

Bibliometric Approach of the Demands, Availability, and Difficulty of Digital Academic Writing Sources for Undergraduate Students

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Abstract

Teaching materials are one of the essential components in learning process of writing scientific article for undergraduate students. This research aims to obtain an overview of the teaching material needs of writing scientific article with bibliometric analysis-assisted for undergraduate students in university. This research used qualitative research. The participants were 60 undergraduate students from two universities in Bekasi and Jakarta, Indonesia. The questionnaires and interviews technique were taken to collect the data. The stages of analyzing data consisted of data reduction, presentation, and verification. The research findings showed that the teaching materials of writing scientific article are integrated in teaching materials of compulsory curriculum subjects of Indonesian language learning. However, the analytical method such as bibliometric analysis is still limited integrated in teaching materials of writing scientific article. In addition, the variety of teaching material needed by students are quite diverse consisted of electronics modules, electronic textbooks, electronic student worksheets, electronic handouts, and material presented using PowerPoint. Electronic module with bibliometric analysis-assisted was chosen by students as the most needed teaching material in writing scientific article. For the future research, these results can be a reference for developing electronic modules of writing scientific article with bibliometric analysis-assisted in university. The novelty of this research is finding the specific need analysis of teaching materials of writing scientific article with bibliometric analysis-assisted for undergraduate students.

Keywords: Academic writing; bibliometric approach; digital learning sources; undergraduate students

Introduction

Teaching materials are one of the essential components in learning of writing scientific article skills for undergraduate students. Teaching materials are a collection of materials that can be used to support the learning process in the form of print, audio, visual or electronic-based (Cahyadi, 2019). Teaching materials have various benefits in supporting the achievement of learning objectives. Teaching materials for students are needed to support the Indonesian language learning outcomes (Kavadella et al., 2013). The adequate teaching materials have a big impact on achieving learning goals (Sugihartini & Laba Jayanta, 2017). Teaching materials can facilitate students to gain the knowledge and support the independent learning (Martin, 2018). Teaching materials provide opportunities for students to study a competency in a structured manner so that they are able to master that competency comprehensively (Marlina Eliyanti, 2016). In summary, teaching materials are a collection of materials to support learning in achieving learning goals.

Writing is one of the language skills that are important for students to learn in university. Writing skills are needed to support academic assignments of students. Writing skills learned in university include writing scientific papers in the form of papers, proposals, reports and scientific articles. Scientific articles are a type of academic text learned by students through compulsory curriculum subjects of Indonesian language learning. Scientific articles are usually published in scientific journals in periodic publications that contain scientific studies in certain fields (Rifai, 1995). However, most of students in university still find difficulties in writing scientific articles. Research findings showed that writing ability of students is still in the low category, especially in writing papers and scientific articles (Heriyudananta, 2021; Nirwana & Ruspa, 2021; Widodo et al., 2020).

On the other hand, writing scientific article skills of students are also closely related to the teaching materials in learning process. The previous research results showed that some of lecturers have limited abilities in developing teaching materials (Asrial & Syahrial, 2019). This result showed that teaching materials, besides limited, are also difficult to produce for lecturers (Suarsana, 2021). The teaching materials used in university have special characteristics that must be in line with the demands of student learning targets (Ferdiani & Pranyata, 2022). Teaching materials in the learning process not only as learning materials, but can also be used to create learning situations such as student-centered learning so that learning can be more interactive (Murniyanto et al., 2022; Sri et al., 2020). The learning process must be supported and designed with instructional designs that easy to use into practice (Magdalena et al., 2020). The design of teaching materials can support individual and independent learning so that the role of lecturers can be supported by the teaching materials (Ngujer Basuki et al., 2015).

Furthermore, learning process of writing scientific articles can utilize the use of analysis methods to stimulate students to develop ideas and knowledge in writing. One of the analytical methods is bibliometric analysis. Bibliometric analysis is a popular method for exploring and analyzing large amounts of scientific data (Donthu et al., 2021). Bibliometric analysis can be done using the *Publish or Perish* software. *Publish or Perish* software takes bibliographic data and describes publication patterns based on fields, topics, journals, institutions, and authors (Harzing, 2011).

