CHAPTER III

RESEARCH METHODOLOGY

This chapter presents an overview of the research method adopted in this study and the rationale underlying the selection of the research design and the participant(s) of the study. This chapter comprises five major sections that are: (1) research design; (2) participants (3) data collection; (4) data analysis; and (5) data trustworthiness.

3.1 Research Design

This study employed a qualitative comparative approach because this method attempts to describe a complex phenomenon in a holistic way (Malik & Hamied, 2014) as this study aims to explore the genre knowledge of Indonesian graduate students in writing research article introductions as compared with their major from soft and hard sciences. It also intends to obtain information regarding the influence of genre knowledge and their writing development during three semesters in composing research article introductions.

3.2 Participants

A total of 12 research article introductions written in English from four graduate students of a public university in West Java were purposively selected. The selection of the participants was based on the criteria below:

- The participants are two graduate students from English Education Department (soft science) and two graduate students from Mathematics Education Department (hard science).
- All of the participants are in their senior year (fourth semester) and successfully wrote and published at least one research-based paper during semesters 1, 2, and 3.
- All research article introductions are written in English and published in International Conference Proceedings or National Journals.

3.3 Data Collection

The data were collected through two instruments namely document analyses and in-depth interviews. Document analyses were held in two stages namely collecting documents which were 12 research article introductions written by 4 Indonesian graduate students majoring in soft and hard sciences during their first, second, and third semesters and analyzing those research article introductions using Swales' (2004) revised Creating a Research Space (CARS) framework. As this study focused on exploring students' writing development associated with their genre knowledge, the number of research article introductions under examination was purposively restricted in order to enhance the researchers' understanding of each participant's writing development. Paper identity of the twelve research article introductions is portrayed in Table 3.1 below:

Table 3.1

Paper Identity of the Twelve Research Article Introductions

Participants	Department	RAI	Title	Publisher
Student A	Mathematics Education Department	RAI 1	Achievement emotions of female students in mathematical problem-solving situations.	Journal of Physics, Conference Series. International Conference on Mathematics and Science Education (ICMScE) 2020
		RAI 2	Problem-Based Learning for Mathematical Critical Thinking Skills: A Meta-Analysis	Journal of Hunan University (Natural Sciences)
		RAI 3	Using Problem-Based Learning to Enhance Mathematical Abilities of Primary School Students: A	JTAM (Jurnal Teori dan Aplikasi Matematika)

			Systematic Review and Meta-Analysis	
Student B	Mathematics Education Department	RAI 4	Analysis of teachers' difficulties in implementing STEM approach in learning: a study literature	Journal of Physics, Conference Series. International Conference on Mathematics and Science Education (ICMScE) 2020
		RAI 5	Teachers' Difficulties in Implementing Distance Learning during Covid-19 Pandemic	ACM Proceeding of International Conference on Education Technology and Computers (ICETC'20)
		RAI 6	The Effectiveness of Implementing Project-based Learning (PjBL) model in STEM Education: A Literature Review	Journal of Physics: Conference Series
Student C	English Education Department	RAI 7	Fostering Language Learner Autonomy through the Involvement of ICT: Teachers' Perception	ELTR Journal
		RAI 8	English Education Department Graduates' Job Preferences: A Case Study of English Language Learning Center Teachers	SAGA: Journal of English Language Teaching and Applied Linguistics
		RAI 9	The Representation of 21st Century Skills in an Indonesian EFL Textbook	LLT Journal
Student D	English Education Department	RAI 10	Promoting EFL Young Learners' Higher Order Thinking Skills (HOTs) through	ACM Proceeding of International Conference on Education Technology and

	Interactive Digital Storytelling	Computers (ICETC'20)
RAI 11	A Move Analysis of Research Article Introduction Written by Indonesian Authors: The Case of Soft and Hard Sciences	Advances in Social Science, Education and Humanities Research, volume 546 - Proceedings of the Thirteenth Conference on Applied Linguistics (CONAPLIN 2020)
RAI 12	Promoting Students' Critical Thinking through Multimodal Digital Classroom Assessments (MDCAs) in Online Learning	ACM Proceeding of the 3rd International Conference on Modern Education Technology

