Students’ scientific articles writing ability based on lacertilia inventory results in the conservation area Bengkulu University

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Abstract. Writing scientific articles is a problem for teachers especially in elementary, junior and high school levels. This study aimed to determine student ability to write scientific articles based on the results of lacertilia suborder inventory in the conservation area of Bengkulu University. This study used Research and Development method. Participants in this research were teachers who being students of graduated school of science education on 2018 academic year who enroll biology environment subject. Students in 7 groups has made 7 articles based on lacertilia inventory research. From the scientific articles writing, there are 7 indicators that indicate in good score, including the ability to write title, identity, article components, abstracts, introduction, results and discussion, and conclusions with highest average score as much as 3.42 in ability to write results and discussion, and lowest average score as much as 2.14 in ability to write method.

1. Introduction

Scientific article are published to display new research results based on observation, investigation, take data collection and using scientific methods. A scientific article is most often published in scientific journal. Characteristic of scientific article such as use: (a) prose language, not poetry, (b) passive sentence patterns, (c) formal writing format, (d) standard language (e) present an important issues (f) present systematically and objectively [1,2].

Writing scientific articles is a problem for teachers especially in elementary, junior and high school levels. Difficulties include: (a) low motivation of teacher in writing, especially based on scientific research, (b) busy with routine, (c) lack of insight and skills in scientific writing, (d) not familiar with technology, (e) lack of reference sources, (f) lack of socialization from schools / institutions, (g) limited scientific writing knowing [3-6]. Therefore this study was aimed to determine the writing scientific article’s ability of Graduated School of Science Education students at the Faculty of Teacher Training and Education in Bengkulu University, whom were teacher and prospective being teacher and lecturer. The guideline used in this study was a template of Pendipa Journal managed by the Graduate School of Science Education Bengkulu University.

Students expected to own the ability to write scientifically so they can publish their scientific article in journals or scientific publications. The importance of students to write scientifically is not only purpose to writing a thesis, but also a manifestation of the creativity and knowledge. Writing is a culture that important for intellectuals and academics person, especially for students in University. Writing also
a place for creative thinking actualization which full of inspiration. In the University, there are a condition that every students must to write a scientific article based on their own research. Based on government letter No: 152 / E / T / 2012 addressed to all rector/ chancellors / heads / directors of all PTN and PTS in Indonesia, where this letter was signed by the Director General of Higher Education, Joko Susanto which stated that the requirements for graduating S1, S2 or S3 students were to include and make scientific papers published in scientific journals, both online and print. It show that every students in University must to have ability to write scientifically.

A similar study related to the ability to write scientifically [6] about training scientific article writing for teachers of SMAN 8, Jambi City. From this research, show that training activities in writing scientific articles were able to develop the ability of teachers in scientific writing, which can be clearly seen from teacher publications that published in several media, especially scientific journals. In addition, this research can improve the professionalism of teachers while improving the quality of learning.

2. Methods
This study used Research and Development methods. Research and Development method [7] has 4 characteristics: 1) systematic study of process in designing, developing and evaluating models, programs, teaching-learning strategies and their equipment’s, products, and systems as solutions to complex problems in practical education, and also has the aim to increase knowledge about the characteristics; 2) the general stages of development research consist of the design, development, evaluation and implementation process; 3) determining the focus, process, conclusions and results of the study will determine the type and form of development research to be carried out by researchers who wish to conduct development research in the field of learning; and 4) the use and selection of evaluation techniques largely determine the quality of models, programs, teaching strategies and tools, products, and systems.

The participants in this study were Graduate School students of Science Education FKIP UNIB 2018 academic year who took Environmental Biology subject. The study was conducted in the University of Bengkulu conservation area such as: 1) Learning Center, 2) Heosemys conservation area, 3) Emys conservation area, 4) Butterfly Garden area, 5) conservation area behind PGSD Dormitory, 6) Forestry conservation area, and 7) Forestry arboretum area (near the law lab). Lacertilia inventory research was conducted in June-August 2018, which includes the preparation stage to the writing of scientific articles. The technical inventory of lacertilia was carried out at 09.00 - 11.00 AM and 7.00 PM - 09.00 PM to obtain data on the types of nocturnal and diurnal lacertilia. Determination of sampling points was done by looking at habitat types based on vegetation composition and based on direct checking in the field. These habitats consist of habitats with forested vegetation compositions as well as habitats with minimal composition even without vegetation. Meanwhile the activity of guiding the writing of scientific articles was carried out in September 2018.