Research on teaching materials of writing scientific article in Indonesian language learning in university has been carried out by many previous researchers such as research on the need analysis of Indonesian language teaching materials (Ngujer Basuki et al., 2015), research on the need analysis of teaching materials of writing skill (Tenri Ampa & Quraisy, 2018; Yundayani et al., 2017) and research on the development of Indonesian language teaching materials in

higher education (Mulyaningtyas, 2020; Subekti et al., 2016; Ulfah & Jumaiyah, 2018). However, research regarding the need analysis of teaching materials of writing scientific article with bibliometric analysis-assisted is still limited and has not been carried out by previous researchers. Therefore, this research aims to obtain an overview of the teaching material needs of writing scientific article with bibliometric analysis-assisted for undergraduate students in university.

Literature review

Teaching materials

Teaching materials are a collection of materials that can be used to support the learning process in the form of print, audio, visual or electronic-based (Cahyadi, 2019). There are various kinds of teaching materials that can be used in universities, such as textbooks, modules, handouts, and student worksheets. In the current digital era, many teaching materials have also been developed in electronic form. For example, teaching materials in the form of interactive electronic books can be used for group or independent learning (Rosida et al., 2021). The research results of Chantarasombat & Sombatsakulkit (2021) showed that students' independence can be increased through the use of electronic books. Moreover, the use of electronic textbooks can increase student motivation and achievement (Sari & Antasari, 2022).

One of the teaching materials that can be used in Indonesian language learning in university is a module. A module is a set of planned learning programs designed to help students achieve learning goals (Wiradnyana et al., 2022; Zisca Diana & Wirawati, 2021). The research showed that one of the obstacles of Indonesian language learning in university is the lack of availability of modules for students. Modules can facilitate students learning independently and classically (Maulidatul, 2022).

In line with advances in technology and challenges in the 21st century, the printed modules currently available are not support students' needs (Najuah et al., 2021). Moreover, in the last two years, Indonesia has been faced with the Covid-19 pandemic which demands in learning (Kuntarto, 2017; Cardoso, 2023). One of the problems that occurs in online learning for Indonesian language courses is the presentation of learning materials (Yusi Kamhar & Lestari, 2019). Learning material cannot be presented in a simple format but must be able to be understood by students. Electronic module is a non-printed, electronic-based teaching material product which is independently designed to be studied by students (Hamid et al., 2021). Electronic modules can facilitate students to study effectively and efficiently from the aspects of cost, time, and affordability (Hamid et al., 2021; Song et al., 2021). Therefore, it is important to innovate printed modules into electronic modules (e-modules) to facilitate students in electronic-based Indonesian language learning (Modise, 2021).

Scientific article writing

A scientific article is an article that contains and examines a particular problem using scientific principles (Ghufron, 2014). Scientific articles must be written using good and correct writing methods (Brotowidjoyo & Mukayat, 2002). Writing is a language skill that is used to communicate indirectly, not face to face (Tarigan, 2013). Writing scientific articles is a language skill to express ideas or suggestions in a particular field. Writing scientific articles certainly has a purpose. The purpose of writing scientific articles is to generate ideas (Brown, 2000). The text structure of scientific articles generally consists of abstract, introduction, literature review, research methodology, results, discussion and conclusions. In general, a scientific article will be

assessed on 1) suitability between title and content, 2) focus of the problem formulation, 3) discussion in accordance with the problem formulation, 4) appropriate conclusion, 5) writing technique, and 6) systematic presentation (Sudjana, 2011).

Bibliometric analysis

The term bibliometrics was first used by Pritchard in 1969 which is the application of mathematical and statistical methods to books and other communication media (Chellappandi & Vijayakumar, 2018). Bibliometrics is also a quantitative analysis of written documents that is often used to analyze scientific and scholarly publications (Waltman & Noyons, 2018). The scope of bibliometrics includes the relationship between the growth in the number of literature papers and library database usage patterns (Chellappandi & Vijayakumar, 2018). Bibliometrics is based on enumeration and statistical analysis of scientific output in the form of articles, publications, citations, patents and other more complex indicators (Okubo, 1997).

