



# Difficulties of Mathematics and Natural Science Academicians in Publishing Scientific Article

Firas Khaleyra<sup>1,\*</sup>, Utama Alan Deta<sup>1</sup>, Nurita Apridiana Lestari<sup>1</sup>, Muhammad Jakfar<sup>1</sup>, and Ratih Dewi Saputri<sup>1</sup>

Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya, Surabaya, Indonesia

\*Corresponding author. [firaskhaleyra@unesa.ac.id](mailto:firaskhaleyra@unesa.ac.id)

**Abstract.** In publishing research results as a scientific article, academicians often face various difficulties, especially if they send the article to journals with foreign language. Language barrier often hinders the publication of scientific articles. In this study, we aimed to examine the perception of the academic community from the Faculty of Mathematics and Natural Sciences (FMIPA), Universitas Negeri Surabaya (Unesa) in the difficulties of writing and publication of scientific articles. The instrument used in the form of a questionnaire consisting of 10 questions based on the aspects of research substance, writing articles, and submitting to scientific journals using Likert scale. Respondents were lecturers and Postgraduate students in FMIPA Unesa. The aspect in publishing scientific article perceived to be most difficult by mathematics and natural sciences academicians was found to be proofreading article (scored  $2.74 \pm 1.00$ ), while aspect with the highest score was writing article according to journal template ( $3.46 \pm 1.04$ ). From this study, it can be concluded that the academics of mathematics and natural sciences from Indonesia who apply English as English as Foreign Language (EFL) perceived language barrier to be the aspect found to be most difficult compared to other aspects, such as writing according to template or submitting process.

**Keywords:** scientific publishing, language barrier, EFL Academics, academic writing

## 1 Introduction

Higher Education in Indonesia plays a role in the implementation of the Tri Dharma of Higher Education which consists of education and teaching, research and development, and community service [1]. Research as part of Tri Dharma of Higher Education encompass the obligation to publish scientific articles to disseminate results of the research that has been carried out. Dissemination of new knowledge is arguably the most important part of academic activity, which is the reason why scientific publishing is regarded as peak of any research work [2].

For this reason, the skills to communicate research findings in the form of scientific articles is critical to increase the dissemination of research results. Reporting results of study must pay attention to the truthfulness of material written, the nature of intended

audience, and questions about clarity, writing style, structure, and accuracy. These factors are especially critical in the writing of articles in field of mathematics and natural sciences. These factors cause writing scientific articles to be perceived as difficult, which resulted in many researchers avoiding critical elements that might hamper the development of science or their own career [3].

The ideal manuscript has the characteristics of having a clear and short hypothesis and message, is an original writing, has a logical organization, contributes significantly in the field, on target with journal readers, and responsive to the reviewer suggestions. While less than ideal manuscripts are characterized by plagiarism, unethical data collections, ineffective or imperfect findings, data overinterpretation, salami-slicing findings, and non-conclusive discussions [4]. Scientific articles usually consist of introduction, methods, results, and discussion, widely known as standard IMRAD structure [5].

Furthermore, the analysis of comparison of article structure with high impact shows a different structure from rejected articles in desk evaluation. A writer must carefully consider impact or article in relevant journals that use similar research techniques to better understand the most effective structure [6]. The structure of an article is very important because it allows good content to be read and valued. The structure cannot make articles very good, but can prevent articles to be difficult to read.

One of the current problems experienced by lecturers and students in writing scientific articles for publication in journal is language constraints. Currently 98% of scientific publications use English [7]. Most researchers in Indonesia apply English as foreign language (EFL). Some studies have shown that the efforts needed by scientific article writers for journal publications from EFL countries are higher than native English writers. Previous studies showed that as many as 43.5% of articles from EFL authors were rejected for reasons related to language writing [8]. Other studies state that writers who use English as the second language experience 24% difficulties, 10% dissatisfaction, and 22% higher anxiety than writers who use English as the first language [9].

This study was designed with the aim of finding out the perception of mathematics and natural sciences lecturers and students in the Faculty of Mathematics and Natural Sciences (FMNS) Universitas Negeri Surabaya (Unesa) regarding their perceptions and obstacles in writing scientific articles in English. From the results of the study, we hope that it can be an insight to improve the policies regarding article publication in Indonesian universities.

