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## Comparative Analysis of National and International Educational Science Articles in Vietnam: Evidence from the Introduction, Methods, Results, and Discussion Structure

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**Abstract:** The introduction, methods, results, and discussion (IMRaD structure) is a structure used by many journals and publishers in its publications since the early twentieth century. This research aims to survey and analyze some prestigious Open Access journals in the field of educational science in the world and in Vietnam on the use of IMRaD structure in presenting research results. We selected 05 open journals with the highest IF in the 2018 Scopus list and 05 prestigious journals in this field in Vietnam to conduct analysis of the articles in the latest 03 issues of these journals. The results of the survey of manuscript draft requirements and the frequency of articles written according to the IMRaD structure of the above journals show that: the IMRaD structure is commonly used in the articles in the field of Educational science in the world. However, in Vietnam, there is no journal that fully meets the contents compared to the basic IMRaD structure. The analysis of the content of articles published in journals in Vietnam shows that the weakest point of the researches is that the research methodology section is almost absent. Finally, we propose some solutions to improve scientific editing in Educational science journals in Vietnam to meet international publishing standards.

**Keywords:** *Educational science, IMRaD structure, Vietnam, articles.*

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### Introduction

The first scientific journals appeared in the 17th century. At that time, articles were published mainly as descriptive letters and stories structured in chronological order. For more than two centuries, scientific papers have been published without the generally accepted format. However, during the development process, journals have gradually replaced the chronological presentation with some form of structured presentation to make the presentation of research results more explicit and more scientific (Wu, 2011).

The IMRaD structure (Introduction, Methods, Results, and Discussion) began to be used by scientific journals around the 1940s, though, until the 1970s, the IMRAD structure became the presentation standard when the United States launched the national standard of the presentation of scientific papers (American National Standards Institute - ANSI Z39.16-1972) published in 1972 and again in 1979. (Day, 1989; Sollaci & Pereira, 2004). At that time, the IMRaD structure was commonly used as the basic IMRaD structure (see Figure 1). Previous research has confirmed that IMRaD has dominated scientific journals since the second half of the twentieth century (Wu, 2011) because the IMRaD structure eliminates unnecessary details and helps scientific papers be presented in a way that is more understandable to readers (Day, 1989; Sollaci & Pereira, 2004). The IMRaD structure is considered to be a simple framework for scientists to write their scientific papers. It prevents unnecessary duplication, thus saving print space and reading time. Because the structure follows the timeline of scientific thought and workflows, its use makes writing the content of the article easier (Batmanabane, 2018). The IMRaD structure became popular in the presentation of researches in many

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fields such as medicine, physics, scientific reports in general (Bazerman, 1984; Eriksson et al., 2005; Kul, 2018; Larracilla-Salazar et al., 2019; Sollaci & Pereira, 2004)

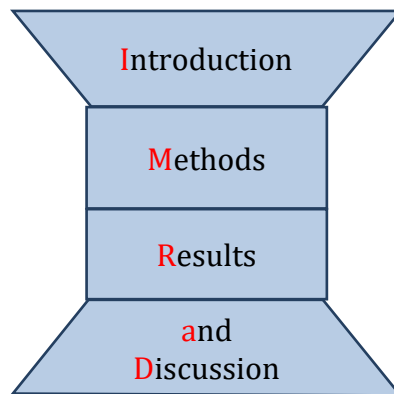


Figure 1. Basic IMRaD structure

During the development of science, the structure of the articles was also developed and improved. The basic IMRaD structure was further developed to make it more complete, suitable for presenting a primary research. Hartley (1999) came up with an additional structure consisting of 7 parts that could be considered the next version of traditional IMRaD (Including Abstract; Introduction; Method; Results; Discussion; Conclusion; Acknowledge) (see Figure 2). He also provided more detailed information for the implementation of this structure.

