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A Genre Analysis of Science and Technology Scopus-Indexed Journal Articles: Does Impact Factor Project Different Rhetorical Moves?

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ABSTRACT

Productivity in conducting research and publishing articles is the obligation of lecturers as academics. However, due to their failure to follow international writing conventions, they have difficulties in writing for international publications. Various studies have investigated the rhetorical move of research articles; however, much still needs to be investigated on the rhetorical move of the research articles written by highly reputable lecturers by comparing their publications in low-impact versus high-impact Scopus-indexed journals. This study aims to analyse the rhetorical structures of research articles in low and high-impact articles written by highly reputable lecturers in one of the universities in West Java in science and technology. Eight research articles were analysed through the framework of the move proposed by Maswana et al. in 2015. The results showed similarities and differences between the two groups. Stating a purpose, methods, and results in the abstract section was obligatory. In the method section, recounting an experimental process was always present in both groups. Interestingly, the difference was shown in stating the research implications in the conclusion part, where high-impact frequently used the move more than low-impact articles. The results show that the impact factor partly projects rhetorical moves in the research articles. This study is expected to be a useful reference for Indonesian lecturers to develop their awareness of writing an impactful research article.

Keywords: *Low-Impact; High-Impact; Rhetorical Structure; Research Article.*

INTRODUCTION

One of the most important aspects of academic life is academic writing. Lecturers as academics and educational institutions, need to develop and disseminate knowledge in education, research, and community service or dedication following the *Tri Dharma* of Higher Education by publishing scientific journals (Sutoro, 2021). Retnaningdyastuti (2015) states that as academics, lecturers have a task of transferring knowledge to students so they can develop their abilities. Not only that, a lecturer has the task of being able to elaborate on science or technology through scientific research to be disseminated to the wider community so that it can be useful in the development of science or technology for the future. Productivity in conducting research and publishing articles is the obligation of lecturers as academics. Since the issuance of Permenristekdikti Number

20 in 2017, scientific publications have been required to increase the quantity and quality of scientific publications at the national and international levels. This increase is intended so that Indonesia can compete with other countries (Retnowati, Mardapi, & Kartowagiran, 2018). In addition, in the Regulation of the Minister of Administrative Reform and Bureaucratic Reform Number 17 of 2013 concerning Functional Positions of Lecturers and Their Credit Scores, scientific publications must be done by lecturers to obtain the academic position of Expert Assistant or promotion from Expert Assistant to Lector.

Coleman (2014) states that the organizational structure of research articles, in general, includes a title, abstract, introduction, literature review, research method, findings and discussions, conclusion, and references. However, the organizational structure in each research article subsection may have similarities and variations that can be influenced by the demands and targets of the journal. An internationally accepted abstract consists of background, research objectives, research methods, general findings, and conclusions (Hyland, 2000). An internationally accepted introduction provides background information about particular research topics and problems that will be examined more deeply to establish a research context, the findings, and the gaps of the previous research, as well as research objectives and problem formulation (Swales, 2004). In addition, research methods include steps or procedures for carrying out research and justifications for each decision taken (Bazerman, 1988; Gladon, Graves, & Kelly, 2011). Then, the findings and discussion sub-section includes information regarding the presentation of research findings, interpretation of research findings, comparisons between the present research with related findings in previous research or literature, and justifications for discussing research findings (Suherdi, Kurniawan, & Lubis, 2020; Ruiying & Allison, 2003). Lastly, conclusions state the entire research findings, an evaluation of the research from its benefits and limitations, and recommendations for future research (Moreno & Swales, 2018; Ruiying & Allison, 2003).

To fully understand the generic structure of research articles, one needs to understand genre awareness, as it is essential in comprehending the general structure of research publications. "A critical understanding of both rhetorical objectives and ideological repercussions of generic forms" is how Devitt (2004) defines genre awareness (p. 192). This is in accordance with the opinion of Fazilatfar and Naseri (2014), where awareness of the variations in discourse patterns in an article text can determine success in publishing articles in international journals. Appropriate and acceptable use of English is also the second factor in determining the success or failure of a writer to publish their articles in a reputable journal. In recent years, it has become undeniable that English is the preferred language for international scientific communication (Ferguson, Pérez-Llantada, & Plo, 2011). Because of this, the research papers' English quality and standards are essential for the efficient global dissemination of academic information through international journals (Suherdi et al., 2020). This makes publishing articles in reputable journals a challenge and a daunting experience for native and non-native speakers (Canagarajah, 1996; Flowerdew, 2001). Although there are already many

international academic writing guidelines in the form of guidebooks (e.g., Wallwork, 2016) or training books (Swales & Feak, 2000; Wallwork, 2013), these difficulties are still a major concern for researchers who will publish their articles in reputable journals.