Meanwhile, in-depth interviews using the interview protocol as the second instrument were held after the document analysis stage. The interview was intended to obtain information related to the authors' experiences in writing and publishing research articles from semester 1 until semester 3, their points of view on writing research articles for international publication purposes, and the authors' opinions, reasons, and perspectives that verify the textual evidence of rhetorical moves in their actual research article introductions. The interview protocol was formulated based on several theoretical underpinnings. Questions about genre knowledge were based on Tardy's (2009) and Tardy, Sommer-Farias, and Gevers' (2020) studies. Among the four derivatives of genre knowledge (i.e. formal knowledge, process knowledge, rhetorical knowledge, and subject-matter knowledge), only formal knowledge was used to formulate the questions, because formal knowledge focuses on the textual instantiation of the genre, in either oral or written form (Tardy, 2009). Formal knowledge in this study encompassed the authors' understanding of rhetorical moves (and the constituent steps) of research article introductions and their typical linguistic

features. Questions related to factors contributing to the development of authors' genre knowledge were grounded from the genre theory discussed in Devitt's (2015) study.

3.4 Data Analysis

The data in the forms of research article introductions were analysed using Swales' (2004) revised Creating A Research Space (CARS) framework as follow:

Move 1. *Establishing a territory* (citations required)
Via
Topic generalizations of increasing specificity
Move 2. *Establishing a niche* (citations possible)
Via
Step 1A Indicating a gap, or
Step 1B Adding to what is known
Step 2 (optional) Presenting positive justification
Move 3. *Presenting the present work* (citations possible)
Step 1 (obligatory) Announcing present research descriptively and/or purposively
Step 2* (optional) Presenting research questions or hypotheses
Step 3 (optional) Definitional clarifications
Step 4 (optional) Summarizing methods
Step 5 (PISF**) Announcing principal outcomes
Step 6 (PISF) Stating the value of the present research
Step 7 (PISF) Outlining the structure of the paper.
*Steps 2–4 are not only optional but less fixed in their order of occurrence than the others
**PISF: Probable in some fields, but unlikely in others

Figure 3.1 *Swales' (2004) revised model of Creating A Research Space (CARS)*

The research article introductions analysis was done through several stages. At first, the titles, abstracts, and introductions of the papers were read first to get familiar with

the research topic and the content. Then, the introductions were read thoroughly while breaking down each research article introduction into sentences as the sentences were the units of analysis. After that, every sentence was labelled by a move. The moves were further classified into steps, as depicted in Table 3.2. Because this study does not aim to reach any quantitative conclusion, the textual analysis was focused on the rhetorical structure of the individual research article introduction.

Table 3.2

Sample of the Coding Process in the Move Analysis Stage

No	Sentence	Move	Step
1	Achievement emotions, such as anxiety, frustration, and hope, are always involved in student learning activities because they are biological and psychological conditions associated with learning activities like problem-solving and examinations [1,2].	**1 Establishing a territory**	
2	The interaction between students, Mathematics teachers, and Mathematics learning created activities during Mathematics learning process [3-6].	**1 Establishing a territory**	
3	One of Mathematics learning process forms is Mathematics evaluation [7,8].	**1 Establishing a territory**	
4	Thus, Mathematics ability test, such as mathematical problem-solving ability, must involve achievement emotions.	**1 Establishing a territory**	