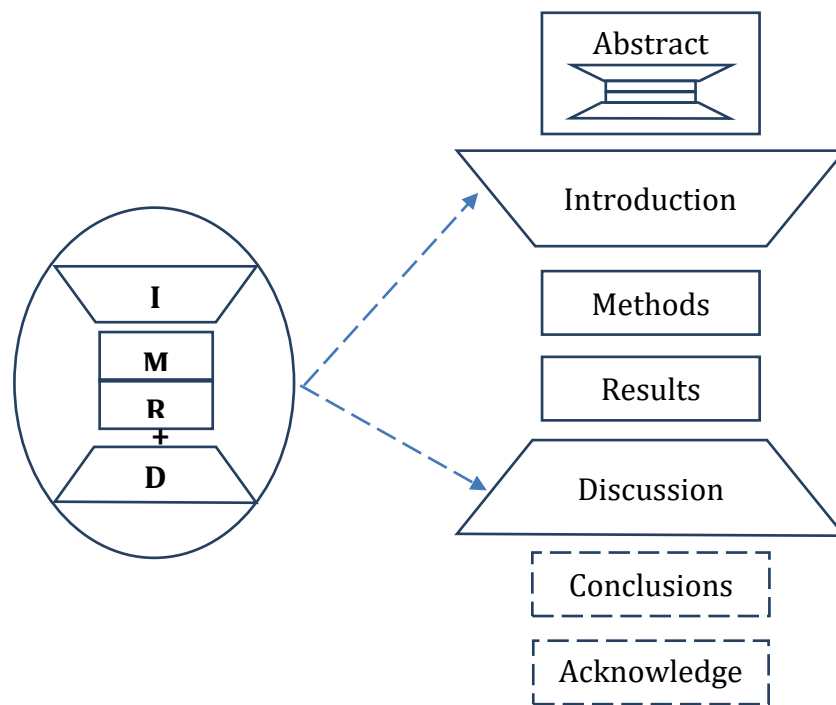


Figure 2. Extended IMRaD structure (Hartley, 1999)

Some journals specify the IMRaD structure to be slightly modified to allow authors to use the structures in presenting their research results flexibly. For example, AIM structure (RaD) C (Abstract, Introduction, Materials and Methods, repeated Results and Discussion, Conclusions): This structure is often used with short reports (see Figure 3) (O'Connor, 2009).

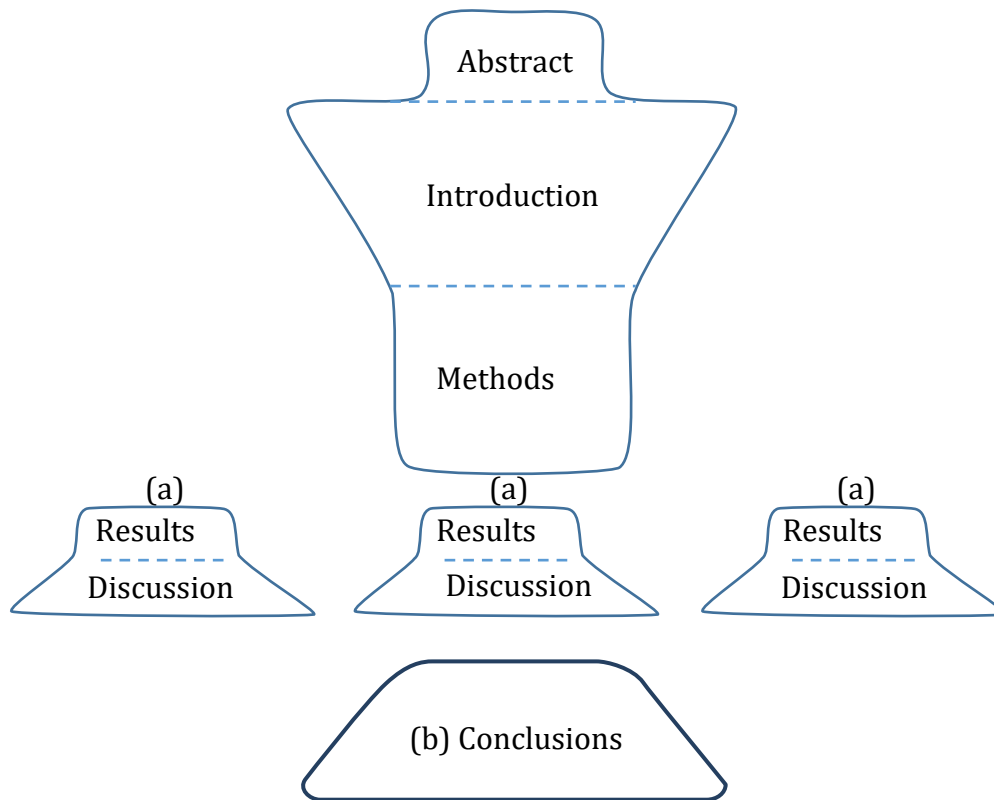


Figure 3. AIM structure (RaD) C (Cargill et al., 2013)