Bibliometric analysis is based on relevant information about scientific publications that can be extracted from data sources. Information used from bibliographic databases of scientific publications includes 1) identify the source (Journal title, year, volume and page), 2) author's name, 3) affiliates, 4) references, 5) document type, 6) title, controlled terms, keywords, abstract, subject title, and 7) acknowledgments (Glanzel, 2003). Bibliometrics has several benefits including find out the amount of literature productivity, conduct comparative studies of the literature produced, fields of study, quantity and quality of research in various branches, various regions during different periods, and others, describe the type and number of publications, and describe the distribution and distribution patterns of literature, and describe the impact of literature (Mathankar, 2018).

Research method

The research method of present research consists of research design, research subjects, research instruments, and data analysis. it can be described as follows.

Research design

This research was qualitative research. Qualitative research is an approach that the researchers interact with participants in their natural settings (Borg & Gall, 2014). Qualitative research can explore a problem and developing a detailed understanding of a central phenomenon (Creswell, 2002). This research design was chosen with the consideration that the researcher wanted to study in more depth the symptoms, events and occurrences in the natural environment. This qualitative research was used to examine educational problems related to the teaching material needs of writing scientific article with bibliometric analysis-assisted for undergraduate students in university.

Research subjects

This research was conducted at two universities in Bekasi and Jakarta, Indonesia. The research subjects consisted of 60 undergraduate students. The profile of research participants is described in Table 1, as follows.

Table 1. Profile of Research Participants

Characteristics	Students	
	University A	University B
Gender	22 males	16 males
	10 females	12 females
Age	18 – 20 years old	17 – 20 years old
Educational Level	Bachelor	Bachelor
Total of Students	32 students	28 students

Research instruments

The data collection is carried out using questionnaire and interviews. The questionnaire technique is collecting data or information from sources carried out to obtain appropriate information with a research focus. The closed-ended questions were taken in the questionnaire of this research. The closed-ended questions consist of 30 items. The aspects of questionnaire were teaching materials of writing scientific article used in university, implementation of electronic-based learning, the need of teaching materials for scientific articles writing, and the need of electronic module with bibliometric analysis-assisted for the learning of writing scientific articles. The details of questionnaire as follows.

Table 2. Aspects of questionnaire

No	Aspects	Number of Items
1.	Teaching materials of writing scientific article used in university	8 items
2.	Implementation of electronic-based learning	6 items
3.	The need of teaching materials for scientific articles writing	8 items
4.	The need of electronic module with bibliometric analysis-assisted for the learning of writing scientific articles	8 items

The Interviews were conducted directly interview the participants. The aspects of interviews were the reason of need electronic-based teaching materials, the reason of need of teaching materials for scientific articles writing, and the reason of need of electronic module with bibliometric analysis-assisted for the learning of writing scientific articles. The details of interviews as follows.

Table 3. Aspects of interviews

No	Aspects	Number of Items
1.	The reason of need of teaching materials for scientific articles writing	2 items
2.	Difficulties of writing scientific articles	2 items
3.	The need of electronic teaching materials for scientific articles writing	2 items
4.	The need of electronic module with bibliometric analysis-assisted for the learning of writing scientific articles	6 items

Data analysis

The research data were analyzed by the stages consisted of data reduction, data presentation and verification. Data reduction is carried out in the form of a process of selecting, editing, focusing attention and simplifying, abstracting and transforming rough data that emerges from field notes. Data validity is the process of validating the research data that has been obtained. The validation used triangulation techniques. Triangulation technique is a technique for checking the validity of data that uses something outside the data. This means that this research checks the degree of trust through several data sources using the interview method.

Results

The results of need analysis of teaching materials of writing scientific article with bibliometric analysis-assisted for undergraduate students is described in two sub topics, as follows.

The availability of teaching materials of writing scientific article

Teaching materials of writing scientific article is an important aspect of learning in university. The availability of teaching materials can support the achievement of writing scientific article skills in the learning of Compulsory Curriculum Subjects of Indonesian language. Based on data obtained through a questionnaire, all of students stated that teaching materials of writing scientific article were available for learning process in university. The teaching materials of writing scientific article are integrated in teaching materials of compulsory curriculum subjects of Indonesian language learning. The availability can be described from three aspects consisted of 1) the variety of teaching materials, 2) the use of analytical methods, and 3) the use of digital modes.

First, the variety of teaching materials of writing scientific article used are quite diverse, as follows.