## 2 Method

This research was a descriptive study to determine the perceptions and obstacles experienced by the FMNS academic community in publishing of scientific articles. This research was conducted at FMNS Unesa with the target of the FMNS academic community who had written or was writing scientific articles for publications during the time of study, including lecturers and graduate students. The perception of the difficulty of the academic community was interpolated in the form of a questionnaire consisting of 10 questions (Table 1). Questions were formulated based on aspects of the substance of scientific articles (topics, titles, methods, discussions), writing (searching and writing

references, adjusting to templates), as well as submitting to journals (translating, proof-reading, and submitting to journals) which they were experienced during writing and submitting scientific articles. Perception questions were answered with a score of 1-5 from the most difficult to the easiest based on the Likert scale. The questionnaire was presented to respondents using Google Form. Data was then analyzed descriptively.

**Table 1.** Instrument questions about the perception of difficulties in writing scientific articles

No. Aspects	Answers
1 Determining topics that are relevant to study field development (research substance)	Score 1 if perceived to be very difficult Score 2 if perceived to be difficult Score 3 if perceived to be not quite difficult Score 4 if perceived to be easy Score 5 if perceived to be very easy
2 Writing title with significant scientific impact (research substance)	Same as above
3 Designing methods according to title (research substance)	Same as above
4 Writing discussion in line with obtained results (research substance)	Same as above
5 Searching for references relevant to study (writing article)	Same as above
6 Writing references according to journal style (writing article)	Same as above
7 Writing article according to journal template (writing article)	Same as above
8 Translating article to required language (submitting to journal)	Same as above
9 Proofreading translated article (submitting to journal)	Same as above
10 Submitting article to journal (submitting to journal)	Same as above

### 3 Result and Discussion

#### 3.1 Respondents profile

As many as 112 respondents from students and lecturers of FMNS Unesa filled the survey from August to September 2023. Profile of respondents is presented in Table 2. Each field consisted of basic science and education study programs, except for science education which only consisted of science education study programs at postgraduate level.

**Table 2.** Profile of Respondents

Field	Proportion (%)	Position	Proportion (%)
Biology	35%	Students	76%
Physics	20%	Lecturers	24%
Chemistry	13%		
Mathematics	5%		
Science ed.	28%		

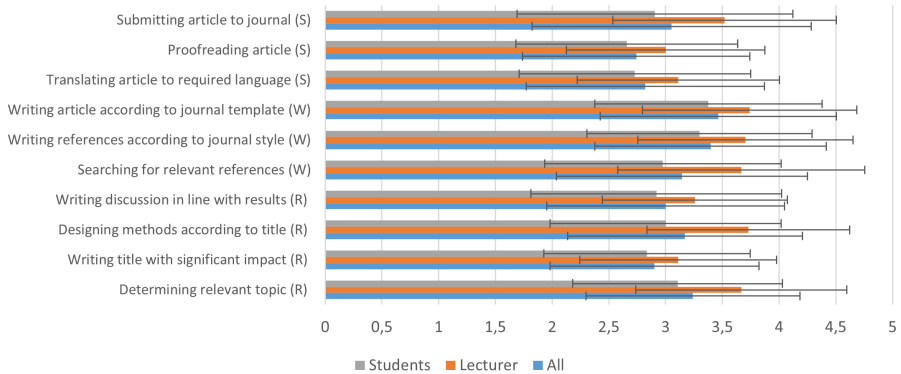
### 3.2 Perception of difficulties on the various aspects of writing scientific article

Respondents' perceptions of aspects of writing scientific articles that caused difficulties are presented in Fig 1. Based on the average of all respondents, the aspect that gets the lowest average score is the article proofreading ( $2.74 \pm 1.00$ ). The aspects of the data from lecturer and student respondents are also similar, namely article proofreading ( $3 \pm 0.87$  and  $2.65 \pm 0.98$ ), while the aspect that got the highest score is writing the article according to the journal template both for data from all respondents (score  $3.46 \pm 1.04$ ), lecturers ( $3.74 \pm 0.94$ ), and students ( $3.38 \pm 1.00$ ). The highest gap from lecturers and students was found from aspect designing methods according to title, which from lecturer respondents scored  $3.73 \pm 0.89$ , while from students  $3.00 \pm 1.02$ .

