



UNIVERSITI PUTRA MALAYSIA

***A PROBLEM-BASED LEARNING APPROACH TO DEVELOP
METACOGNITION AND WRITING PERFORMANCE OF NIGERIAN
UNDERGRADUATES***

MUHAMMAD MUKHTAR ALIYU

FBMK 2017 13



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UNDERGRADUATES**

By

MUHAMMAD MUKHTAR ALIYU

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfillment of the Requirements for the Degree of Doctor of Philosophy**

May 2017

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DEDICATION

To my parents and my entire family – for your guidance, prayers, support and encouragement

To my teachers – for your guidance and support

To my wife – for your patience and prayers throughout this journey



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UPM

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the Degree of Doctor of Philosophy

**A PROBLEM-BASED LEARNING APPROACH TO DEVELOP
METACOGNITION AND WRITING PERFORMANCE OF NIGERIAN
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MUHAMMAD MUKHTAR ALIYU

May 2017

Chairman : Yong Mei Fung, PhD
Faculty : Modern Languages and Communication

Writing is an essential language skill for undergraduates. However, many Nigerian undergraduates display various problems when writing in English. In order to develop writing skills, there is a need to develop metacognition as it influences writing. However, there is an absence of studies that explore learning approaches to be used in developing students' metacognition. Therefore, the aim of this study is to investigate the effects of a problem-based learning (PBL) approach on metacognition and the writing performance of Nigerian undergraduates. The study employed a mixed-method convergent parallel design. The participants involved in the study were an intact class of 18 second-year students taking English Composition course in a college in North-eastern Nigeria. The study was conducted over a period of 12 weeks.

The quantitative data were collected through the participants' writing activities, a metacognitive questionnaire which was administered before and after the PBL treatment, and a PBL questionnaire which was administered at the end of the whole PBL treatment. Paired-sample t-test analysis was run to compare the mean scores of the pre- and post-treatment writing scores and metacognitive scores. The results showed that there were significant improvements in the content, organisation, vocabulary, language use and mechanics of the participants' post-treatment writing scores. The statistical analysis of the metacognitive questionnaire revealed significant improvements in the participants' metacognition. Specifically, the results showed that the PBL approach had significant effect on the participants' awareness of metacognitive knowledge of task requirements, personal learning process, strategy use, text and accuracy, problem-solving and discourse features. The results of the PBL questionnaire showed the participants' positive perceptions of the use of the PBL approach in a writing classroom.

The qualitative data were collected from the participants' interactions during the PBL process and through semi-structured interviews and reflective journal writing. The analysis of the qualitative data revealed that tutor facilitations and peer collaboration involved in the PBL process helped and encouraged the participants to employ metacognitive strategies effectively to generate viable solutions to ill-structured problems and collaboratively developed their writing. The study suggests PBL as an alternative method to be used in writing classrooms, especially in the Nigerian context. The study also offers theoretical and pedagogical implications and recommendations for further research.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

**PENDEKATAN PEMBELAJARAN BERASASKAN MASALAH UNTUK
MEMBANGUNKAN METAKOGNISI DAN PRESTASI MENULIS
BAGI MAHASISWA NIGERIA**

Oleh

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Penulisan dianggap sebagai kemahiran bahasa yang penting untuk mahasiswa. Walau bagaimanapun, ramai pelajar Nigeria berdepan dengan pelbagai masalah dalam penulisan bahasa Inggeris mereka. Untuk membina kemahiran menulis, metakognisi pelajar juga perlu dibangunkan kerana metakognisi mempengaruhi penulisan. Walau bagaimanapun, tiada kajian yang pernah dibuat untuk meneroka pendekatan pembelajaran yang dapat digunakan untuk membangunkan metakognisi pelajar. Oleh itu, kajian ini dilakukan dengan tujuan untuk mengkaji kesan pendekatan pembelajaran berasaskan masalah (PBL) terhadap metakognisi dan kesannya terhadap keterampilan menulis pelajar Nigeria. Kajian ini menggunakan kaedah campuran yang tertumpu pada reka bentuk penyelidikan selari. Peserta kajian terdiri daripada kesemua lapan belas orang pelajar tahun kedua yang mengambil kursus penulisan karangan bahasa Inggeris di sebuah kolej di Timur Laut Nigeria. Kajian ini dijalankan dalam tempoh 12 minggu.