Due to the fact that having those obstacles to be overcome, a textual approach through analysis of discourse patterns can be one of the solutions in analyzing the organizational structure of information that can be accepted in reputable journals. Discourse pattern analysis was originally popularized by Swales (1981) under the concept of genre analysis in the journal article introduction, and this work was continued in the abstract section in 1990. His initiative led to the emergence of other researchers who were involved in the realm of genre analysis through discourse pattern analysis. Swales (1990) defined rhetorical organization as a group of communicative functions (moves) and their sub-communicative functions or stages that convey information effectively. Move analysis can be defined as a textual analysis of the communicative goals and their constituent steps to comprehend how the discourse pattern is manifested in the writing that is being investigated. (Zamani & Ebadi, 2016).

Several previous studies have investigated the rhetorical organization of abstract discourse patterns (Amnuai, 2019; Doró, 2013; Fauzan, Lubis, & Kurniawan, 2020; Kaya & Yağız, 2020; Kurniawan, Lubis, Suherdi, & Danuwijaya, 2019); introductions (Hirano, 2009; Kanoksilapatham, 2007; Lu, Yoon, & Kisselev, 2021; Luthfianda, Kurniawan, & Gunawan, 2021); literature review (Rabie & Boraie, 2021); method (Bruce, 2008; Cotos, Huffman, & Link, 2017; Musa, Khamis, & Zanariah, 2015); findings and discussion (Lubis, 2019; Ruiying & Allison, 2003; Suherdi et al., 2020); conclusion (Alkamillah, Azwandi, & Maisarah, 2022; Zamani & Ebadi, 2016). There are also several studies that have thoroughly investigated all parts of the research articles, such as Kanoksilapatham (2005), who examined 60 biochemistry research articles. In addition, Maswana, Kanamaru, and Tajino (2015) analyzed discourse patterns from 67 research articles across five engineering fields. The results show several conventional moves across the five engineering fields in the abstract, introduction, and conclusion sections. Also, Ye (2019) has investigated the most cited energy engineering research articles written by Chinese expert writers.

Based on the background research, to the best of the researcher's knowledge, much still needs to be investigated on the rhetorical move of the research articles written by highly reputable lecturers by comparing their publications in low-impact versus high-impact Scopus-indexed journals in science and technology. The word ‘journal’ is often associated with the reputation of a scientific publication. In short, the reputation of a scientific journal is the result of calculating the journal's metrics, which is one of the aspects representing its contribution. Thus, the reputation of a scientific journal can be seen from its indexation status (Erfanmanesh, Tahira, & Abrizah, 2017). Scopus Elsevier B.V. and Web of Science Clarivate Analytics are examples of the two largest journal indexing institutions in the world. If a particular journal is indexed in one or both of these institutions, then the journal has a good reputation in scientific publications. To find out the impact of a journal, the number of citations can be considered a measure of the impact of research articles because it is the simplest and easiest (Li & Yin, 2022).

Therefore, this present study sought to investigate the moves of low and high-impact articles by two lecturers from one of the universities in West Java, especially in the field of science and technology, specifically in the fields of chemistry and electrical engineering. There is one research question addressed in this present research as follows:

1. How are the similarities and differences of rhetorical moves in the English science and technology research articles in low and high-impact journals?

METHOD

Research Design

This present study employed a descriptive comparative qualitative to identify and code the rhetorical structure of the analyzed articles. This is in line with the aim of this study which compared the discourse patterns of the English RAs between low-impact and high-impact Scopus-indexed journals on science and technology, specifically in the fields of chemistry and electrical engineering.

Participants

This study involved two lecturers from a state university in Indonesia with doctorates in their respective subdisciplines who have a high reputation from a reputable indexing institution. The two lecturers became participants in this research as they meet the following criteria: 1) have the highest Scopus h-index in their affiliation in the fields of science and technology, and 2) are still active as lecturers at the university. The chemistry lecturer involved is a scientist in the field of particle technology with an H-index of 33 in Scopus. Until now, he has won more than 33 national and international awards. One of his achievements is as The Most Inspiring Researcher 2022 in Unikomers Awards 2022. In addition, he is also included in the list of the 2% most influential scientists in the world. Meanwhile, the electrical engineering lecturer involved is also the winner of the Top 24 best researchers in Indonesia in the SINTA database version and the Top 10 best Indonesian researchers in the Scopus database version from the Ministry of Research and Technology with an H-index of 13 in Scopus.

Corpus

The corpus of this study consisted of eight English RAs from science and technology published in 2012-2020. From each lecturer, four articles were selected to be analyzed. The four articles were then categorized into two groups: two articles with low citations and two other articles with high citations. The detailed research articles are shown in Table 1.

Table 1 Publication year, subdisciplines, number of citations

Research article no.	Publication year	Subdisciplines	Number of citation (Google Scholar)
1	2013	Chemistry	87
2	2012	Chemistry	76

3	2012	Chemistry	7
4	2017	Chemistry	7
5	2014	Electrical engineering	21
6	2018	Electrical engineering	17
7	2019	Electrical engineering	5
8	2020	Electrical engineering	2

The researcher chose eight articles from reputable journals which are indexed in Scopus.