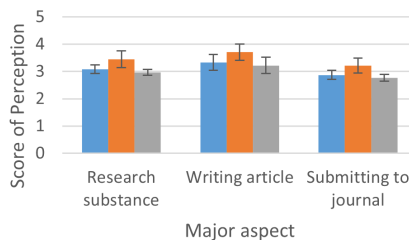
The questions presented to respondents reflect on three major aspects of publishing study, which are research substance, from determining topics up to writing discussion; writing the article, from searching up relevant references to writing according to template; and submitting to journal, from translating to submitting to journal system. Scores of each major aspect was taken from the average of composing minor aspects. It was found that submitting to journal has the lowest score from all respondents ( $2.87 \pm 0.16$ ), lecturers ( $3.21 \pm 0.27$ ), and students ( $2.76 \pm 0.13$ ) compared to other aspects (Fig. 2). The highest score of major aspects was from writing article ( $3.33 \pm 0.29$  from all respondents).

Publishing scientific articles has become an obligation for all academicians in Indonesia; not only lecturers or faculty members, but also for university students, especially post-graduate students, causing polemic in academic community [9]. Some universities obligate their students to publish article first before they can defend their thesis, as part of graduation requirements. On the other hand, publishing articles directly ties to the career path of a lecturer in Indonesia. Therefore, publishing articles in journal or publisher with foreign language, especially English, have become an integral part of academic activities.

The respondents for our study was the postgraduate students (76%) and lecturers (24%) from all study programs in FNMS Unesa. Both postgraduate students and lecturers are academicians in our community required to publish article for different reasons, but more likely to choose publication in English. Publication in journal with English language is chosen more due to higher exposure. Research in non-English languages is less available than the one published in English. On top of that, important information published in languages other than English can possibly lost or, practically non-existent for the community [10].



**Fig. 1.** Score of difficulty perception in various aspects writing and publishing scientific article. Major aspect: R = research substance, W = writing article; S = submitting to journal.



**Fig. 2.** Score of perception in major aspects of publishing scientific article. Colour of bars reflects different respondents: blue = all respondents, orange = lecturers, grey = student respondents.

In this study, we found that the aspect that perceived to be most difficult, both by lecturers and students were proofreading article ( $2.74 \pm 1.00$ ). Proofreading requires high level of understanding not only in the language uses, oftentimes English, but also in the scientific terms use in the journal publication, which usually very specific of the field. Therefore, most EFL speakers might not be confident or certain that their proofreading is right. In other study, 52.5% students still found it difficult to use good English grammar and still made mistakes in grammars when writing scientific article [11].

As a country that apply English as Foreign Language (EFL), the difficulties of Indonesian authors in writing scientific articles in English have been researched. From previous research, many scientific article writers in Indonesia find it difficult to write articles that can convince readers that the research perspective that has been carried out is different from previous research or that there is new knowledge generated in their research [11]. Introducing new knowledge requires not only good skill in explanatory writings but also deep understanding on the development of the field.

Research from other EFL countries also found that as many as 43.5% of article rejections or corrections were due to poor English. In the same study, it was also stated

that there were 33% of respondents who chose not to participate in international seminar activities because of the obligation to speak in English when presenting their papers [8]. Another study with respondents from Korea, which is also an EFL country, indicated that the linguistic or language aspect of scientific articles was the most difficult factor when writing articles [12]. Lack of experience in writing scientific article in English have been reported to be one of the major challenges for Moroccan doctoral students in creating publishing materials [13].

Major aspect with highest score in the current study was writing article ( $3.33 \pm 0.29$ ), which including searching for relevant references, writing references according to journal style, and writing article according to journal template. Writing article according to journal template had overall highest score compared to all other aspects asked to respondents ( $3.46 \pm 1.04$ ), reflected similarly to both student and lecturer respondents. In line with this result, previous research reported that graduate students had more difficulties with the linguistic feature of a paper than the overall organization and paragraph development [12]. Other study also showed that most EFL students were not able to write literature review effectively mostly due to lack of knowledge to implant critical view in their writing [14].

Aspect with the highest gap between student and lecturer respondents was designing methods according to title (lecturer respondents scored  $3.73 \pm 0.89$ , while students  $3.00 \pm 1.02$ ). This is interesting because this implies on the difference of experience on designing studies. Students might perceive methodology as difficult due to their limited experience on performing research, while lecturers usually had more experience on designing and conducting studies, thus perceive this aspect to be easier than student respondents.

Our study indicates that language still poses a barrier to publishing study. The use of English as common language has improved science communication across the world, however this also create inequalities for non-English speaker to publish and disseminate their research, hence hinders their contribution [15]. Other solution is increasing initiative from publishers to publish in bilingual [16], however this requires a very long time in the future to realize.