Data kuantitatif dikumpulkan melalui aktiviti penulisan para peserta, soal selidik metakognitif yang telah diberikan sebelum dan selepas menjalani PBL, serta soal selidik PBL yang ditadbirkan pada akhir sesi PBL sepenuhnya. Ujian t-sampel berpasangan telah dijalankan untuk membandingkan min skor bagi skor penulisan dan skor metakognisi sebelum dan selepas pengendalian PBL. Hasil kajian menunjukkan bahawa terdapat peningkatan yang ketara dalam aspek kandungan, organisasi, perbendaharaan kata, penggunaan bahasa dan mekanisma pada skor penulisan selepas pengujian PBL. Analisis statistik soal selidik metakognisi menunjukkan bahawa peningkatan metakognisi peserta berlaku secara signifikan. Secara khusus, keputusan menunjukkan kesan pendekatan PBL yang signifikan pada kesedaran peserta tentang keperluan pengetahuan metakognitif dalam pelaksanaan tugas, proses pembelajaran sendiri, penggunaan strategi, teks dan ketepatan, penyelesaian masalah dan penampilan wacana. Keputusan soal selidik PBL menunjukkan bahawa peserta

mempamerkan tanggapan positif terhadap penggunaan pendekatan PBL dalam kelas penulisan karangan.

Data kualitatif dikumpulkan daripada interaksi peserta semasa proses PBL, temu bual separa berstruktur dan penulisan jurnal yang reflektif. Dapatan data kualitatif membuktikan bahawa rundingan tutor dan kolaborasi rakan sebaya yang terlibat dalam proses PBL membantu dan menggalakkan peserta untuk menggunakan strategi metakognitif dengan berkesan dalam usaha mencari penyelesaian yang baik bagi menyelesaikan struktur dan meningkatkan mutu penulisan mereka secara kolaboratif. Kajian ini menunjukkan bahawa PBL boleh digunakan sebagai kaedah alternatif untuk kelas menulis karangan, terutama dalam konteks Nigeria. Kajian ini juga menampilkan implikasi teori dan pedagogi serta cadangan kajian lanjutan.



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I certify that a Thesis Examination Committee has met on 9 May 2017 to conduct the final examination of Muhammad Mukhtar Aliyu on his thesis entitled "A Problem-Based Learning Approach to Develop Metacognition and Writing Performance of Nigerian Undergraduates" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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LIST OF ABBREVIATIONS

DE	Direct Entry
ESL	English as Second Language
FL	Foreign Language
JAMB	Joint Admission and Matriculation Board
NCE	Nigerian Certificate of Education
PBL	Problem-based Learning
SSCE	Senior Secondary School Examination
ZPD	Zone of Proximal Development

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Writing is an important language skill. However, it is a skill that is complex and very difficult to acquire especially in academic settings (Paltridge, 2004) due to various factors (Mu, 2005), such as learners' language competence, writing strategies and metacognitive knowledge (Kim, 2013). In learning English as a second language (ESL) or a foreign language (EFL), students face many difficulties in their writing (Lillis & Scott, 2007; Richards, 1990; Xiao, 2007). For instance, Xiao (2007) describes ESL and EFL writing as frustrating for learners because they make little progress in their writing in spite of the efforts made. The slow progress is due to their limited linguistic competence, such as inappropriate lexical expressions, incorrect mechanics, and grammar related problems. It is also due to the lack of strategic and rhetorical knowledge of writing in English, such as coherence, rhetorical patterns, and the knowledge of revision of their writing. Such writing problems noticeably distinguish the writing of ESL students from that of the native speakers. Silva (1997) points out that the differences in the writing of the ESL and native students can be seen in the general textual patterns, argument structure, use of background reading texts, reader orientation, patterns of cohesion, the construction of sentences and lexical choices.