The selected articles were written by the participants who were the first author of the articles. The journals included in the dataset are as follows: *Chemical Engineering Science* (Q1), *Langmuir* (Q1), *Journal of Engineering Science and Technology* (Q3), *Journal of Nanoparticle Research* (Q2*), WSEAS Transactions on Power Systems* (Q2), *and TELKOMNIKA (Telecommunication Computing Electronics and Control)* (Q3).

Instrument and Data Analysis Procedure

The instrument used in this present study was a framework of move analysis proposed by Maswana et al. (2015) model. It was used to analyze the micro-structure (moves) of each part of the articles that have been done. In analyzing the article, the researcher first chose Maswana et al. (2015) model as a basic reference in the initial analysis process. Then, the researcher coded a text using the model earlier. After one text was analyzed, it was found that the results of the code also appeared in Maswana et al. (2015) model. Therefore, based on the results of this initial analysis, the researcher decided to use Maswana et al. (2015) model because it has a high degree of compatibility. More details regarding the moves and steps can be seen in the appendix.

Throughout this research's data analysis process, three steps were taken in the procedure. Before the data analysis was carried out, a consent form was given to the two lecturers to ask their permission to analyze their articles. The first procedure of the analysis was broke down all sections of the whole article into their communicative purposes (see Table 2). The second one was highlighted and labelled phrases or sentences according to the framework. Then, the data that had been analyzed manually was transferred to Excel so that it was easy to be re-checked. Lastly, the findings were compared to see if there were similarities and differences between high and low-impact journals. Table 2 shows the sample analysis process and its results.

Table 2. A sample of the analysis process in labelling and classifying the communicative functions.

RA No. 7	**Label (Step-based)**	**Classification (Move-based)**
Street-lighting system is designed to give	Background of	Move a (Step 1)

comfort to users by considering the energy efficiency aspect and suitability with the lighting standard.	research	
The experiment was done by analyzing two types of lamps used for the street lighting system: i.e., high-power Light-Emitting Diode (LED) and High-Pressure Sodium (HPS). To analyse the intensity and the energy used, a numerical simulation was conducted using **DIALux software.**	Methods	Move a (Step 3)
The street lighting system is one of the most important facilities in cities. This system can increase the safety of road traffic participants and give pedestrians' sense of security on the other. Public street lighting can also reduce crimes at night [1-3]. Specifically, in the busy areas, many people are walking around all night long, or moving from one place to the workplace, home, shopping tour, malls, restaurants, and cinemas (or the other way around).	Reference to establish knowledge in the field	Move 1 (Step 1)
Based on our previous studies in the development of a system for analyzing the lighting for many purposes [23, 26-31], **the purpose of this report** is to analyze the optimal illuminance level based on standardized lighting.	Reference to research purpose	Move 3 (Step 1)
The study started with a survey on the existing condition of roads whose lighting system would be evaluated.	Indicating data collection procedure	Move 4 (Step 4)
The study was conducted in one of the most populous and the busiest roads in Bandung, West Java, Indonesia (6.91°S, 107.60°E; shown in Fig. 1(a).	Indicating source of data	Move 4 (Step 1)
Figures 2 and 3 are the illumination distributions in Schemes 1 and 2, respectively. Visualization of the 3-D surface showed the real condition of street- lighting of	Stating specific findings	Move 7 (Step 4)

the evaluated site. The lighting distribution was displayed in different colours. The colour index explained the difference in illumination. Those nine colour indexes ranged from 0 to 26 l×. In scheme 1, the illumination average was obtained from 304 spots and in scheme 2 the average was obtained from 288 spots.		
Based on the simulation results of both schemes, **all recommendations could be implemented** in the study area since they met the SNI standard. Both schemes had almost equal uniformity level, yet the illumination was better when using LED. It is also shown that the boom angle, which is defined as the light falling spot, is zero.	Interpreting results	Move 8 (Step 1)
Redesigning street-lighting system has been conducted in this study by evaluating the illumination method. One of the roads in Bandung, West Java, Indonesia is selected as the research site. **The findings show that** the existing condition of the street-lighting remarkably exceeds the lighting standard in Indonesia, illumination is 8 times and uniformity is 3 times; thus, it results in energy waste.	Stating the main results and significance	Move 9 (Step 1)
According to the simulation results using DIALux software**, it is recommended that the existing lamps can be replaced** with either LED or HPS technology to get saver energy.	Stating a specific outcome	Move B (step 1)

Inter-Coder Reliability

The study's findings were validated using an inter-coder. The coders were two lecturers with specializations in linguistics and move analysis. The inter-coding procedure was conducted while re-examining moves. The same coder who was involved in defining the rhetorical moves and steps individually coded the rhetorical strategies of a particular research article. It was decided to choose the same coder throughout the analysis process in order to get a consistent agreement between the rater and the

researcher. Then, a discussion with the coder was conducted to determine which move and/or step labels should be used and delivered.

