development, previous research, novelty (originality), abstract development, and research purposes [37]. It aims to convince the reader of the reasons, research, and help researchers obtain actual supporting data. Common mistakes in students are when they do not include previous research on the object to be studied, and the lack of highlighting what the purpose of the research will be carried out.

(iv) Method

The method section explains information on the place and time of the research, research subjects, data collection techniques, and data analysis techniques, to the formulas used. The method section aims to provide all necessary information related to the research, thus enabling the reader to repeat the same research/experiment [38]. Common mistakes were made when writing a method is that it is not explained in detail what activities are carried out so that the research flow is not clear to understand. The method section contains many references that should be included in the theoretical framework.

(v) Results and Discussion

The Results section presents a review of research data and the results of the analysis of the data obtained with narrative text and can use the support of tables and figures to clarify the verbal presentation of the results from the data. The title of the caption is placed below the figure, while the title of the table is placed above it. The description of the table or figure is mentioned first in the paragraph before the table/figure appears. The Discussion section describes the results of the research descriptively accompanied by evidence or data supported by references to previous research [39]. Common mistakes for students when writing results and discussion is not calling the pictures or tables in the paragraphs used, this makes the reader confused. In addition, in the discussion section, there is no research from other

people to support the results of the research data carried out, this will make the reader doubt whether or not the results of the research obtained are true.

(vi) Conclusion

The conclusion is a brief statement about the results of the analysis which means answering the objectives of the questions that have been asked in the study [30]. Common mistakes were made when writing the conclusion is the use of long-winded sentences regarding the research results obtained.

(vii) References

References are all reference sources used in research and actually quoted in the manuscript. Reference writing aims to prevent citing sources from plagiarism. There are several reference styles such as, APA, Van Couver, Harvard, MLA, IEEE, Chicago or Turabian, and others that authors can adjust to the format and provisions of the journal templating used [13]. Students' mistakes in writing references are the use of in-text citations with those in the references that are not appropriate or different, there are even references that are not called in the paragraph or vice versa. Students need to pay attention to the reference section because it is the main reference source for readers.

Based on above results, we found the effectiveniess in examining the problems in writing articles. However, all evaluations were done in online system. The limitations of this study need to be considered because this research was conducted when the COVID-19 outbreak occurred online or from home studies that needs additional strategies for enhancing results and comprehension [40-48]. Thus, further analyses will be done in our future research.

4. Conclusion

A scientific article is an article that contains and examines a particular problem using scientific principles. The structure of scientific articles is formed from the title, abstract and keywords, introduction, method, results and discussion, conclusion, and bibliography. Article writing errors were found in the structure of scientific articles such as the components of the title, abstract, introduction, mode, results and discussion, conclusion, and references. The results of the pre-test showed that 91.50% had difficulty in writing scientific articles, and there were still errors in the title, abstract, keywords, introduction, method, results and discussion, conclusion, and bibliography sections. The results of the post-test carried out increased by 65.8. This study may be utilized as general guidelines for authors to apply when self-editing their manuscripts before sending them to journal editors.

Acknowledgments

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