IMRaD structure - a presentation form that has been developed for nearly 100 years but it has been recommended to be used in presenting research by many journals and authors up to now, and it has been standardized at the same time (Ribeiro et al., 2018; Tress & Saunders, 2014). The IMRaD structure is particularly suitable for empirical researches, accounting for the majority of current researches (Teodosiu, 2019). Besides, the IMRaD structure is also used as a rubric in assessing student essays (Charan & Haider, 2016; Rakedzon & Baram-Tsabari, 2017a, 2017b), and this helps improve the students' writing skills and publish their research results.

However, at present, studies on the application or requirements of using IMRaD structure in journals in the field of Educational science have not received much attention, especially in developing countries. In Vietnam, the fact is that journals of educational science in Vietnam has not reached the international standards (ACI, Scopus...), and the analysis to find out the non-standard points is necessary. Therefore, the first purpose of this article is to analyze the structural requirements of a publication in international journals, specifically those in the field of Educational science indexed in Scopus.. From there, we shall determine the general format of an educational science article according to the general trend in the world. We then briefly present the analysis of the article structure in some journals in the field of educational science in Vietnam according to the IMRaD structure. Finally, we end the article with the discussion of the research question: Is the IMRaD structure often used in publications on educational science? Do publications on educational science in Vietnam follow this structure? From there, we shall propose improvements for the educational science journals in Vietnam to fit the general trend of the world.

## Methods

### Research Design

In this research, we are based on a method of document analysis. The material used in this analysis is articles on prestigious journals of educational science in the world and Vietnam were selected for analysis. For international journals, the two impact factors of the journal, IF, are now one of the two important indicators that are of interest to the scientists and used as the critical criteria to evaluate and rank scientific journals in the world. They indicate the prestige and development of each scientific journal over a period of time that varies from year to year. Therefore, the prestigious journals were selected based on the IF of the journals.

The Journal Rankings at the page <https://www.scimagojr.com> was used to selected journals to analyze. In the box of Journal Rankings, we selected subject areas as Social Sciences; for subject categories, the education field was selected; type: Journals. To facilitate the search for results, Only Open Access Journals were selected. We chose to sort by journal impact factor from high to low; the result was a list of journals sorted by IF. After that, five journals in the field of educational science (excluding multidisciplinary journals) of different publishers with the highest journal impact factor in 2018 were selected (access date: 21/12/2019). Selected journals include:

Table 1. Prestigious journals in the field of educational science in the world

Journal	ISSN	Q	IF	H-index	Website
Communications in Information Literacy (CIL)	19335954	Q1	1.52	13	<a href="https://pdxscholar.library.pdx.edu/comminfolit/">https://pdxscholar.library.pdx.edu/comminfolit/</a>
Language Learning and Technology (LLT)	10943501	Q1	1.43	62	<a href="https://www.lltjournal.or/">https://www.lltjournal.or/</a>
Minerva	15731871	Q1	1.21	33	<a href="https://www.springer.com/journal/11024">https://www.springer.com/journal/11024</a>
International Review of Research in Open and Distance Learning (IRRODL)	14923831	Q1	1.2	56	<a href="http://www.irrodl.org/index.php/irrodl">http://www.irrodl.org/index.php/irrodl</a>
CBE Life Sciences Education (CBE-LSE)	19317913	Q1	1.16	48	<a href="https://www.lifescied.org/">https://www.lifescied.org/</a>

For journals of educational science in Vietnam, the ranking is calculated according to the grading regulations of the State Council of Professor Title - the most prestigious Scientific Council of Vietnam (Nguyen et al., 2020). In particular, the highest score for scientific journals is 1.25 points. Journals in the field of educational science are graded according to 4 levels: 1.0; 0.75; 0.5; 0.25. In the list of 48 journals in the field of educational science, we selected the journals with the highest scores in the country with a maximum score of 1.0 and 0.75. Selected journals include:

Table 2. Prestigious journals in the field of educational science in Vietnam

No.	Name of journal	ISSN index	Publishing agency	Score
1.	Journal of Educational Sciences (JES.VNIES)	0866-3662	Vietnam Institute of Educational sciences	1.0
2.	Journal of Science (JOS.HNUE)	0866-3719	Hanoi National University of Education	1.0
3.	Journal of Science: Journal of Educational Research (JOS.VNU)	0866-3612	Vietnam National University, Hanoi	1.0
4.	Journal of Education Vietnam Journal of Education (Vietnamese language) (VJEV)	2354-0735	The Ministry of Education and Training;	0.75
5.	Vietnam Journal of Education (English language) (VJEE)	2588-1477	The Ministry of Education and Training;	0.75
6.	Journal of Science (jos.HCMUP)	1859-3100	Ho Chi Minh City University of Education	0.75

### Data analysis

To confirm the rate of using IMRaD structure for publications in journals, we conducted data analysis of the article structure on the journal's website by submitting, downloading and analyzing the structure of journal articles in the last 03 issues for structural analysis. The research team that participated in the document analysis was the author of the article. The authors are members of the European Association of Science Editors, of which one author is the editor-in-chief of The Vietnam Journal of Education and has extensive editorial experience science.

The document analysis steps are as follows:

Step 1. The research team analyzes scientific literature, based on the IMRaD structure research, to determine the analytical framework of the articles.

Step 2. Try analyzing the sample, the whole team chooses a number of articles, suggestions for type, and then comments, agree.

Step 3. Each individual analysis group chooses to count, analyze the articles in a journal, make a statistical table, and analyze.

Step 4. The whole group meets, analyzes each journal, re-evaluates individual assessments.

Step 5. Statistics, synthesis, analysis, and evaluation.

The articles are classified into 4 types:

(1) Those have a basic IMRaD structure: The Introduction, Methodology, Results, and Discussion headings or synonyms for these headings are sufficient and printed. The Introduction section does not need to have a heading (see Figure 1);

(2) Extended IMRaD structure: meeting the requirements of form 1 and adding extensions of the IMRaD structure (see Figure 2, 3)

(3) Part of the IMRaD structure: there are at least 3 main parts of the IMRaD structure

(4) Not following the IMRaD structure: Articles that are not one of the 3 above types.

## Results

*The structure of articles in the field of education in the world basically presented according to the IMRaD structure*

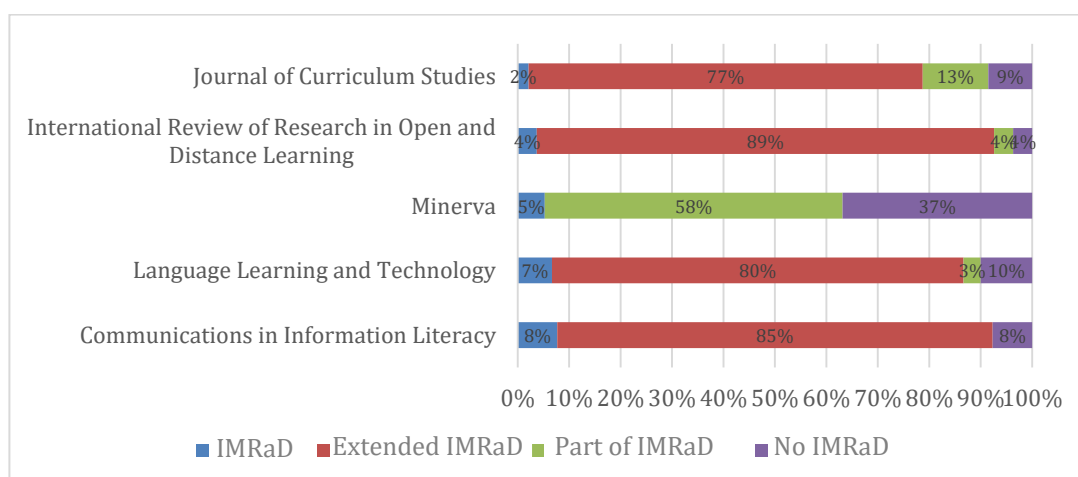
Out of 5 selected journals, 4 out of 5 journals have a general requirement that the article structure is an extended IMRaD structure in the guide for authors when they need to publish journal articles. In the journals surveyed, only Minerva (Publisher Kluwer Academic Publishers, Netherlands) did not clearly state the structure of the article.