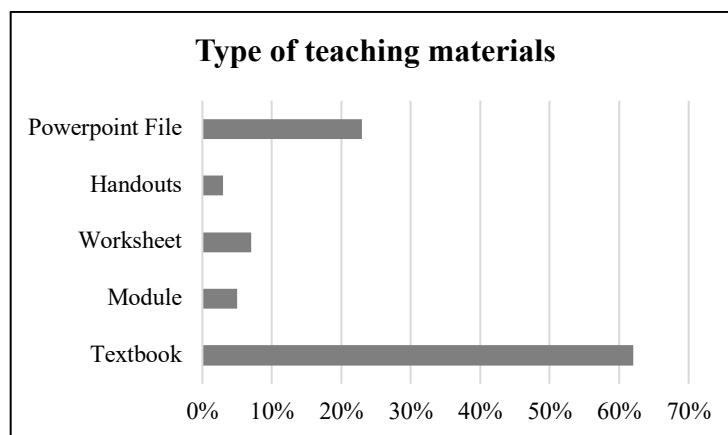


Figure 1. The variety of teaching materials

The variety of teaching materials that have been used by students in Indonesian language learning consists of modules, textbooks, student worksheets, handouts, and power point file. Based on Figure 1, 62% of students use the textbook of Compulsory Curriculum Subjects of Indonesian language learning as the teaching materials of writing scientific article in universities. It means that the most used teaching materials in the learning of writing scientific article is textbook. Generally, there are two types of textbooks which are textbook that is officially published by Ministry of Education and Culture of Republic of Indonesia and textbook that is published by book publisher. The textbook used in learning process include 1) a textbook

entitled “Bahasa Indonesia untuk Perguruan Tinggi” print of the year 2016 published by Direktorat Jenderal Pembelajaran dan Kemahasiswaan Kemenristekdikti, 2) textbook entitled “Tata Bahasa Baku Bahasa Indonesia Edisi Keempat” print of the year 2017 published by Badan Pengembangan dan Pembinaan Bahasa Kementerian Pendidikan dan Kebudayaan, and 3) textbook entitled “Bahasa Indonesia Akademik : Mata Kuliah Pengembangan Kepribadian” print of the year 2010 published by Pustaka Mandiri. Moreover, the textbook officially published by Ministry of Education and Culture of Republic of Indonesia is more widely used by students in university.

However, 3% of students use the handouts as the teaching materials of writing scientific article in universities. Handouts is a collection of teaching materials that contains summary of relevant materials to support learning. Handout is limited used by students than other types of teaching materials. Most of students have never used handouts in learning process of writing scientific articles. It means that handouts are not familiar for students in the learning process of writing scientific articles. Comparing to other types of teaching materials, handouts have specific characteristics. Handouts only contains summary of essential topics or materials, so that it is less complete than other types of teaching materials.

Second, the analytical methods are used in the learning process of writing scientific article, but it still limited integrated in teaching materials of writing scientific article. The learning process of writing scientific article have utilized certain analytical methods, such as bibliometric analysis and systematic literature review. According to the results, 23% students stated there learning process of writing scientific articles that utilize bibliometric analysis methods, while 77% students found the learning process of writing scientific articles in their university have not utilized bibliometric analysis methods. In addition, 60% students stated that the learning process for writing scientific articles in their university have utilized systematic literature review, while 40% students found that there is no learning process for writing scientific articles that utilize systematic literature review.

It means that analytical methods such as bibliometric analysis and systematic literature review are introduced by lecture for undergraduate students when they learn about writing scientific article, but unfortunately it is not served systematically in teaching materials form. In addition, systematic literature review more familiar for undergraduate students than bibliometric analysis. it can be seen that bibliometric analysis have not learned by most of students than systematic literature review. These results give an opportunity that teaching material should be integrated to bibliometric analysis-assisted teaching materials for supporting scientific article writing.

Third, teaching materials of writing scientific article are available in digital form. The digital era has had an impact on the implementation of learning in universities. The use of electronic products in learning includes the use of electronic-based teaching materials, electronic-based learning media, electronic classes, and so on. Based on the results, the use of electronic-based learning is shown in the use of electronic-based teaching materials. The data showed that 95% of 60 students or 57 students, had used electronic-based teaching materials in Indonesian language learning. The others that are 5% of students have not used electronic-based teaching materials.