In this regard, the problems that the students face in ESL writing must be addressed in order to assist them in their academic achievement (Silva, 1997). This may be done using appropriate ESL writing instruction in the classroom. In the Nigerian context, for instance, the approach that is currently used in the ESL classroom could be reviewed for such a purpose. Various studies related to this subject have shown that students can improve their writing skills by means of metacognition; the studies suggest that success in writing can be attained when the writers have a developed metacognition (Harris, Santangelo & Graham, 2010; Kasper, 1997; Victori, 1999; Yanyan, 2010).

Flavell (1976) defines metacognition as the ability to think about one's cognitive process. It has two aspects: (a) the awareness of one's cognitive process and (b) the regulation of one's cognitive process. Flavell (1992) further states that metacognition has an immense impact on students' reading, writing, memory and problem-solving skills, as well as in many other areas of learning. Section 2.6 gives more details on metacognition.

In the writing context, metacognition is described as the awareness of the purpose, attributes, structures and demands of the different writing genres. It also includes awareness of the writing process, such as the recursive nature of the sub-process of planning, sentence generation, organisation, clarity, revision, spelling, punctuation

and evocation of interest in readers (Wong, 1999). Metacognition in writing also involves self-regulation in the writing process, which is the ability for individuals to regulate their cognitive process in writing, the knowledge of the writing process, and the demands of different writing genres through the conscious use of strategies such as planning, monitoring and evaluating in the writing process (Harris, Santangelo & Graham, 2010; Wenden, 1991; Wong, 1999).

To develop students' metacognition, Xiao (2007) suggests that instructional approaches used in writing classrooms, as well as the goals of the writing task and the expectation of readers, should be clearly explained to the students. Graham and Harris (2009) also suggest that students should be engaged in the writing process and be allowed them to work together to plan, draft, revise and edit their writing. For instance, students should be helped to gather and organise ideas for their writing and to learn to write sentences that are more complex. In addition, it is crucial that the instructors monitor the students' writing performance and provide ample time for writing, which would facilitate the development of students' metacognition.

Finally, to develop students' metacognition, the instructional procedures should be repeatedly given, as the development of metacognition requires time and patience from the instructors (Xiao, 2007). These suggestions are in line with the belief that writing is a social activity where students support one another during the process (McLane, 1990). The suggestions also concur with the belief that students best acquire language skills in a natural setting, when they are allowed to perform a real-life task (Ellis, 2003).

In view of these concerns, the present study proposes that a problem-based learning approach (PBL) be incorporated into ESL writing instruction to investigate its effectiveness in developing the metacognition and writing performance of ESL students. PBL provides a learning context where tutors engage the students in discussions and the students are allowed to support one another while working on a real-life problem. The use of PBL in the educational context has been encouraging in the last decade. Previous studies on the use of PBL in classrooms have found it to be effective in different aspects and areas of learning. These include improving students' metacognition in science-related fields (Downing et al., 2009; Tosun & Senocak, 2013), acquisition of subject/content knowledge (Hande, Mohammed & Komattil, 2014), development of critical thinking skills (Yuan et. al., 2008), life-long learning skills (Hosseini & Assareh, 2011) and acquisition of problem-solving skills (Bigelow, 2004). In language classrooms, PBL has also been found to be effective in improving students' speaking skills and providing a meaningful context for language learning (Norzaini Azman & Shin, 2012). PBL, which is an instructional approach that is student-centred and contextualises learning in a real-life situation (Section 2.3 for details), was developed to improve students' learning output alongside their critical thinking and other skills through collaborative work to solve a real-life problem in order to learn issues.