*Table 3. Requirements for how to present articles in international journals in the field of educational science*

Journal	Instructions for presenting the articles			Notes
	IMRaD	Extended IMRaD	Others	
CIL	X			The requirements to extend beyond the IMRaD structure include a literature review (Communications in Information Literacy Journals, n.d.); appendices (Language Learning & Technology, n.d.); materials. Notably, the IRRODL journal asks the authors to clarify the pool of subject and analysis of research and how results impact theory and practice (Submissions   The International Review of Research in Open and Distributed Learning, n.d.).
LLT	X			
IRRODL	X			
CBE-LSE	X			
Minerva			X	Minerva Journal is a journal that publishes articles of the review of Science, Learning, and Policy. This journal only requires general structure including Title, Abstract, Keywords, declarations (all manuscripts must contain the following sections under the heading 'Declarations'). However, the section of Declarations also recommends that the authors should present the following issues: Funding, Conflicts of interest / Competing interests, availability of data and material, Code availability, Authors' contributions (Minerva   Submission guidelines. n.d.)

The statistical results show that the number of articles in the last three issues of the journals is 136 original articles (as of March 20). Specifically, there are 13 articles in Communications in Information Literacy; 30 articles in Language Learning and Technology; 19 articles in Minerva; 27 articles in International Review of Research in Open and Distance Learning and 47 articles in CBE Life Sciences Education.

The results of the structural analysis of the articles show that there are 120/136 (88.2%) of articles following the IMRaD structure, extended IMRaD structure, or part of the IMRaD structure. Only a few articles in selected journals are not in the IMRaD structure (see Figure 4).



*Figure 4. Statistics of international articles following the IMRaD structure*

Extensions to the IMRaD structure of journals often include literature review and background, theory framework, implication, and limitation. For articles that do not follow the IMRaD structure, they are usually general reviews of a particular issue, and at this time, the results are not subject to headings but rather to more detailed headlines depending on the article.

Based on the initial analysis, it is possible to affirm that educational articles in the world are basically presented in the IMRaD structure. Besides, the indispensable sections in those researches are abstract, conclusion, and reference. These sections also have similar general requirements in reputable journals around the world. We will use the extended IMRaD structure, which includes abstract, conclusion, and reference, to analyze the structure of articles in the field of educational science in Vietnam.

**Requirements and practice of implementing IMRaD structure in articles of leading journals in the field of educational science**

*About implementation requirements*

Regarding requirements for articles, based on information posted on the website of journals, we find that 4 out of 6 journals only recommend presenting articles in three parts. Introduction, content, conclusion, and discussion. However, journals also have more specific instructions for more details. For example, the VJEV clearly instructs the authors to present the research method, research facilities, research subjects, research results, and discussion. (Vietnam Journal of Education, n.d.-a);

2 out of 6 journals that recommend the authors to present according to the extended IMRaD structure include VJEE and JOS.VNU. For the English edition of the journal of education, the two recent issues of the journal have changed the requirements for the structure of the article including the following contents: Introduction (summary of theoretical background, the current situation of the research issues); Literature review; Methods and results (research method, research instruments, objectives, new findings, and discussion); Discussion and conclusion; References. (Vietnam Journal of Education, n.d.-b); JOS.VNU also recommends the authors to present their articles under the headings like Introduction sections; Material and methods; Theory/ calculation; Results; Discussion; Conclusions (VNU Journal of Science, n.d.)

Table 4. Analysis of the general structure of journals in Vietnam according to the extended IMRaD structure

Headings	JOS. HNUE	JOS. VNU	JES. VNIES	VJEV	VJEE	JOS. HCMUP
Abstract	x	x	x	x	x	x
Introduction	x	x	x	x	x	x
Methods	Content	x	Content	Content	x	Content
Results		x				
Discussion		x				
Conclusion	x	x		x	x	x
Reference	x	x		x	x	x

*About the practice of structural analysis of published articles in the last 3 issues*

The results of the frequency of articles on educational science in Vietnam using the IMRaD structure in the last three issues of the selected journals have been provided. A total of 253 original articles. Only 13 articles of the JOS.VNU has followed the extended IMRaD structure. These articles are mostly written in English (although this journal has provided clear instructions on the article’s structure on its website). There are 55 articles on VJEE that are considered to have the structures which are the most similar to the IMRaD structure, with Methods and Results; Discussion and Conclusion sections are put together. However, this is also a limitation because when combining headings, the transparency in the partial presentation of the IMRaD structure is significantly reduced (see Figure 5).