5	Unexpectedly, students' achievement emotions, either positive or negative, were varied during Mathematics ability tests depending on the situation like Mathematics ability tests demanding students' higher order thinking in mathematical problem-solving [9,10].	**1 Establishing a territory**	
6	Students anxiousness before and after Mathematics tests could be caused by students' anxiety, nervousness, stomach-ache, and hopelessness [1].	**1 Establishing a territory**	
7	Anxiety, nervousness, hopelessness, boredom, and anger caused bad learning result and psychology so that it was very essential to be considered by teachers, especially Mathematics teachers.	**1 Establishing a territory**	
8	Some previous studies on the students' achievement emotions were more likely to observe and investigate the teaching quality, classroom management, and during the learning processes [11-14].	**2 Establishing a niche**	**1B Adding to what is known**
9	However, there were limited studies on students' Mathematics evaluation.	**2 Establishing a niche**	**1A Indicating a gap**
10	Moreover, some studies regarding students' achievement emotions during Mathematics evaluation process were conducted but the evaluation was carried out outside of the lesson, in the form of	**2 Establishing a niche**	**1A Indicating a gap**

	homework and not specific to gender [15-17].		
11	On the other hand, this study investigated students' achievement emotions during the test of mathematical problem-solving abilities conducted during the lesson and specifically to female students.	**3 Presenting the present work**	**1 Announcing present research descriptively and/or purposively**
12	Female students were chosen as the subject since some previous studies on female emotion indicated that females felt worried, hopeless, bored, and angry more than males in depressed situations [18-20] unhappy and proud with the work they did more than males [21,22].	**3 Presenting the present work**	**1 Announcing present research descriptively and/or purposively**
13	Moreover, those feeling occurred more in adolescent females than in adult females [23,24].	**3 Presenting the present work**	**1 Announcing present research descriptively and/or purposively**
14	Therefore, if Mathematics teachers did not put this into account, it will affect female students' learning motivation and achievement which tend to be lower than male students [5].	**3 Presenting the present work**	**6 Stating the value of the present research**

15	This study aimed to investigate the achievement emotions of female students in mathematical problem-solving situations by answering the following questions: 1) Is there any effect of mathematical problem-solving situations on female students' achievement emotion changing? 2) Is there any correlation between the mathematical problem-solving ability level and female students' achievement emotion after taking the test?	**3 Presenting the present work**	**2 Presenting research questions**

After all of the research article introductions were analyzed based on moves and steps, the researcher summarized the number of occurrence of moves and steps in the twelve research article introductions as mentioned in the following table:

Table 3.3

Sample of Moves and Steps Occurrence

Number of Occurrence of Moves and Steps	**RAI 1**	**RAI 2**	**RAI 3**	**RAI 4**	**RAI 5**	**RAI 6**	**RAI 7**	**RAI 8**	**RAI 9**	**RAI 10**	**RAI 11**	**RAI 12**
a. Move 1 (obligatory)	**7**	**20**	**11**	**26**	**22**	**45**	**30**	**33**	**35**	**13**	**26**	**15**
b. Move 2	**3**	**8**	**18**	**10**	**7**	**1**	**6**	**7**	**2**	**5**	**1**	**5**
Step 1A (interchange-able with Step 1B)	2	7	13	6	7	-	-	-	2	4	1	4
Step 1B (interchange-able with Step 1A)	1	1	5	4	-	1	6	7	-	1	-	1
Step 2 (optional)	-	-	-	-	-	-	-	-	-	-	-	-

c. Move 3	**5**	**3**	**4**	**1**	**-**	**1**	**2**	**2**	**5**	**1**	**6**	**1**
Step 1 (obligatory)	3	2	1	1	-	1	1	1	3	1	5	1
Step 2 (optional)	1	-	-	-	-	-	1	1	1	-	1	-
Step 3 (optional)	-	-	-	-	-	-	-	-	-	-	-	-
Step 4 (optional)	-	-	3	-	-	-	-	-	-	-	-	-
Step 5 (optional)	-	-	-	-	-	-	-	-	-	-	-	-
Step 6 (optional)	1	1	-	-	-	-	-	-	1	-	-	-
Step 7 (optional)	-	-	-	-	-	-	-	-	-	-	-	-

Then, the researcher compared the percentage of occurrence for each move and step between the RAIs written by Soft Science students and Hard Science students as presented in the table below:

Table 3.4

Sample of Percentage Occurrence for Each Move and Step

Move-step Category	**Hard Science f (%) n=6**	**Soft Science f (%) n=6**
Move 1	100	100
Move 2	100	100
Step 1A	83	66
Step 1B	83	66
Step 2	0	0
Move 3	83	100
Step 1	83	100
Step 2	**16**	**66**
Step 3	0	0
Step 4	**16**	**0**