FINDINGS AND DISCUSSION

Each group (low and high-impact articles) which consists of two Chemistry RAs and two Electrical Engineering RAs were analyzed using Maswana et al. (2015) model. The analysis results show the manifestation of rhetorical moves in low and high-impact articles. The term 'salience' is the interpretation of the percentage of RAs featuring the moves and steps. The salience of moves and steps from the abstract section to the discussion (conclusion) section of the 8 RAs will be shown and described in its sub-section.

Abstract

Table 3. The salience of moves and steps in the abstract section

Move/Step	**Low Impact Articles (N=4)**		**High Impact Articles (N=4)**	
Move a: Abstract	***Featuring***	***Percentage***	***Featuring***	***Percentage***
a1 Background of research	2	50%	2	50%
a2 Purpose	4	100%	4	100%
a3 Methods	4	100%	4	100%
a4 Results	4	100%	4	100%
a5 Conclusion	3	75%	2	50%

As shown in Table 3, there were slight differences in the steps of Move a in the abstract in low and high-impact research articles. Both low and high-impact articles contained Move a, Step 2 (purpose), Move a, Step 3 (method), and Move a, Step 4 (result), which means that the moves and the steps are obligatory to be manifested in each research article. Additionally, Move a, Step 1 was realized in half of the total number of low-impact and high-impact articles, respectively, demonstrating that this move and step was the author's least-used move; it is considered optional. Authors may sometimes exclude the background or evaluation due to the abstract section's length restriction. As a result, they have more opportunities to discuss the methodology and main findings, which are the two most essential parts of an abstract (Fang, 2021). Furthermore, the difference lies in Move a, Step 5, which infrequently manifested in the high-impact but frequently in the low-impact one.

Based on how the step pattern was manifested in the abstract section, P-M-R was the most prevalent pattern. This is consistent with Hyland's findings (2000), where he

states that "P-M-Pr" is the most prevalent. In spite of having a different label in the 'result,' it still accomplishes the same thing.

Example

Move a, Step 2: Doughnut magnesium fluoride particles with controllable size (from 6 to 50 nm) and shape (sphere and cube) were successfully prepared using an electron-beam irradiation method. **Move a, Step 3:** While common reports typically produced doughnut particles in the micrometer range, the present method succeeded in preparing this type of particles with sizes of nanometers. Different from other methods that pointed out the importance of the additional additive and specific process to support the formation of doughnut structure, we preferred exploiting the electron beam irradiation method that was simpler and free of additive. Transformation of the particle from its original morphology (dense structure) into doughnut shape were also investigated, along with the analysis of irradiation time and elemental composition. **Move a, Step 4:** Outer sizes and shapes of the final particles were identical to those of the initial particles (before irradiation process), giving a potential way for controlling the size and the shape of the doughnut particles by adjusting the size and the shape of the initial magnesium fluoride particles only. [RA 3, Chemistry]

The example above shows Move a, Step 2 (purpose), Move a, Step 3 (method), and Move a, Step 4 (result). From the example, a unique way of explaining the purpose of the research was found. It may be difficult to determine whether the Move a, Step 2 above is a purpose or a result. This phenomenon is consistent with a previous study (Doró, 2013), which asserts that it is unusual and can be misleading for the purpose of an abstract, which is supposed to offer the reader a clear understanding of the project and its results.

Introduction

Table 4. The salience of moves and steps in the introduction section

Move/Step	**Low Impact Articles (N=4)**		**High Impact Articles (N=4)**	
Move 1:Presenting background information	***Featuring***	***Percentage***	***Featuring***	***Percentage***
11 Reference to established knowledge in the field	4	100%	4	100%
12 Reference to main research problems	2	50%	2	50%

Move 2: Reviewing related research	***Featuring***	***Percentage***	***Featuring***	***Percentage***
21 Reference to previous research	4	100%	4	100%
22 Reference to limitations of previous research	3	75%	3	75%
Move 3: Presenting new research conducted by the author(s)	***Featuring***	***Percentage***	***Featuring***	***Percentage***
31 Reference to research purpose	4	100%	4	100%
32 Reference to main research procedure and outcome	4	100%	3	75%

The table above shows the moves and steps used in the introduction of the research articles. From the findings, it could be seen that there were also slight differences between the moves and steps used by the authors in low and high-impact research articles. Based on the similarities between the two groups, Move 1, Step 1 (reference to establish knowledge in the field), Move 2, Step 1 (reference to previous research), and Move 3, Step 1 (reference to research purpose) were used the most frequently in both low and high-impact research articles which can be concluded that those are obligatory. This is in line with the function of the introduction, which is to contextualize a research study in the pertinent literature, claim its novelty, and outline the study's key aspects (Swales, 1990). The following instances present the moves and the steps.