Moreover, the variety of electronic-based teaching materials used is also quite diverse. The data showed that 53% of 60 students or 32 students, used the electronic textbook as a form of teaching material in Indonesian language learning at universities. In addition, other students use different forms of electronic teaching materials. 15% of students use electronic modules, 8%

of students use electronic electronic worksheets, 6% of students use handouts and 16% of students use other electronic teaching materials, such as material presented using PowerPoint. This means that electronic teaching materials used in Indonesian language learning consist of electronic textbooks, electronic modules, electronic handouts, electronic worksheets, and material presented using PowerPoint.

The need of teaching materials for writing scientific articles

Writing scientific articles is a topic in writing skills that should be mastered by students in university. However, writing scientific articles is complex and challenging for students. According to the results, 95% of 60 students need a specific teaching materials for writing scientific article, while 5% students stated they do not need a specific teaching material. It means that for students teaching materials can help students in writing scientific articles. There are some of reasons why students need specific teaching materials for writing scientific article, as follows.

I need teaching materials to make it easier for me to understand writing scientific articles (A)
Writing scientific articles is so complex, such as find the topic, find the reference, arrange the structure, and so on, so I think teaching materials can help us (M)
I need a correct model of scientific articles through teaching materials (B)
The teaching materials can guide us in writing scientific articles (H)
Mastery the topic of writing scientific articles can support our final assignment in undergraduate study, so I think it's important for having teaching materials (C)
I need this knowledge to have a career in the future, one of which is to publish articles, so having teaching materials is a must (J)

According to the interview transcript above, students need teaching materials of writing scientific article to support them in learning process. There are five benefits categories of teaching materials for students such as 1) describing systematically about writing scientific article, 2) supporting understanding of writing scientific article, 3) giving a correct model or example of scientific article, 4) giving steps in writing scientific article, and 5) as a guide to support future academic work. It means that based on students' perspective, teaching materials are essential to help them in learning writing scientific articles.

The reason of students need teaching materials also cannot be separated from students' perspective that writing scientific articles have some of challenges and difficulties. Most of students find difficulties in writing scientific article so they need specific teaching materials. Some of difficulties of students as follows.

I don't understand the steps that need to be taken in writing a scientific article (A)
I have a problem in finding the reference (M)
I think the limited knowledge and research skill have a big impact in difficulty of writing scientific article (B)
Getting the idea and determining the title is the most difficult part for me to start writing scientific article (H)
I have difficulty writing according to correct language rules (C)
Writing according to the structure of scientific writing is so complex for me (J)

Based on the interview transcript above, most of students think that writing scientific article is difficult. The difficulties are categorized in five aspects such as 1) limited

understanding of how to write scientific article, 2) confusing how to start write an article, 3) less understanding about structure of scientific article, 4) difficult to find the references, and 5) limited knowledge to utilize spesicif methods for writing scientific articles. That difficulties should be anticipate by students in learning process. Teaching materials can facilitate students in facing the challenges of writing scientific materials. Through systematic teaching materials, students have a guide and models of writing scientific articles.

Moreover, the detail of students' perception of difficulties of writing scientific articles presented in percentage describe in Figure 2 and Figure 3.

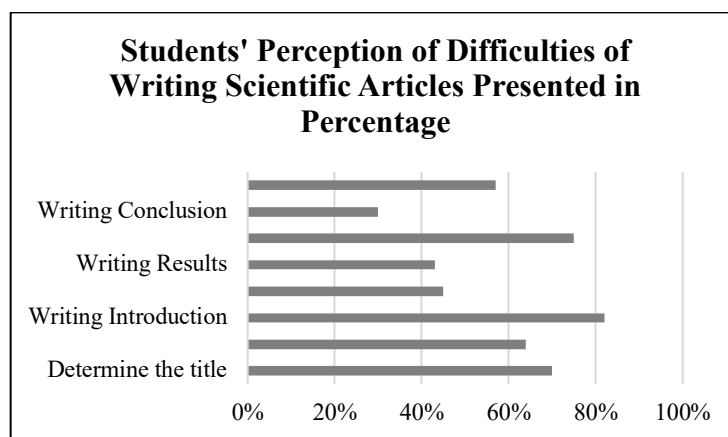


Figure 2. Students' perception of difficulties of writing scientific articles presented in percentage

