Importance of Higher Order Thinking Skills (HOTS in Academic Research Writing): A Structured Literature Survey

Mustafa Nasser Abdul Kareem

Department of English, College of Arts, Almaaqal University, Basrah, Iraq

Corresponding Author: Mustafa Nasser Abdul Kareem, **Email:** mustafa.abdulkareem@almaaqal.edu.iq

ABSTRACT

The aim of this paper is to explore how postgraduate students can master higher order thinking skills (HOTS) in academic research writing (ARW) by reviewing other research studies. It also aims to determine how the elements of HOTS such as analysing, synthesizing, and evaluating are important for the courses in academic communities. To achieve this purpose, the paper will explore pedagogical strategies as enlisted in the literature for enhancing students' skills in academic research writing based on HOTS. Therefore, the findings would provide writing educators with comprehensive overview on how postgraduate students are fully prepared for the advanced tasks of academic research writing.

Keywords: higher order thinking skills, Academic research writing (ARW), Tertiary educational level, Postgraduate students, Effective strategies

1. INTRODUCTION

Academic research writing is an integral part of learning process throughout a student's education. It involves applying knowledge and skills to improve students' full writing skills, and to increase their academic writing skills. Meaning that, students need to expand their knowledge of their educational choice. Thereby, students have to involve with various types of writing complex skills such as academic literacy, linguistic features, and management skills. Besides, these skills should be taught in an academic or professional way to make those students as competent writers (Castello, 2013; Scardamalia, 1991). Generally, expert writers are meant to be hard-workers when they are assigned to various tasks such as planning, problem solving, revising goals and methods, and organizing (Flower and Hayes, 1980; Scardamalia and Bereiter, 1987; Abdullah, Ahmad-Zaluki, & Abd Rahim, 2021).

Therefore, this paper aims to further explore how postgraduate students can master (HOTS) in academic research writing in relation to previous studies. It also aims to determine how writing skills are significant to courses or workshops in academic communities.

2. ACADEMIC RESEARCH WRITING

Academic research writing is a social practice, and it is the central of research process. It is also expressed as the production of academic text, which expected from high level students in the academic discourse communities. Those students need to think and act as researchers when conducting their research, and they need to develop their identity as academic researchers and social writers in a community of social practices (Castello, 2013; Kamler, 2001).

According to Dysthe (2000), academic research writing is a social practice. It is a form of participating and becoming a member of scientific community and culture. In other words, Dowse (2014) clarified academic research writing in academic community is the creation of meaning that involves certain processes such as reading, thinking, and practising within academic discipline. These processes require students to use evidence in their writing to inform readers about them. Krause (2007) mentioned that readers are likely to be more persuaded and guided by evidence. Evidence presents the information that support students' points includes articles, books, journals, and other kind of documents. These can provide the readers with details about the evidence that students use to support their claims (Krause, 2007). Nevertheless, Lonka (2013) stated that such tasks could be difficult especially among postgraduate students, and without sufficient guidance they will maintain the conception of academic writing unsuccessfully in their doctoral studies.

3. ACADEMIC RESEARCH WRITING AT POSTGRADUATE LEVEL

Academic research writing takes the form of course papers, research papers, book reports, translations, theses, and dissertations. The form of academic research writing is converging in terms of publishing, the purpose, and intended graduate and postgraduate students. Academic research writing is a crucial to task for the success of postgraduate students. It allows them to become active members of their respective disciplines. At various disciplines, students are required to write specific genres regarding academic research writing such as reporting their process of research, writing their dissertations or thesis. At that point, writing is integral part of research, which encompasses certain procedures starting from presenting students' ideas till reporting the conducted research (Dowse, 2014; Shannon, 2011; Lonka, 2013).

In academic research writing, students present new ideas and produce scientific knowledge. However, learning to write in academic manner is difficult as it requires adopting and acquiring higher order thinking skills. Academic writers involve various elements of academic research writing at postgraduate level such as cognitive factors and dimensions, which are related to HOTS. Each of these elements includes various skills that postgraduate students have to acquire in their writing. There are various skills that can be considered as complex.

4. HIGHER ORDER THINKING SKILLS (HOTS)

Higher order thinking skills are required from all students in their educational disciplines. They may include many skills such as analysis, critical thinking, synthesizing, and evaluating (Ramos, 2013).