Example

Move 1, Step 1: Recently, tungsten trioxide (WO3) has been widely studied because it has an affinity for visible light, and is chemically inert, thermallystable, and harmless (Liu et al., 2012; Saepurahman et al., 2010; Sun et al., 2010). These excellent properties make this material useful for solar-related applications such as photocatalysts, solar cells, water splitting, and hydrogen generation. **Move 2, Step 1:** Design of materials with porous structures has been much studied to solve this difficulty. An increase in the porous structural order improves the material performance and also reduces the amounts

of raw materials used. **Move 3, Step 1:** Based on our previous work, the purpose of this study was to develop a method for the rapid synthesis of spherical macroporous WO3 particles with controllable porous structure and particle diameter (from 0.3 to 2 μm) and to examine the correlations between the porous structure and the photocatalytic performance over non-porous WO3 particles. [RA 1, chemistry.

Moreover, half of the total number of the RAs in the two groups used Move 1, Step 2 to mention the main research problems where it can be interpreted that Move 1, Step 2 is optional. The same case also happened in Moves 2, Step 2 (reference to limitations of previous research), where the moves and steps were almost frequently used in each group and are identified as conventional. Looking at how the authors manifested Move 2, it was found that the cyclical patterning of this move is quite common in some introductions. This is in line with Kanoksilapatham's (2005) findings, which imply that the presented study is intricate and considers numerous gaps in prior research.

Example

Move 2, Step 1: Baeck et al. (2003), Teoh et al. (2005), and Li et al. (2010) used surfactants as templates, and materials with mesoporous structures were successfully prepared. **Move 2, Step 2:** However, the surfactant sometimes cannot be removed completely (Huang et al., 2012), which may produce impurities and adversely affect the material performance. **Move 2, Step 1:** Instead of surfactants, Singh et al. (2008) and Chen et al. (2011a) proposed the use of gas bubbles to form pores. **Move 2, Step 2:** Although such methods are effective, the synthetic procedures are complicated and require the use of electrochemical devices, limiting scaling-up of production. [RA 1, chemistry].

In addition, Move 3 (presenting new research conducted by the author(s)) was also almost frequently used in both groups, and it typically concludes the introduction section (Kanoksilapatham, 2012). This move is not cyclical in congruence with Swales's (1990; 2004) models. Move 3, Step 1 was present in each research article and obligatory in both groups; meanwhile, Move 3, Step 2 in the high-impact article was less performed than in the low-impact one, but overall, Move 3 was the most frequently used among Move 1 and Move 2.

Example

Move 3, Step 1: Based on our previous work, **the purpose of this study** was to develop a method for the rapid synthesis of spherical macroporous WO3 particles with controllable porous structure and particle diameter (from 0.3 to 2 μm) and to examine the correlations between the porous structure and the photocatalytic performance over non-porous WO3 particles. [RA 1, chemistry]. **Move 3, Step 1:** To fill in such a gap, **this study investigates** all hydrothermal power plants on interconnectedsystems located in Java-Madura-Bali utilizing a hybrid of artificial neural network and lambda iteration deterministic. [RA 8, electrical engineering].

The instances above show how the authors manifested Move 3, Step 1 (reference to research purpose). The findings showed that the author mostly stated the purpose of

the study explicitly by using the phrase "the purpose of this study." Meanwhile, the other author performed its communicative function in RA 8 in a different way by using the word 'investigates.' This is in accordance with the findings of Kanoksilapatham (2012), where there are several possible ways of stating purposive statements.

Method

Table 5. *The salience of moves and steps in the method section*

Move/Step	**Low Impact Articles (N=4)**		**High Impact Articles (N=4)**	
Move 4: Identifying source of data and method adopted in collecting them	***Featuring***	***Percentage***	***Featuring***	***Percentage***
41 Indicating source of data.	2	50%	1	25%
42 Indicating data size.	0	0%	1	25%
43 Indicating criteria for data collection.	0	0%	0	0%
44 Indicating data collection procedure.	1	25%	2	50%
45 Providing background details about the study is going to analyze	2	50%	1	25%
Move 5: Describing experimental procedures	***Featuring***	***Percentage***	***Featuring***	***Percentage***
51 Identifying main research apparatus	2	50%	3	75%
52 Recounting experimental process.	4	100%	4	100%
53 Indicating criteria for success	2	50%	1	25%

Move 6: Describing data analysis procedures	***Featuring***	***Percentage***	***Featuring***	***Percentage***
61 Defining terminologies	1	25%	1	25%
62 Indicating process of data classification.	0	0%	0	0%
63 Identifying analytical instrument and procedure.	0	0%	0	0%
64 Indicating modification to instrument and procedure.	0	0%	0	0%

Based on Table 5, moves and steps in low and high-impact articles were quite varied. The findings showed that the authors did not use Move 4, Step 3 (indicating criteria for data collection) at all in their research articles in both groups. In addition, Move 4, Step 2 (indicating data size) also was not present in low-impact articles but was rarely found in high-impact articles and is thus considered optional.