Step 5	0	0
Step 6	33	16
Step 7	0	0

After the research article introduction analysis is done, the data collected from in-depth interview in form of interview transcripts were first translated into English. The translated interview transcripts were coded verbatim. After all transcripts have been coded, they were classified into bigger themes that can directly address the research questions. Next, the classification results were analyzed by using Miles and Huberman's (1994) framework. In data reduction stage, the data were sorted out and reduced because not all data were directly associated with the objectives of this research. In data display stage, the selected data were re-examined to ensure the representation of its content in describing the genre knowledge and the factors influencing the authors' genre knowledge development within both groups, i.e. soft and hard sciences authors. In data verification and drawing conclusion stage, the final data were verified and compared between both groups to reach adequate conclusion. To maintain data trustworthiness, the results were checked by an expert in genre-approach move analysis.

3.5 Data Trustworthiness

The researcher used abbreviations instead of the students' names (e.g., Student A) in displaying the data. Furthermore, to increase the data confidence and credibility, the researcher conducted inter-coder reliability. The move-step patterns of all research article introductions were cross-checked by one lecturer (Crookes, 1986) in the expertise of discourse analysis. The following steps illustrate the procedure of conducting inter-coder reliability:

1. After the researcher finished the research article introduction analysis, all of the twelve research article introductions were chosen for inter-coder reliability.

2. The researcher prepared the Word documents of the research article introductions in form of table, so that the coder can just put the number on the column beside the sentence column.
3. The researcher conducted one-session discussion with the coder to become acquainted with the use of the coding system (Kanoksilapatham, 2005) by giving the printed detailed description of the synthesized model and some examples from the training data.
4. The coder independently coded those research article introductions and during the process, the researcher discussed some identified disagreements four times.
5. After the coding process was finished, the researcher calculated the degree of agreement using percent agreement.
6. After obtaining the final results, the researcher discussed some identified disagreements again with the coder.

Table 3.5 and 3.6 below mentioned the sample of inter-coder analysis and percent agreement.

Table 3.5

Sample of Inter-coder Analysis

No	Sentence	Move	Step	Expert Judgment Move	Expert Judgment Step	Inter Coder Agreement
1	Currently, Ministry of Education and Culture of Indonesia launched new regulations related to higher education.	**1 Establishing a territory**		**1 Establishing a territory**		**1**

2	In the regulation number 3, 4, 5, 6, and 7 year 2020, Ministry of Education and Culture of Indonesia introduced new skills that should be mastered by college students after they graduated in order to fulfil the skills needed in this 21st century. Those skills are computational logic, creative, critical thinking, collaboration, communication, and compassion which is further known as 6C skills. All of those skills are already being developed in Indonesian universities, especially critical thinking since the ability to think critically is important to the academic, personal, and professional success of college students [9].	**1 Establishing a territory**	**1 Establishing a territory**	**1**
3		**1 Establishing a territory**	**1 Establishing a territory**	**1**
4		**1 Establishing a territory**	**1 Establishing a territory**	**1**

5	Unfortunately, due to the new regulation about 6C skills, the outcome has not been figured out yet and Indonesian universities are still trying to find the best strategies in its development.	**2 Establishing a niche**	**1A Indicating a gap**	**1 Establishing a territory**		**0**
6	In terms of critical thinking development in English Language Teaching, many researchers examined assessment as an important aspect. For example a study by Heijltjes et al. [13] found that when	**1 Establishing a territory**		**1 Establishing a territory**		**1**
7	combined with practice, explicit instruction appeared to vastly improve students' critical thinking performance.	**1 Establishing a territory**		**1 Establishing a territory**		**1**