1.2 Statement of the Problem

In recent years, various studies have shown that many Nigerian undergraduates cannot produce writing that is free from errors (Bodunde & Sotiloye, 2013; Ngadda & Nwoke 2014). The problem could be attributed to the students' lack of metacognition (Lawoyi & Adeyanju, 2013; Olusoji, 2013) and the methods used by Nigerian instructors in the writing instruction.

Despite many years spent on learning English and the status of the language in the country (English is used as the official language as well as the medium of instruction at primary, secondary and tertiary levels), many problems have been observed in the writing of Nigerian undergraduates. Theodore (2013), for instance, points out that the students lack good communicative and imaginative skills to clearly express their ideas to the readers. They often display various grammatical and mechanical errors such as wrong tenses, punctuations, spellings, concord, abbreviations and prepositions in their writing (Bodunde & Sotiloye, 2013; Olusoji, 2013).

The writing problems could be attributed to the undergraduates' lack of metacognitive awareness in their writing. Previous studies have shown that many of the undergraduates are not aware of the knowledge required for them to accomplish their writing in English, such as grammar, ideas relevant to writing a topic, mechanics, organisation and revision of their writing (Bodunde & Sotiloye, 2013; Kamal, 2004; Ngadda & Nwoke 2014). Olusoji (2013) and Kamal (2004) also found that the undergraduates in their study tended to choose the wrong words when they wrote in English. Furthermore, these undergraduates were not aware of appropriate strategies to use to plan, generate ideas, monitor their writing progress and evaluate their writing product.

Another factor which contributes to the undergraduates' writing problems is the instructional methods used by which the students learn writing (Dabalén et al., 2000). In Nigeria, many writing instructors adopt product-based approaches in their classrooms, which mainly emphasise the mechanical correctness of the writing output and pay little or no attention to the writing process (Muodumogu & Unwaha, 2013). Some of these approaches include: (a) the guided method where students are given only guidelines to help them to write compositions, (b) the non-guided method in which students are given only topics and then are asked to produce essays on their own, and (c) the literacy method where students are provided with the basic information of the theme, structure, tone and other aspects of style and asked to write a composition (Omachonu, 2003). In these approaches, the students are left to write individually. In other words, neither the instructors nor their peers assist them in the writing process (Muodumogu & Unwaha, 2013; Omachonu, 2003). As a result, the students view writing as a boring and difficult activity, and their writing shows little or no improvement (Obi-Okoye, 2004).

As pointed out earlier, previous studies that identified problems in the writing of the undergraduates did make some recommendations that will improve the students' writing (Ngadda & Nwoke, 2014). However, most of the recommendations seem inadequate as the undergraduates' writing problems persist. Therefore, there is a need for further research to explore the use of any potential approaches that can facilitate the development of the students' metacognition and writing skills.

As highlighted earlier, the findings of previous studies on the use of the PBL suggest the suitability of the approach for developing students' metacognition and writing skills. However, to date, a review of the literature does not show that the PBL approach has been employed in ESL writing classroom in the Nigerian context. Moreover, as far as the researcher's knowledge is concerned, no published literature has been found on the use of PBL for developing students' metacognition in ESL writing. Therefore, this study aims to investigate the use of PBL for developing Nigerian students' ESL writing and metacognitive skills.