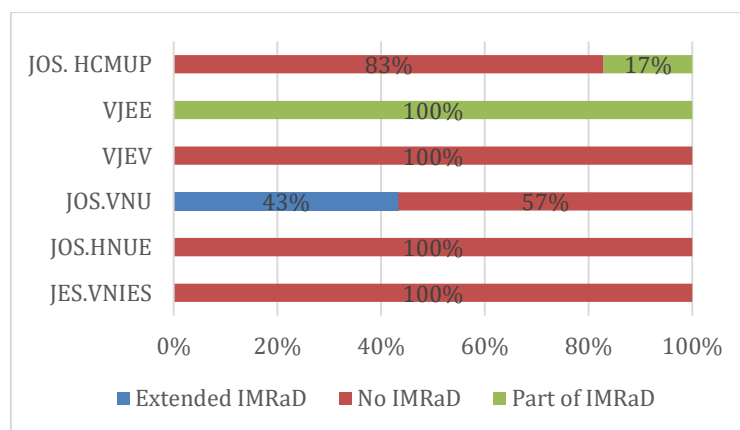


Figure 5. Statistics of educational science articles following the IMRaD structure in Vietnam

The analysis results show that the most common structure in educational science journals in Vietnam includes 03 sections: Introduction, Content, and Conclusion. However, in reality, when analyzing the content of the articles, each author presents the content in a different style, so there is no general agreement on the layout of the publications of these journals.

The shortage in journals in the field of educational science in Vietnam is the research methodology section. For most journals, this content has not yet been included as a significant part of the article. Only 2 journals, JOS.VNU and VJEE, have this section. However, for VJEE, it is a combination of research methods and results. On the other hand, because the authors have not been familiar with this change, most of them have not clarified the research methodology in their publications. This makes it difficult for readers to understand how to research to produce the results for that article.

### Discussion

The analysis results show that the structure of the articles in educational journals in Vietnam is quite different compared with the general requirements in the world (Sollaci & Pereira, 2004). The difference is not only in the headings but also in the content of each section in the article. Further, in-depth analysis of the contents of some sections with significant differences (without universal access) in 06 educational science journals in Vietnam show this difference more clearly.

#### *Abstract section of educational science articles in Vietnam*

According to international standards, the abstract of an article can be considered as a miniature of that article. It is also recommended to present the abstract according to the IMRaD structure (Cargill, Margaret, & O'Connor, 2013; Driscoll & Driscoll, 2002) Or present the details by background, aim(s), sample(s), method(s), results, conclusion, sometimes comments (Hartley, 1999).

However, the abstracts of articles in educational journals in Vietnam are often quite short (about less than 100 words and only include content such as background and aim(s)). In which, the background is presented quite generally. The structure of abstracts between journals in general and articles, in particular, is not consistent and not the same as the structure of abstracts in articles in international journals within this research. Moreover, abstracts often do not present the research methodology and results. In particular, the abstracts often present only on research issues, but not on the fundamental research results. For example:

*"The article is based on the study of scientific basis to increase criteria of industrial culture value for specialized economic students"* (Huyen, 2019, p. 14)

This makes the purpose of the abstract, which is of provides a quick overview of the research, interest to the reader, challenging to accomplish (Mcmillan & Schumacher, 2010). *Introduction section of educational science articles in Vietnam*

The introduction usually has a length of 500 - 1000 words and presents the importance and purpose of the research (Burrows, 2011). To do that, it's necessary to answer questions in this section, like why are you writing and why now? Whom are you writing for? Who is doing the writing? What problem are you addressing? What the background to it? And what the prior hypothesis you were testing? (Sharp, 2002) To answer the above questions, according to (Hartley, 1999), the introduction can be arranged in 03 ways: (1) previous research; limitations; aims; hypotheses; (2) previous research 1; previous research 2; aims; hypotheses; (3) previous research (for); previous research (against); aims; hypotheses; With IMRaD structure, in this section, researchers need to be able not only to locate other work dealing with their intended area of study but also to be able to evaluate this work in terms of its relevance to the research question of interest (Jack R. Fraenkel et al., 2018) However, when analyzing the content of the introduction in the leading prestigious journals of Vietnam in the field of educational science, we can see: i) the inconsistencies in the structure in each journal and among Journals; ii) except for a few articles that have a fairly good presentation of this section, most of the other articles have a spare analysis of the research context and research history, missing important international citations.

This reflects the lack of interest of Vietnamese authors with related foreign documents or may be due to foreign language restrictions. Because of this, the presentation of the theoretical framework, the most important in the research in Vietnam, lacks modern theoretical frameworks which are developed by many countries.