The similarity between the two groups also could be found in the frequency of Move 5, Step 2 (recounting experimental process), which was always present in both low and high-impact articles and is considered obligatory. It was because the RAs from the two groups were hard science. Hence, the articles tended to use Move 5, Step 2, considering that some of the articles had various headings for the method section, such as 'Experimental section, 'Experimental method' (Maswana et al., 2015). In addition, due to the corpus of the two groups were hard science research articles, no wonder that Move 5 was the most frequently used among the other moves in this section.

Example

Move 5, Step 2: At the end of the hollow particle synthesis procedure, the reacted solution was purified using a centrifugation process (15 000 rpm, 30 min). The sedimented solution containing composite PS/silica particles was dried and then used in the template-removal process (i.e., heat treatment (500 °C)) to form hollow silica particles. [RA 2, Chemistry]. **Move 5, Step 2:** In this system, the output control was done using direct addressing, in which this directly focused on the relay to the plant. Both modes (i.e., manual and automatic modes) can be used for this system. [RA 6, Electrical Engineering].

The differences between the rhetorical organization in low and high-impact articles were found. Move 4, Step 1 (indicating source of data), Move 4, Step 5 (providing background details about the study is going to analyze), and Move 5, Step 3 (indicating criteria for success) were more manifested in low-impact articles than in high-impact articles. The moves and steps were respectively realized in half of the total articles in low-impact articles. Thus the moves and steps are considered optional. The finding also showed that Move 5, Step 1 (identifying main research apparatus) was almost frequently used in high-impact articles but less used in low-impact articles.

Example

Move 4, Step 1: The study was conducted in one of the most populous and the busiest roads in Bandung, West Java, Indonesia (6.91°S, 107.60°E; shown in Fig. 1(a). **Move 4, Step 5:** The information on the site of the research is shown through Google Map I (in both map and satellite map) in Figs. 1(b) and (c). The photograph image of the evaluated location is shown in Fig. 1(d). The complete data of the road is in the following…. [RA 7, Electrical Engineering]. **Move 5, Step 3:** In this study, the heating process was fixed in the following condition: an ATP mass of 10.41 mg; a heating rate of 5°C/min; and a nitrogen gas flow rate of 200 mL/min) [RA 4, Chemistry].

Furthermore, Move 6, Step 1 was manifested in low and high-impact articles, which only appeared once in each group. In addition, Move 6, Step 2 (indicating process of data classification), 3 (identifying analytical instrument and procedure), and 4 (indicating modification to instrument and procedure) were not present in both groups as the authors in both groups mostly stated experimental process directly in this section and infrequently stated data analysis procedure in the articles.

Result

Table 6. The salience of moves and steps in the result section

Move/Step	**Low Impact Articles (N=4)**		**High Impact Articles (N=4)**	
Move 7: Reporting results	***Featuring***	***Percentage***	***Featuring***	***Percentage***
71 Restating data analysis procedures	0	0%	0	0%
72 Restating research questions.	0	0%	0	0%
73 Stating general findings.	0	0%	1	25%
74 Stating specific findings.	4	100%	4	100%

Move 8: Commenting on results	***Featuring***	***Percentage***	***Featuring***	***Percentage***
81 Interpreting results.	4	100%	4	100%
82 Comparing results with previous studies.	1	25%	1	25%
83 Evaluating results (or research).	3	75%	1	25%

Based on Table 6, the findings showed that the rhetorical organization of Move 7 and Move 8 in the results section were quite similar in both low and high-impact articles. Move 7, Step 1 was not manifested at all in the two groups. That was because the whole research article did not restate the data analysis procedures, and the same thing happened to move 7, Step 2, because none of the articles mentioned the research questions. Furthermore, the authors mostly did not state general findings in the articles. There was only one high-impact article that used the move and the step, and thus those moves and steps are considered optional. It is supported by the findings of Maswana et al. (2015), where he stated that in his article that all subdisciplines (in the research's corpus) except electrical engineering and computer science heavily used 'Move 7, Step 3: Stating general findings.'

In this section, once the authors had presented the method section, they tended to immediately report the results using Move 7, Step 4 and interpret the results. Therefore, move 7, Step 4 (stating specific findings) and Move 8, Step 1 (interpreting results) were always present in both groups and are obligatory. Those moves and steps were highly cyclical and common in RAs in both groups (hard sciences) (Maswana et al., 2015; Ruiying & Allison, 2003). Looking at the way how the authors presented Move 7, Step 4 and Move 8, Step 1, the findings revealed that when the authors stated specific findings (Move 7, Step 4), they usually interpreted the results (Move 8, Step 1). Furthermore, they would compare the results with the prior studies or research (Move 8, Step 2) and try to evaluate the research (Move 8, Step 3). The following examples illustrate the cyclical of Move 7, Step 4 and Move 8, Step 1.