1.3 Purpose of the Study

The purpose of this study is to investigate the effects of PBL on the metacognition and writing performance of Nigerian undergraduates. The following are the specific objectives of the study:

1. To determine the effects of PBL on metacognitive knowledge and writing performance of Nigerian undergraduates;
2. To examine the use of metacognitive strategies by Nigerian undergraduates in the PBL writing process;
3. To find out how tutor facilitation and peer collaboration support the Nigerian undergraduates in the writing process;
4. To examine the undergraduates' experiences and perceptions of the use of PBL in the writing classroom

1.4 Research Questions

The following questions were formulated to guide the study using a problem-based learning approach in writing instruction:

1. What is the effect of the PBL approach on the writing performance of the Nigerian undergraduates?
2. What is the effect of the PBL approach on the metacognitive knowledge of the Nigerian undergraduates?
3. How do the undergraduates use metacognitive strategies in the PBL writing process?
4. What strategies do the tutors use to facilitate the undergraduates' writing in the PBL process?
5. How do the undergraduates support one another in the PBL writing process?
6. What are the undergraduates' perceptions of the PBL approach?

1.5 Conceptual Framework of the Study

In this study, the writing was carried out in the PBL context. Thus, three theories underpin the study and they look at both the writing process and the product. The cognitive process theory of writing process describes the recursive nature of writing. The constructivist theory supports the interactive learning environment and the use of the ill-structured problem. The metacognitive theory describes how learners retrieve their knowledge and regulate the writing process (see Section 2.2 for the detailed discussions on the theories). The writing process which was carried out in the PBL context is an independent variable of the study. The outcomes of the study, which are the dependent variables, are the effects of PBL on the participants' metacognition and writing performance. Figure 1.1 illustrates the relationship between the variables of the study.