The instrument that used in the lacertilia inventory activity was in the form of an observation sheet which was equipped with a key to identifying species, while in the activity of writing scientific articles, the instrument used was a scientific article evaluation sheet which was completed with an assessment rubric. Research procedures include: 1) students in groups was arranged observation sheets for lacertilia observations, 2) students carried out lacertilia inventory, 3) students checking lacertilia classification based on key of determinations to analyze data, 4) students found various problems in reptile inventory activities, 5) students improved observation sheets and re-do reptile inventory, 6) students were sure about the classification of lacertilia, 7) students wrote scientific articles based on data, 8) students found problems in writing scientific articles, 7) students were guided by lecturers and assistants in writing scientific articles, 8) students wrote scientific articles with different titles.

3. Results and discussion
This research encourages students be able to carry out field research in the form of an inventory of reptiles belonging to the suborder lacertilia. Students were required to be able to design and develop field activities in the form of designing observation sheets or observation sheets which also include
measurements of reptile bodies with various indicators as well as measurement of various abiotic factors that support the conservation area. The activity of designing and developing this observation sheet is in accordance with research and development methods [8] such as regarding the development of research-based booklets as a source of learning environmental pollution material in high school [9]. After being practiced for the first time students certainly experience various problems such as the wrong location of the search area, wrong observation time, improper search techniques, and various problems so that the reptile animal was difficult to find. Therefore the observation sheet was evaluated so that it can correct the difficulties and problems. Then students were guided to be able to write scientific articles related to the results of field research that has been done.

The activity of writing scientific articles was arranged according to the format of writing articles in the Pendipa Journal. Pendipa Journal is a journal that accommodates research articles related to biology, chemistry, physics, and science education which are managed by the Postgraduate Study Program of Natural Sciences in FKIP Bengkulu University published online with periodic periods, namely in February, June, and October [10]. Pendipa Journal has a printed and online ISSN number and indexed by various sites such as Google Scholar, Crossref, ISJD, PKP Index, ESJI, BASE, Mendeley, Academia.edu, and World Cat.

This scientific article writing activity was carried out with students forming groups and designing scientific articles based on the data they have got in the lacertilia inventory activity. In the first two weeks, it turned out that many students complained about the difficulty of writing scientific articles without being accompanied by a lecturer or assistant. This was due to a lack of confidence both in the inventory data obtained and in writing skills that were lacking. The lack of skills in writing scientific articles happened because students were not always required to write articles, especially in schools (most of them have become teachers in various schools). Responding to this difficulty, the lecturer and assistant assisted in writing scientific articles. After the scientific article writing assistance activities, the students' ability to write articles improved. This was evidenced by the existence of 7 articles compiled by 7 groups with various titles.

Articles that have been write by students in 7 groups such as: 1) jenis-jenis reptilia (sub ordo lacertilia) di area kampus Universitas Bengkulu, 2) pengaruh faktor abiotik terhadap jenis-jenis keaneeragaman lacertilia di kawasan Universitas Bengkulu, 3) keaneeragaman reptil subordo lacertilia di area kampus Universitas Bengkulu, 4) identifikasi jenis-jenis reptil (sub ordo lacertilia) di area kampus Universitas Bengkulu, 5) pengaruh faktor abiotik area kampun Universitas Bengkulu kota Bengkulu terhadap morfologi jenis reptil subordio lacertilia, 6) eksplorasi reptil subordo lacertilia di kawasan kampus Universitas Bengkulu, 7) jenis-jenis reptilia (sub ordo lacertilia) di area kampus Universitas Bengkulu. Assessment’s recapitulation of scientific articles summarized in Table 1.

| Article Code | Observer code |
|--------------|---------------|
| A1           | OB_1          |
| A2           | OB_2          |
| A3           | OB_3          |
| A4           | OB_4          |
| A5           | OB_5          |
| A6           | OB_6          |
| A7           | OB_7          |

Table 1. Recapitulation of scientific article assessment.