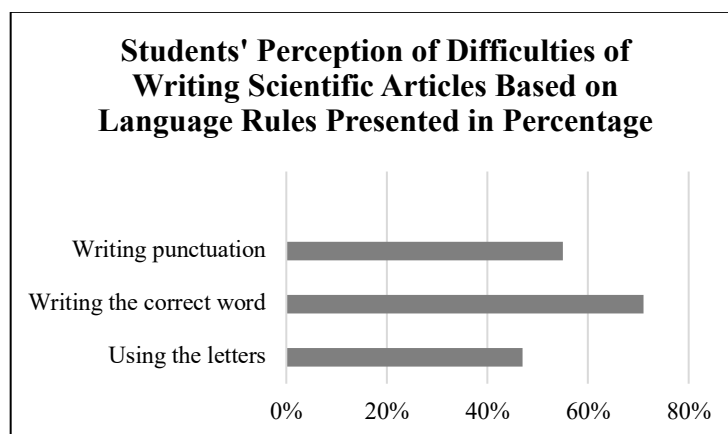


Figure 3. Students' perception of difficulties of writing scientific articles based on language rules presented in percentage

According to Figure 2, 82% of students have a perception that writing introduction is the most difficult parts. In introduction parts, students need to describe the research background, gap research, and novelty. They find difficulties how to start write an introduction. Students tend to write a literature review in introduction and focus on describe only about the theory of research variables than describe more about the research background, gap research, and novelty. In the other hand, students also find difficulties in language rules. According to Figure 3, 71% of students are difficult writing the correct word in scientific article writing. Most of students are not focus on how to write based on language rules. They need to give attention not only for the contents of scientific article, but also for language rules. In Indonesian language context, they

can refer to Ejaan yang Disempurnakan (EYD) or a guidance for students to write in Indonesian language.

Next, in technology era, electronic-based teaching materials are need to support students in learning process. According to the results, 95% of 60 students need electronic-based teaching materials for writing scientific article, while 5% students stated they do not need electronic-based teaching material. According to the interviews, there are some of reasons why students need electronic-based teaching materials for writing scientific article, as follows.

Electronic-based teaching materials are affordable and easy to use (A)

Electronic -based teaching materials are suitable for our generation as a Gen Z (M)

Sometimes, I am difficult to find the printed materials about writing scientific articles, so I think electronic-based teaching materials can help us to read in every time and everywhere (B)

Electronic-based teaching materials can be used through our gadget such as handphone or ipad (H)

I need electronic-based teaching materials not only for learning writing scientific article, but also for support my final assignments in undergraduate program (C)

I need an effective and flexible teaching materials (J)

According to the interviews, electronics-based teaching materials can help students in the learning process of writing scientific article. There are four benefits from electronics-based teaching materials, such as 1) easy to access, 2) suitable for students in digital era, 3) effective and efficient, and 4) low cost. It means that students tend to choose electronics-based teaching materials than printed teaching materials.

Moreover, the variety of electronic-based teaching materials needed by students describe in Figure 4, as follows.

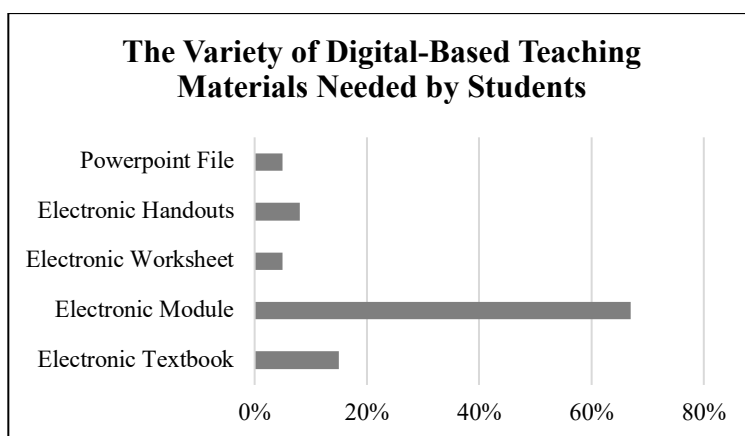


Figure 4. The variety of digital-based teaching materials needed by students

Modules are one form of teaching materials that can be used in learning writing scientific article in universities. Modules can facilitate students to study independently. In addition, modules also facilitate students to acquire comprehensive knowledge. Based on the results of the study, 67% of 60 students need electronic modules as teaching materials in writing scientific article. Based on the results, the reasons why students need electronic modules in writing scientific article as follows.