Example

Move 7, Step 4: XRD patterns of the spray-pyrolyzed particles prepared from precursors with various PS/ATP mass ratios are shown in Fig. 4. The XRD patterns show that all the synthesized particles are WO3. **Move 8, Step 1:** […] The Scherrer crystal sizes of the samples at the monoclinic peak of 231 are 28, 25, 25, 25, 23, and 28 nm, corresponding to PS/ATP ratios of 0.00, 0.13, 0.27, 0.40, 0.54, and 0.60, respectively. These results imply that increasing the amount of PS does not change crystal size. **Move 7, Step 4:** To confirm the structures of the pores in the particles, three dimensional tomography analysis was conducted (Fig. 6). The results were consistent

with the above SEM and TEM results, and showed that the addition of PS to the initial precursor allowed the creation of holes in the particles (Fig. 6a), and addition of increasing amounts of PS led to the production of particles with highly ordered macroporous structures (Fig. 6b). **Move 8, Step 1:** In the case of the particle shown in Fig. 6b, connecting holes can be clearly seen, implying that the PS spheres were connected to each other. [RA 1, Chemistry].

From the examples above, the use of figures or tables were commonly used to display the specific results and to clarify the reported results (Fang, 2021) where this is what distinguishes between Move 7, Step 3 (stating general findings) and move 7, Step 4 (stating specific findings), considering that it is quite difficult to distinguish between those moves and steps.

In addition, Move 8, Step 2 (comparing results with previous studies) was rarely found in both groups and was used in one article in each group; thus is considered optional. It was different from Move 8, step 3 (evaluating results (or research)), where it was almost frequently used in low-impact and is considered conventional but infrequently used in high-impact articles.

Discussion (Conclusion)

Table 7. The salience of moves and steps in the discussion (conclusion) section

Move/Step	**Low Impact Articles (N=4)**		**High Impact Articles (N=4)**	
Move 9: Highlighting overall results and their significance	***Featuring***	***Percentage***	***Featuring***	***Percentage***
91 Stating the main results and significance.	4	100%	4	75%
Move b: Explaining specific research outcomes	***Featuring***	***Percentage***	***Featuring***	***Percentage***
b1 Stating a specific outcome	3	75%	2	50%
b2 Interpreting the outcome.	2	50%	1	25%
b3 Indicating significance of the outcome	1	25%	1	25%

b4 Contrasting present and previous outcomes.	0	0%	0	0%
b5 Indicating limitations of outcomes	3	75%	2	50%
Move c: Stating research conclusions	***Featuring***	***Percentage***	***Featuring***	***Percentage***
c1 Indicating research implications.	1	25%	4	100%
c2 Promoting further research.	3	75%	4	100%

Table 7 shows the rhetorical organizations in the discussion (conclusion) section in low and high-impact articles. It was found that there were few differences between the moves and steps used in both groups. The findings showed that Move 9, Step 1 (stating the main results and significance) was present in both low and high-impact articles and is deemed obligatory in this section. This is consistent with Sabet and Kazempouri (2015), who found that the move reporting results was obligatory in the total of 60 discussion sections of RAs published in Iranian local and international ESP journals. It is also in line with Jin's (2017) findings which showed that the statements of results were always present in CHA groups (the corpus of high-impact articles) and were almost present in CLA groups (the corpus of low-impact articles), where it can be called that this move is obligatory. However, this is different from previous findings (Amnuai & Wannaruk, 2013; Suherdi et al., 2020) where Amnuai and Wannaruk (2013) stated that reporting results were conventional in both 30 discussion sections from Thai journals and international journals, and Suherdi et al. (2020) also reported the same thing that the reporting results was conventional in discussion sections of 113 unpublished ELT RAs written by Indonesian undergraduate EFL students.

In contrast, Move b, Step 4 (contrasting present and previous outcome) was not found in both group at all. This tendency arises from the fact that outstanding researchers have a thorough understanding of the theories and relevant studies in their field and are able to compare their findings with those of prior studies as a result of years of diligent and thorough involvement with the topic under study (Jin, 2017).

Example

Move 9, Step 1: The present study has successfully derived the mathematical analysis model for understanding the kinetic parameters based on TG dan DTA curves. The accuracy of the present model was confirmed by the identical results with current

literature. The analysis of the present model was also done for calculating the kinetic parameters of various materials. [RA 4, Chemistry].

The frequency of the presence of Move b, Step 5 (indicating limitations of outcomes) was notable in low and high-impact articles. The move and the step in the low-impact article was more frequent than in the high-impact one where it is conventional in low-impact articles but optional in the high-impact one. The prevalence of this move in this section indicates that the scientists were cautious and honest in their acknowledgment of the study's limitations (Kanoksilapatham, 2005).

Example

Move b, Step 5: Although the preparation of mesopore-free hollow particles with a spherical shape, smooth surface, and controllable size and shell thickness has succeeded, several disadvantages/ exceptions (e.g., the good hollow particles had a shell in the range of 4−12 nm) were found. [RA2, Chemistry].