| Article Basic Framework | Article Content Components |
|-------------------------|---------------------------|
| Title | Identity | Article component | Writing Procedure | Abstract | Introduction | Method | Results and Discussion | Conclusion | References |
| A1 | 3 | 2 | 3 | 2 | 4 | 3 | 2 | 2 | 2 | 2 |
| A2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 1 |
| A3 | 4 | 2 | 1 | 2 | 3 | 2 | 2 | 3 | 4 | 1 |
| A4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 |
| A5 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 4 | 3 |
| A6 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 4 | 3 |
| A7 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 2 | 2 |
| Total score | 34 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| Average score | 3 | 2.5 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 |

Score criteria

| Number | Good | Good | Good | Good | Enough | Good | Good | Enough | Good | Good | Enough |
|--------|------|------|------|------|--------|------|------|--------|------|------|--------|
| 1      | 4    | 3    | 4    | 5    | 6      | 7    | 8    | 9      | 10   | 11    | 12     |

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| A3 | 4 | 2 | 1 | 2 | 3 | 2 | 2 | 3 | 4 | 1 |
| A4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 |
| A5 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 4 | 3 |
| A6 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 4 | 3 |
| A7 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 2 | 2 |
| Total score | 34 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| Average score | 3 | 2.5 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 | 3.25 |

Score criteria

| Number | Good | Good | Good | Good | Enough | Good | Good | Enough | Good | Good | Enough |
|--------|------|------|------|------|--------|------|------|--------|------|------|--------|
| 1      | 4    | 3    | 4    | 5    | 6      | 7    | 8    | 9      | 10   | 11    | 12     |
Table 1 shows that scientific articles that have been written by students that judged based on several aspects of assessment which were divided into 2 aspects, including: 1) the basic framework of the article includes the title, identity, components of the article, and writing procedures. 2) the component content of the article which includes abstracts, introduction, methods, results and discussion, conclusions, and bibliography.

3.1. Basic article framework
The basic framework of the article includes the title, identity, article components, and writing procedures. In the aspect of the title, “very good” category score given if the article title contains all components: 1) the title consists of 20 words maximum, 2) variables are clear and can be measured, 3) the title reflects the contents of the article, given 4 score. If it contains 2 of the 3 components given “good” category with a 3 score. Articles containing 1 of the 3 components are given a “enough” category with 2 score, and if none of the components that appear are given a “less” category with 1 score.

In the aspect of identity, a category will be “very good” given if the article's identity contains all of the following components: 1) including the name of author and co-author, 2) listing the institution, 3) listing correspondence address. If it contains 2 of the 3 components it will given a “good” category with 3 score. Articles containing 1 of the 3 components are given an “enough” category with 2 score, and if none of the components that appear are given a “less” category with 1 score.

In the aspect of article components, a category will be “very good” given if the writing structure consists of all of the following components: 1) title, 2) identity, 3) abstract, 4) introduction, 5) method, 6) results and discussion, 7) conclusion, 8) reference, and written systematically. If the writing structure contains 7 of the 8 components, it is given a “good” category with 3 score. Articles containing 6 of the 8 writing structures are given a “enough” category with 2 score, and if it contains 6 of the 8 writing structures but is not systematically written it is given a “less” category with 1 score.

In the aspect of writing component, a “very good” category is given if the writing procedure of the article is consistent with the journal which includes: 1) size and type of font, 2) layout, 3) table writing, 4) picture writing, it will given 4 score. If the writing procedure of an article contain 3 of 4 components, it is given a “good” category with 3 score. Articles containing 2 of the 4 components of the writing procedure are given an “enough” category with 2 score, and if it does not contain all the journal writing procedures are given a “less” category with 1 score.

Based on the four aspects (see Table 1) shows that the lowest score criteria are found in the aspect of writing procedures with an average score of 2.5 with “enough” criteria. This is due to students being inaccurate in compiling articles according to the recommended writing procedures such as: 1) students writing with varying size and type of letters and not in accordance with the template, 2) students were not careful enough to read the template rules regarding layout, and if there is difficulty should immediately write articles in the downloaded file, 3) students include tables and figures but did not pay attention to writing in procedures. From this it can be concluded that in writing articles, students need to pay attention to the writing according to the journal template they have because each journal has its own rules. If the article is not written according to the template, the article will be rejected by journal manager.

The highest score criteria were found in the aspect of identity with an average score of 3.07 with “good” criteria. It shows that students have been able to write identity in their articles according to the format that has been recommended. The identity referred in this case, is able to include the name of the author and co-author, include the institution, and the complete address of the correspondence.