Electronic modules can clarify the presentation of material (A)

Electronic modules can increase student knowledge (M)

Electronic modules are easy to relearn on an ongoing basis (B)

Electronic modules as a reference for learning writing scientific article (H)

Electronic modules can overcome space and time limitations in learning to write scientific articles (C)

Electronic modules can improve the effectiveness and efficiency of learning (J)

Based on the interviews, they thought that e-modules could clarify the presentation of the material. In presenting material, e-modules become a learning tool in presenting material in detail and specifically. Moreover, e-modules support students' level of knowledge in discussing a topic or problem. Then, the e-module used can be a learning tool, especially writing scientific articles. e-modules can be studied anytime and anywhere so that learning more effective and efficient.

The design of electronic modules needed in writing scientific article include:

Electronic modules have coverage of all teaching materials (A)

I need an electronic module that includes material and steps for writing good and correct scientific articles (M)

A module that contains how to structure a scientific article, starting from the abstract to the end and explaining what elements must be included in the structure (B)

Electronic modules design and contents are interesting to students (H)

Electronic modules that are simple but complete in content so that they are easy to use (C)

Electronic modules contain audio and visual elements, so it can be more interesting (J)

Based on interviews conducted with students, it was stated that all the material contained in the e-module was covered. The teaching materials needed by students can include material and steps for writing scientific articles. Then, clarify the structure of scientific articles that must be included in compiling scientific articles. Other aspects, such as the attractive design and content of the module and containing audio-visual elements, add to the attractiveness of the e-module for students to study.

In addition, the design of electronic modules needed by students describe in Figure 5, as follows.

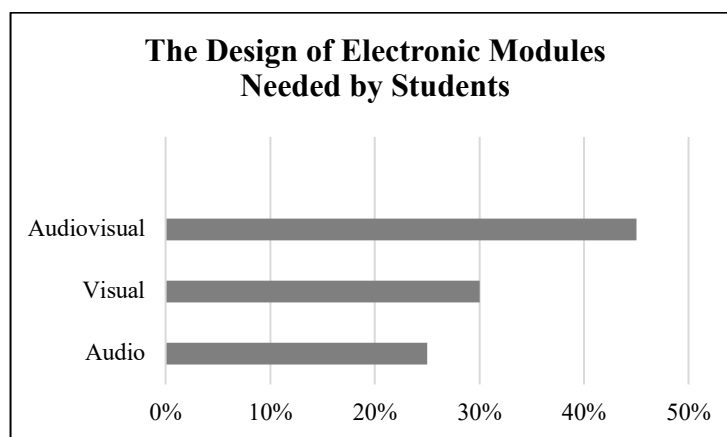


Figure 5. The design of electronic modules needed by students

Figure 5 shows that 45% of students choose audiovisual mode of electronic modules. Audiovisual design can facilitate undergraduate students with different learning styles. Students

in a classroom have various learning styles and they need teaching materials that suitable with them. Audiovisual design in electronic modules contain some of contents such as interactive video. It can help students in understanding of writing scientific articles.

In the other hand, Bibliometric analysis nowadays is useful in writing scientific articles. Based on the results of the study, 90% of 60 students, or 54 students, need bibliometric analysis in writing scientific article, while 3% of students choose that they do not need bibliometric analysis in writing scientific article. Based on the results, the reasons why students need bibliometric analysis in writing scientific article as follows.