Furthermore, Move c, Step 1 (indicating research implications) was recognized in four high-impact articles where it is deemed as obligatory but was recognized in only one low-impact articles. The difference between the two groups was obvious because impact factors affect the writing of standards, namely clarity and criticality. When an article is cited by many people, it can be assumed that the content of the article is of high quality. In addition, Move c, Step 2 (promoting further research) was present in all high-impact articles, but less performed in low-impact one.

Example

Move c, Step 1: Because of their excellent performances, as a result of their porous structures, we suggest that the prepared porous WO3 particles could be used widely in chemical and environmental engineering processes, such as industrial wastewater treatment and solar-related applications. Furthermore, this simple process for designing porous structures could be used to prepare many types of particles, with good control of porous structure, pore size, and particle diameter.[RA 1, Chemistry]. **Move c, Step 2:** Since the mathematical approximation confirmed that the TG and DTA analysis can be used for analyzing the kinetic parameters(i.e. reaction order, activation energy, and Arrhenius constant), further derivation from the present mathematical model can be useful for further development. [RA 4, Chemistry].

In promoting further research, this allows the researchers to advocate the need to offer recommendations for future research (Kanoksilapatham, 2005). Furthermore, This move enables researchers to recommend more work that may be done and offers potential directions for other researchers to follow (Jin, 2017).

CONCLUSION

This study reports on comparative move analysis in low and high-impact articles in the field of science and technology from Scopus-indexed journals and how they differ according to the impacts. The results show similarities and slight differences between the

groups (low and high-impact articles) found at the step levels. The similarities are found in each section of the RAs. In the abstract section, the authors from the two groups always state the purposes of their research and how they would reach the goals with its results. In addition, to give the readers background knowledge of the research, the authors present background information at the beginning of the introduction. Furthermore, in the method section, the authors always recount the experimental process of how the research would be conducted in all RAs in both groups. As for the results, the authors tend to report specific findings then, followed by their interpretations. Interestingly, there was a notable difference between the two groups where the high-impact articles always stated the research implications in the conclusion part while the low-impact stated it infrequently.

The findings of this present study can be used as assistance for researchers who want to write academic writing and can increase researchers' productivity in publishing research articles, especially for those who are involved in academic writing for international publications in the field of science and technology. However, since this study only involved lecturers from one university, it is suggested that future research may investigate the same topic by including more universities so that the results of the analysis can be more representative to be used as a model. Nevertheless, readers may understand how the rhetorical framework may influence an article's visibility, impact, or number of citations due to the results from the research papers published by the lecturers. Due to the small amount of data in the corpus, this present study has only offered a case study of how highly reputable authors manifested the rhetorical organization in their research articles in terms of moves and steps. Thus, future research with more significant amounts of data is suggested to overcome the limitations of this study's findings and to provide more clarity on how Scopus-indexed authors manifest moves and steps in their articles. Besides adding more data to the corpus, this could also be done by increasing the number of fields for hard sciences or even the number of authors.

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Appendix

Table. 1 Move Analysis Guideline from Maswana's (2015) model.

Code	Step	Move	Section
11	Reference to established knowledge in the field.	Presenting background information	Introduction
12	Reference to main research problems.		
21	Reference to previous research.	Reviewing related research	
22	Reference to limitations of previous research.		
31	Reference to research purpose.	Presenting new research conducted by the author(s)	
32	Reference to main research procedure and outcome.		
41	Indicating source of data.	Identifying source of data and method adopted in collecting them	Methods
42	Indicating data size.		
43	Indicating criteria for data collection.		
44	Indicating data collection procedure.		
45	Providing background details about the study is going to analyze.		
51	Identifying main research apparatus.	Describing experimental procedures	

52	Recounting experimental process.		
53	Indicating criteria for success.		
61	Defining terminologies.		
62	Indicating process of data classification.		
63	Identifying (analytical) instrument and procedure.	Describing data analysis procedures	
64	Indicating modification to instrument and procedure.		
71	Restating data analysis procedures.		
72	Restating research questions	Reporting results	
73	Stating general findings.		
74	Stating specific findings.		Results
81	Interpreting results.		
82	Comparing results with previous studies.	Commenting on results	
83	Evaluating results (or research).		
91	Stating the main results and significance.	Highlighting overall results and their significance	
b1	Stating a specific outcome.	Explaining specific research outcomes	Discussion (Conclusion)
b2	Interpreting the outcome.		

b3	Indicating significance of the outcome.		
b4	Contrasting present and previous outcomes.		
b5	Indicating limitations of outcomes.		
c1	Indicating research implications.	Stating research conclusions	
c2	Promoting further research.		
a1	Background of research		
a2	Purpose		
a3	Methods	Abstract	Abstract
a4	Results		
a5	Conclusion		