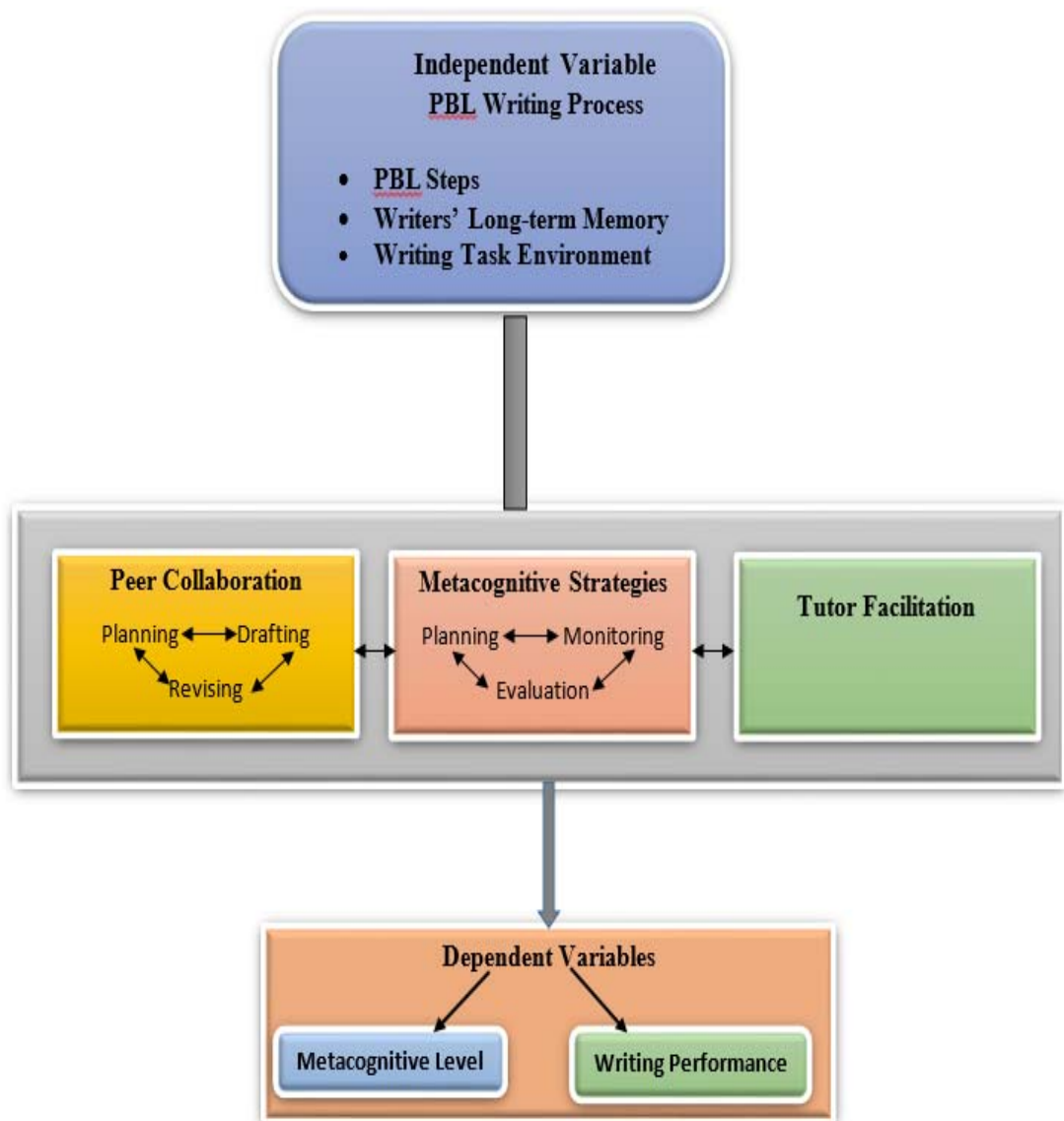


Figure 1.1 : Conceptual framework of the study

Writing as a cognitive and social activity (McLane, 1990; Raimes, 1983), which involves recursion among three components, namely, (a) the writing task environment, (b) the writer's long-term memory, and (c) the writing process (Flower & Hayes, 1981), was incorporated into the PBL process. Following the PBL steps, the participants were divided into small groups to write collaboratively using the metacognitive strategies. With the tutor's facilitation, the participants planned, drafted and revised their writing.

In the planning sessions, they were presented with an ill-structured problem as the writing topic. They generated possible causes and viable solutions to the problem from their long-term memory. They also organised the causes and the solutions in order to present them logically in their writing. Through the discussion, the participants identified learning issues and conducted self-directed learning to find more information about the learning issues to enable them to enrich their writing. During the drafting session, the participants exchanged the new information obtained from the self-directed learning, then collaboratively drafted their proposed solutions to the ill-structured problem. In the reviewing session, the participants collaboratively read and edited their writing (proposed solutions) and re-drafted it.

1.6 Significance of the Study

This study hopes to contribute to the general understanding of PBL and the use of metacognition in writing instruction. In theory, it would extend the PBL approach from its origins in known medical schools to ESL writing classrooms. The findings would provide more empirical evidence on the effectiveness of the PBL approach in developing students' metacognitive and writing skills. The results of the study may provide solutions to the writing problems faced by the Nigerian undergraduates and instructors in various ways.

Through the PBL approach, students may increase their metacognitive knowledge of writing which is the awareness of knowledge and skills required for them to achieve their writing goals. In addition, the students may also learn to work collaboratively and use the metacognitive strategies planning, monitoring and evaluation to successfully accomplish their writing task. As for the instructors, they may reveal some useful strategies they could employ to facilitate the students writing process. Finally, the study may reveal the students' experiences and perceptions of adopting PBL in a writing classroom. The experiences and perceptions may help instructors to make necessary changes and decisions in their classrooms. Future studies may also benefit from the findings of the study.

The study may further give the instructors a deeper insight on the effectiveness of PBL in developing metacognitive and writing skills. It is envisaged that the findings will offer instructors a more student-centred approach that looks at both the writing process and the output. The findings may also highlight some problems likely to be faced by both instructors and students in the PBL process.

There are other benefits of PBL to the students. While they engage in the problem-solving activities, they argue and deliberate on issues which may stimulate their thinking and promote interpersonal relationships. They would possibly learn to make decisions on their own as they decide on what to learn in the PBL activities. Students may also develop their ability to frame and ask probing questions from the tutors. They would also learn to critique sources and content of information offered by one another during the PBL activities. The students may also develop their self-directed and life-long learning skills. The students may also develop their self-directed and life-long learning skills.