Although our sample respondents came from one university among many in Indonesia, we feel that the similar situation also happened in other mathematics and natural sciences faculties in other universities in Indonesia, since most faculties have similar community, with most of their members and students use English as EFL rather than first language. Thus, we hope that this study can provide insight and input to policies regarding scientific article publication in mathematics and natural sciences faculties in Indonesian university.

## 4 Conclusion

The aspect in publishing scientific article perceived to be most difficult by mathematics and natural sciences academicians was found to be proofreading article. It can be concluded that language barrier still hinders the publication of mathematics and natural sciences academicians, compared to other aspect in scientific article writings, such as following template or submitting article. In the future, policies to develop and assist sci-

entific writing skills for English publication can be implemented to help academicians publish their works.

## 5 Acknowledgements

Authors would like to thank Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya (Unesa) for the funding of this research.

## References

1. E. Hennessey, J. Mueller, *Canadian Journal of Education / Revue canadienne de l'éducation* **43**(2), pp. 498 (2020). URL <https://www.jstor.org/stable/26954696>
2. T.L. Setter, R. Munns, K. Stefanova, S. Shabala, *Functional Plant Biology* **47**(12), 1138 (2020). DOI 10.1071/FP20124. URL <https://doi.org/10.1071/FP20124>
3. J. Shah, A. Shah, R. Pietrobon, *Academic Medicine* **84**(4), 511 (2009). DOI 10.1097/ACM.0b013e31819a8c3c
4. A.S. Colwell, F.K. Wong, K.C. Chung. Why do manuscripts get rejected? (2022). DOI 10.1097/PRS.00000000000009627
5. L.B. Sollaci, M.G. Pereira, *Journal of the medical library association* **92**(3), 364 (2004)
6. H. Sun, J.D. Linton, *Technovation* **34**(10), 571 (2014). DOI <https://doi.org/10.1016/j.technovation.2014.07.008>. URL <https://www.sciencedirect.com/science/article/pii/S0166497214001035>
7. V. Ramírez-Castañeda, *PloS one* **15**(9), e0238372 (2020). DOI 10.1371/journal.pone.0238372. URL <https://doi.org/10.1371/journal.pone.0238372>
8. D.I. Hanauer, C.L. Sheridan, K. Englander, *Written Communication* **36**(1), 136 (2019). DOI 10.1177/0741088318804821. URL <https://doi.org/10.1177/0741088318804821>
9. R. Sayekti, *College & Research Libraries News* **82**(11), 513 (2021). DOI 10.5860/crln.82.11.513. URL <https://doi.org/10.5860/crln.82.11.513>
10. R. Sunol, P.J. Saturno, *International Journal for Quality in Health Care* **20**(1), 1 (2008). DOI 10.1093/intqhc/mzm072. URL <https://doi.org/10.1093/intqhc/mzm072>
11. U.A. Azizah, A. Budiman, *JEELS (Journal of English Education and Linguistics Studies)* **4**(2), 175–197 (2017). DOI 10.30762/jeels.v4i2.405. URL <https://jurnal.fakultarbiyah.iainkediri.ac.id/index.php/jeels/article/view/65>
12. D.W. Cho, *English for Specific Purposes* **28**(4), 230 (2009). DOI <https://doi.org/10.1016/j.esp.2009.06.002>. URL <https://www.sciencedirect.com/science/article/pii/S0889490609000404>
13. B. Housseine, T. Oifaa, *Linguistic Forum - A Journal of Linguistics* **2**(3), 13–19 (2020). DOI 10.5281/zenodo.14848043. URL <https://linguisticforum.com/index.php/ling/article/view/52>
14. Z. Shamsavar, H. Kourepaz, *Cogent Education* **7**(1), 1784620 (2020). DOI 10.1080/2331186X.2020.1784620. URL <https://doi.org/10.1080/2331186X.2020.1784620>
15. R. Khelifa, T. Amano, M.A. Nuñez, *Trends in Ecology & Evolution* **37**(2), 109 (2022). DOI 10.1016/j.tree.2021.11.003. URL <https://doi.org/10.1016/j.tree.2021.11.003>
16. R. Meneghini, A.L. Packer, *EMBO reports* **8**(2), 112 (2007). DOI <https://doi.org/10.1038/sj.embor.7400906>. URL <https://www.embopress.org/doi/abs/10.1038/sj.embor.7400906>

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