3.2. Content component of the article
The content component of the article includes abstracts, introduction, methods, results and discussion, conclusions, and references. In the abstract aspect, a category will be “very good” given if the abstract contains all the components, such as: 1) consists of 150-250 words, 2) contains the components of the objective, research, 3) contains the components of the research method, 4) contains the components of the results and research discussion, 5) contains conclusion components and keywords, 6) abstract written
structured. If the abstract containing 5 of the 6 components is given a “good” category with 3 score. Articles containing 4 of the 6 components are given an “enough” category with 2 score, and if the abstract containing 3 of the 6 components are given a “less” category with 1 score.

In the introduction aspect, a “very good” category is given if the introduction contains all the components: 1) shows the common thread between paragraphs, 2) contains the background of the problem, 3) theoretical study related to the problem, 4) describes a clear goal. If the introduction contains 3 of the 4 components it is given a “good” category with 3 score. Articles containing 2 of the 4 components are given an “enough” category with 2 score, and if the introduction contains only 1 of the 4 components it is given a “less” category with 1 score.

In the aspect of the method, a category is “very good” given if the method contains all components: 1) types of research methods, 2) place and time, 3) population-samples, 4) data collection techniques, 5) data analysis techniques and systematically written, it will given 4 score. If the method containing 4 of the 5 components is given a “good” category with 3 score. Articles containing 3 of the 5 components are given an “enough” category with 2 score, and if the method only contains 2 of the 5 components are given a “less” category with 1 score.

In the aspect of results and discussion, a “very good” category is given if it contains all the components: 1) the data presentation is clear and informative, 2) the data presented answers to the problem and in accordance with the objectives, 3) the discussion refers to the results of previous research and is supported by theory, it will given 4 score. If the results and discussion containing 2 of the 3 components are given a “good” category with 4 score. Articles containing 1 of the 3 components are given an “enough” category with 2 score, and if not containing any of the 3 components are given a “less” category with 1 score.

In the aspect of conclusions, a “very good” category is given if the conclusions contain all components: 1) the conclusions formulation answers the problem, 2) written briefly and clearly, 3) conclusions refer to the results, it will given 4 score. If a conclusion containing 2 of the 3 components is given a “good” category with 3 score. Articles containing 1 of the 3 components are given an “enough” category with 2 score, and if the conclusion does not contain any of the components given a “less” category with 1 score.

In the reference aspect, a “very good” category is given if the references contains all the components: 1) references written alphabetically, 2) last name abstracted, 3) writing style follows APA, 4) uses primary literature and 60% of literature comes from journals past 5 years, it will be given 4 score. If the bibliography contains 3 of the 4 components is given a “good” category with 3 score. Articles containing 2 of the 4 components are given an “enough” category with 2 score, and if the references contains only 1 of the 4 components are given a “less” category with 1 score.

From these six aspects (see Table 1) shows that the lowest score criteria were found in the aspect of writing the method with an average score of 2.14 with “enough” criteria. This is caused by: 1) students lack of data from various literatures on the types and methods of research in accordance with what is done, 2) students do not specify the place and time of research in detail, 3) the population and sample of research are not clearly stated, 4) Data collection techniques written on articles are written in no detail and only write data collection techniques in outline, 5) data analysis techniques are not included in most articles. From this it can be concluded that in writing articles, writers need to pay attention to methods according to journal templates and look for literature that matches between those implemented and those written on scientific articles.

The highest score criteria is in the aspect of results and discussion with an average score of 3.42 with “good” criteria. It shows that students have been able to write the results and discussion with a clear and informative data presentation, the data presented answer the problem in accordance with the objectives, and the discussion refers to the results of previous research supported by theory.

4. Conclusion
The score criteria with the "good" category are found in the aspects of writing the title, identity, article components, abstracts, introduction, results and discussion, and conclusions. Meanwhile, the score
criteria with the category of "enough" are found in aspects of writing procedures, methods, and bibliography. From some aspects of this assessment, it can be seen that the highest total score of the ten aspects is in the aspect of writing the results and discussion. This shows that students can write and arrange the results and discussion of scientific articles well. The lowest score is found in the writing aspect of the research method. This shows students still have difficulty in writing research methods.

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