#### *Methods section of educational science articles in Vietnam*

The Methods section provides the information needed for another competent scientist to repeat the work. Another way to think about the goal of the Methods section is that it establishes credibility for the results and should therefore provide enough information about how the work was done for readers to evaluate the results (Crissman, 2009). But when analyzing the content of the articles, we found that the presentation of the research methods, tools, processes, and subjects is generally sketchy. This description is sometimes lacking or general and unclear. This, on the one hand, makes the scientific researches inconsistent and lack of value. Moreover, the presentation of the research subjects, the

research process, the methods of data collection, processing, and the data processing software are often not explicitly presented. Out of 5 journals, only 1 journal (Vietnam Journal of Education) has a section on research methods. However, even in articles with this section (Method and Results), the presentation of the research methods, subjects, processes, and methods of data collection and processing is sketchy, not transparent and detailed. Researches in journals of educational science in Vietnam today are still qualitative, not quantitative. This may be due to the limited access to research methods, especially to the rigorous and scientific implementation of research methods.

*Theoretical research methods: Desk review, document analysis and synthesis to clarify the issues of the role of assignment/ tasks related to real-life in teaching Math and the development of creative competence for lower secondary students; some manifestations of lower secondary students' creative competence in learning Math with regards to solving those assignments/ tasks; design and organize the teaching activities with assignments/ tasks related to real-life in Math subject at lower secondary level towards developing creative competence for students. - Practical research methodologies: Exploring the current situation of designing and organizing the teaching with assignments/ tasks related to real-life in Math towards developing creative competence for lower secondary students; studying the manifestations of students' creative competence in learning Math while solving those assignments/ tasks; observation, class attendance, lesson plan research, using a questionnaire, interviews. (Hue, 2018, p. 77)*

#### *Conclusion section of educational science articles in Vietnam*

When analyzing, we found that there are two common types of conclusions section in 06 educational science journals in Vietnam: Recalling the research results or the tasks performed; or comment only on the use of the research results as suggestions for further research or manipulation. Moreover, the connection of conclusions or recommendations, comments in this section with the research results or processes, research methods are often unclear and uncertain.

#### *References section of educational science articles in Vietnam*

The references section shows a significant difference of some journals of educational science in Vietnam compared to prestigious international journals in some essential points as follows.

Firstly, the presentation of references in journals is unclear and does not follow any citation standard. Currently, only the journal of education, the latest issue, has a statement about the APA standard but has been adapted for Vietnamese authors.

Secondly, the survey found that many articles lacked relevant international references (such as those related to research issues, in the Web of Science system, Scopus, etc.).

Thirdly, the number of references is limited, and most articles usually have only 7 to 10 references. It usually includes documents that the authors include but do not cite. There are many articles that the references were not cited in the article content.

Finally, the used references, which are books, resolutions, and policy documents, account for a large proportion. The used books and textbooks are usually published more than 5 years after the publication date. This result is similar to the assertion in the study of (Bazerman, 1984). This study has also confirmed, the lack of concern with dating references, and the age of the references that are dated, 52 percent of the references are undated, and only about 30 percent are dated six years or less from the article's publication

This result is partly because researchers in Vietnam have not had the opportunity to access published papers on domestic and international research issues recently.

### **Conclusion**

The research results show that the IMRaD structure is used in most educational science publications in prestigious journals around the world (the number of articles following this structure accounts for 120/136 of the recent publications in selected magazines). The general trend of the world in presenting research results in journals is to follow a typical IMRaD structure (extended IMRaD) structure. (4/5 journals in the research have explicitly stated this issue)

The leading journals of educational science in Vietnam have given the requirements on the article structure, but the requirements are different in each journal and not in the IMRaD structure, so the presentation of research results is sometimes unclear, making it difficult for readers.

### **Suggestions**

In the context of international integration, it is appropriate for Vietnamese scientific journals in general and journals of educational science, in particular, to make requirements on the article structure, such as the extended IMRaD structure,



to meet the international standards on the field of educational science. Journals also need to agree on a common structure, in which there should be rules for the content of specific sections. This makes the presentation of research results more explicit, and more scientific. This requirement also helps the authors and researchers more easily publish research results in the form of articles. Moreover, this helps researchers gradually familiarize themselves with international standards in scientific publications, from simple issues such as abstracts, keywords, citation standards, and references.

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