Easy to find the reference using bibliometric analysis (A)

Bibliometric analysis can help me to find the research trends, so it can give opportunities for determining the idea and topic (M)

I can use the bibliometric analysis for analysing the previous published articles (B)

For me bibliometric analysis is a new thing, but I am interested in learning writing scientific article with bibliometric-assisted (H)

Bibliometric analysis will be helpful in writing scientific article (C)

I hope this analysis method give some benefit in writing scientific article (J)

According the the interview transcript above, bibliometric analysis is a new thing for some of undergraduate students, but it is a familiar thing for others. The reason of need of bibliometric analysis can summarize in three aspects, such as 1) bibliometric analysis as a tool to help students finding reference, 2) bibliometric analysis can show the research trends to stimulate ideas in writing scientific article, and 3) bibliometric can obtain an overview about research gap through analyze the previous research. Based on this result, bibliometric can be an analytical method that can be integrated in teaching materials, especially for writing scientific articles for undergraduate students in university.

Discussion

The components of teaching and learning have an impact for the successful of learning process. Based on the results, teaching materials of writing scientific article are available for learning process in university. The teaching materials of writing scientific article are integrated in teaching materials of compulsory curriculum subjects of Indonesian language learning. It means that universities have facilitated the availability of teaching materials, especially for writing scientific article. However, the analytical method such as bibliometric analysis is still limited integrated in teaching materials of writing scientific article.

In addition, the varieties of teaching materials are found to be quite diverse in universities. The variety of teaching materials that have been used by students in Indonesian language learning consists of modules, textbooks, student worksheets, handouts, and power point file. In line with (Mudau, 2022), the varieties of teaching materials in learning process can be products used such as digital, non-digital, or some can be in the form of modules, textbooks, teaching materials, or in the form of textbooks taught to students. The form of teaching materials can support the quality of learning. The choice of form of teaching material needs to be considered carefully so that its use is appropriate for achieving learning objectives.

Moreover, electronic-based teaching materials are needed to improve student skill, especially in mastering writing scientific article. Using appropriate teaching materials can provide opportunities for students to think critically, innovatively and creatively (Kadek & Wijayanti, 2022). Based on research results, 95% of students have used electronic-based

teaching materials for writing scientific article. The digital era is often associated with education in the 21st century (Yusi Kamhar & Lestari, 2019; Masbara, 2024). Electronic-based teaching materials have positive contributions, including saving printing costs and having easy access. Electronic-based teaching materials are easy for students to learn (Zisca Diana & Wirawati, 2021). Electronic-based teaching materials can support language skills learning (Johan et al., 2022). There is a diversity of types of teaching materials chosen by students, including teaching materials in two modes, namely print and digital, digital teaching materials and printed teaching materials. Research results from Lazuardi et al (2021) showed that students need teaching materials that have complete content. Teaching materials require consideration, especially regarding the aspects of difficulty and depth of material (Suhardi, 2019).

Electronic module was chosen by students as the most needed teaching material in writing scientific article. In line with reseracrch from (Juniarti et al., 2021), The data showed 87.1% of students needed technology-based teaching materials. Modules are useful in helping students' language skills (Putu & Damayanthi, 2021). Module is a practical teaching material for undergraduate students. Practical teaching materials can make it easier for students to learn (Wati, 2017). In addition, bibliometric analysis has some benefits for students in writing scientific article. Bibliometrics is the study of the relationship between numbers and patterns in bibliographic data and their use, for example the number of papers, literature growth, and patterns of library and database use (Chellappandi & Vijayakumar, 2018). Therefore, electronic module of writing scientific article with bibliometric analysis-assisted can be a suitable teaching material for undergraduate students in university. The implication of this research for learning process especially writing scientific article is these results can be a initial data to develop better teaching materials. For the future research, these results can be a reference for developing electronic modules of writing scientific article with bibliometric analysis-assisted in university.

Conclusion

Teaching materials are a collection of materials used to support learning outcomes. The results of this research showed that generally teaching materials for writing scientific article are available in universities. However, the analytical method such as bibliometric analysis is still limited integrated in teaching materials of writing scientific article. In addition, the variety of teaching material needed by students are quite diverse consisted of electronics modules, electronic textbooks, electronic student worksheets, electronic handouts, and material presented using PowerPoint. Electronic module with bibliometric analysis-assisted was chosen by students as the most needed teaching material in writing scientific article. For the future research, these results can be a reference for developing electronic modules of writing scientific article with bibliometric analysis-assisted in university.

Declaration of conflicting interest

The authors declare that there is no conflict of interest in this work.

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