The results of the study might also assist policy makers to recommend and provide a good environment for the implementation of the PBL approach of learning in schools, as well as provide the necessary materials and resources. It would guide future studies on the use of the problem-based approach in L2 learning.

1.7 Definition of Key Terms

The key terms related to the study are defined both conceptually and operationally and are presented in the following sections:

Problem-Based Learning (PBL) is an instructional method that allows learners to take control of their learning by constructing their own schema using an ill-structured problem as a trigger (Fatade, 2012). In this study, PBL means collaborative work among learners in proposing viable and plausible solutions to ill-structured problems. It involves brainstorming, hypothesising causes and solutions to the ill-structured problems, conducting self-directed learning, and writing and reviewing the proposed solutions. Savery and Duffy's PBL model (1995) was used in this study and it was administered to the participants in two cycles. The details are presented in Section 3.6.2.

Metacognition: Flavell (1976) defines metacognition as "one's knowledge concerning one's own cognitive processes or anything related to them, e.g., the learning-relevant properties of information or data" (p. 232). He also divides metacognition into two main parts: (i) the metacognitive knowledge and (ii) the metacognitive regulation.

1. **Metacognitive knowledge** is defined as awareness of the general knowledge that learners have acquired about their writing. This includes awareness of appropriate language and vocabulary, a method of improving their writing, effective strategies to use and awareness of other features of writing. The participants' metacognitive knowledge was gauged by means of pre- and post-treatment questionnaires adapted from Kim (2013) and substantiated by semi-structured interviews, which will be further discussed in Chapter 3.
2. **Metacognitive Regulation** is defined as the process during which students control and direct their writing process by using metacognitive strategies: planning, monitoring and evaluating (Wenden, 1998). To examine the use of

the metacognitive strategies by the participants, their interactions during the PBL process were audio- and video-recorded and analysed using Wenden's model (1991). The details are presented in Section 3.8.

Writing Performance: In this study, 'writing performance' is defined as the participants' writing ability to propose viable solutions to the ill-structured problems administered in the study. It also includes their ability to present and support their ideas clearly and logically using appropriate expressions, word choice and mechanical accuracy. The participants' writing performance for the pre- and post-treatment was evaluated based on the adapted Jacobs et al.'s (1981) composition profile scale which covers five writing sub-skills: content, organisation, vocabulary, language use and mechanical accuracy. Appendix R presents the modified writing scale.

Ill-structured Problem: In this study, the 'ill-structured problem' is defined as a problem related to the students' real-life situation and does not have a straightforward answer (Jonassen, 1997). It was given as the topic for the participants' writing activity (see Section 3.5.1).

Scaffolding: In this study, 'scaffolding' means any assistance provided by the tutors to the participants, as well as the support the participants give to their peers in the PBL writing process. The assistance and support given are briefly defined as follows:

- i. **Tutor Facilitation** refers to the process where a tutor helps the participants to discuss the ill-structured problem and to come up with viable solutions in the PBL process. It also refers to the tutors' use of strategies that serve as prompts, such as open-ended questions, to support and guide the participants in the writing process.
- ii. **Peer Collaboration** refers to any assistance provided by the participants to their peers to support them in the PBL writing process. Data on the tutor facilitation and peer collaboration were collected through observation of the audio- and video-recording of the PBL interactions. The data were analysed following Hmelo-Silver and Barrows' (2006) model and Nguyen's (2013) model (refer to Section 3.8).

1.8 Summary

The chapter presented the background of the study and the statement of the problem of the study. It also stated the purpose of the study and presented the research questions formulated to guide the study. The chapter discussed the conceptual framework which shows the relationship between the independent and dependent variables of the study. Finally, the chapter presented the significance of the study and the definition of key terms.

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