8	A meta-analysis study by Abrami et al. [1] on teaching strategies in addition found that dialogue (i.e., teacher-led class discussion and conversation among students with minimal teacher participation) combined with authentic assessment also enhanced students' critical thinking.	**1 Establishing a territory**	**1 Establishing a territory**	**1**
9	Furthermore, Niu et al. [22] recommends that contextual instructions in assessment improve critical thinking.	**1 Establishing a territory**	**1 Establishing a territory**	**1**
10	Additionally, Noddings [24] concludes that the saliency of effective critical thinking instruction involving explicit teaching of critical thinking principles processed within context, though the context can vary according to instructional needs.	**1 Establishing a territory**	**1 Establishing a territory**	**1**

11	Associated with COVID-19 outbreak, Ministry of Education and Culture of Indonesia instructed all of educational institutions including universities to conduct online learning.	**1 Establishing a territory**	**1 Establishing a territory**	**1**
12	Several online platforms such as WhatsApp, Zoom, Google Classroom, and Google Meet are being used in online learning with different kind of assessments.	**1 Establishing a territory**	**1 Establishing a territory**	**1**
13	One of the available assessments used in online learning is Multimodal Digital Classroom Assessments (MDCAs).	**1 Establishing a territory**	**1 Establishing a territory**	**1**
14	MDCAs refer to any teacher-designed assessment practices requiring students to combine two or more representational modes using digital technology.	**1 Establishing a territory**	**1 Establishing a territory**	**1**

15	For example, students could create silent movies using gestures and written language to demonstrate their learning [16].	**1 Establishing a territory**		**1 Establishing a territory**		**1**
16	Previous research about Multimodal Digital Classroom Assessments (MDCAs) conducted by Fjortoft [7] shows that MDCAs may offer richer repertoires of modalities for students and teachers.	**1 Establishing a territory**		**2 Establishing a niche**	**1A Indicating a gap**	**0**
17	However, implementing MDCAs requires continuous attention to validity, literacy demands, and management of the longitudinal nature of certain MDCAs.	**2 Establishing a niche**	**1A Indicating a gap**	**2 Establishing a niche**	**1A Indicating a gap**	**1**
18	Therefore, to provide a meaningful picture of student learning, design processes should consider how evidence from MDCAs complements conventional assessment practices.	**2 Establishing a niche**	**1B Adding to what is known**	**2 Establishing a niche**	**1B Adding to what is known**	**1**
19	The other research					

	conducted by Oakley, Helen, and Ye'Elah [25] indicate that the creation of multimodal texts using tablets in early years classrooms may assist children to improve various aspects of their literacy in an enjoyable way, which at the same time improves their use of digital technology	**2 Establishing a niche**	**1A Indicating a gap**	**2 Establishing a niche**	**1A Indicating a gap**	**1**
20	These studies, conversely, do not focus on the use of MCDAs to promote students' critical thinking.	**2 Establishing a niche**	**1A Indicating a gap**	**2 Establishing a niche**	**1A Indicating a gap**	**1**
21	The current study, therefore, investigates how MCDAs can further be used to promote students' critical thinking especially for EFL postgraduate students in online learning and the challenges faced by the students in its implementation.	**3 Presenting the present work**	**1 Announcing present research descriptively and/or purposively**	**3 Presenting the present work**	**1 Announcing present research descriptively and/or purposively**	**1**
					Degree of Agreement	**19/21 = 0.9**
					Percent Agreement	**90%**

Table 3.6

Percent Agreement Between Coders

No	RAI	Percent Agreement
1	RAI 1 (Student A Semester 1)	86%
2	RAI 2 (Student A Semester)	96%
3	RAI 3 (Student A Semester 3)	93%
4	RAI 4 (Student B Semester 1)	91%
5	RAI 5 (Student B Semester 2)	100%
6	RAI 6 (Student B Semester 3)	100%
7	RAI 7 (Student C Semester 1)	84%
8	RAI 8 (Student C Semester 2)	73%
9	RAI 9 (Student C Semester 3)	97%
10	RAI 10 (Student D Semester 1)	73%
11	RAI 11 (Student D Semester 2)	90%
12	RAI 12 (Student D Semester 3)	90%

Overall, the analysis between the researcher and the expert showed similarities as the data indicated range from 73-100%.