For analysis, many scholars suggested that educators have to teach analysis by utilising certain methods that integrate, organizing, differentiating, attributing, and determine how these parts relate to one another and for the overall structure and determination (Yunos et al.,2010; Zohar).

Critical thinking is another part of HOTS, which may help students advance more new ideas, ideal viewpoints and imaginative insights (Rajendran and Idris, 2008). On the other hand, these skills are acquired in relation to topics with which students are familiar" (Slavin, 2012, p. 242). "Successful approaches to teaching thinking skills include cognitive acceleration and brain-based approaches, which may help to increase the standards of achievement and create thinking students, thinking-classrooms, thinking curriculum and thinking-schools".

The other part of HOTS is synthesizing that deals with old information to create new ones, and after that generalize precise information to draw the outcomes (Sowat, 2013). In other words, synthesizing is the draw of inference from existing knowledge to make or create something new. Synthesising is also essential students to infer links among sources, for instance essays, papers, lectures through instructors, and even individual experiences.

Several approaches are link to HOTS can be taught and advanced by utilising several frameworks to apply them in several educational disciplines. These theories or approaches can assert that critical thinking skills are the characteristics of cognitive processes. For using effective frameworks in teaching and learning HOTS, Bloom's taxonomy is one of the best frameworks of cognitive processes. HOTS can be considered as the main elements of Bloom Taxonomy as many teachers found it helpful as it makes students to engage in certain skills that are related to creative thinking, analyzing, synthesizing, or even evaluating processes (Yen, 2015). Thus, in spite of these skills are complicated, but they may be good for students to enhance their writing performance.

5. Significance of HOTS at Tertiary Educational Level

Teaching HOTS has been increased at tertiary level for many disciplines. Meaning that, teaching HOTS are essential for postgraduate students for the requirements of academic standards (Allen, 2011; Council, 2006). HOTS are also important as they foster critical thinking skills of students to achieve high level of thinking critically. Therefore, many studies need to be focused on the importance of HOTS at tertiary level to enhance students' thinking skills.

HOTS have significant implications for students in language studies as they reflect social practices as students need to think and develop certain skills (Liaw, 2007). Instructors of social sciences state that there is much need for HOTS in academic works as students have to deal with academic activities such as creativity, problem solving, and generating new ideas. Thus, instructors have to engage their students to acquire HOTS during their learning. However, those students might lack acquiring such skills, or they might be incapable of participating in the academic communities (Abdullah, Ahmad-Zaluki, & Abd Rahim, 2019; Pally, 1999).

Thereby, there should be guiding procedures for learning HOTS among postgraduate students. This can be achieved by dealing with complex skills. In other words, these guidelines should help students to improve their potentials in research writing by involving with the process of HOTS.

6. Significance of HOTS in Academic Research Writing

HOTS require the development of ideas in many disciplines of study. "They also cover all the processes of cognitive in terms of essential skills such as analyzing, synthesizing, knowledge crafting, and evaluating. These skills express logical sense of arguments with creative thinking and analysis in academic research writing" (Yanchar, 2003; Vyncke, 2012).

Academic research writing is a powerful skill that students can produce logical connected paragraphs (Nagappan, 2001). Based on this, writing can be considered as a cognitive skill, in which students may enhance their HOTS by applying efficient techniques of cognitive procedures. These techniques form HOTS to provide high level of students' potentials and improve their thinking capabilities.

The majority of students in tertiary levels have not yet mastered the writing skills in the Malaysian University English Test (MUET). In this case, there is an urgent need for instructors to help them improve their writing performance, so they may pass with good results to apply for a place in universities. Thus, for academic research writing, this study suggests that HOTS have to facilitate students' writing ability and interest for the teaching and learning of writing activities in ESL writing classrooms. Therefore, Daud (2011) suggested that there is a necessity to provide adequate frameworks for students to understand the role of HOTS in the process of teaching academic research writing.

7. Teaching HOTS for Postgraduate Students

The importance of teaching HOTS depends on conducting workshops to provide postgraduate students develop their critical thinking skills (Nagappan, 2001). To put it in another way, for developing students' thinking skills, they can use certain thinking skills to evaluate or paraphrase information from previous studies. In other words, (Langer, 1991) claimed "students acquire the kinds of critical thinking skills that are needed to use the communication devices and technologies we meet on a daily basis in our everyday living and in entry-level jobs" (p. 12).
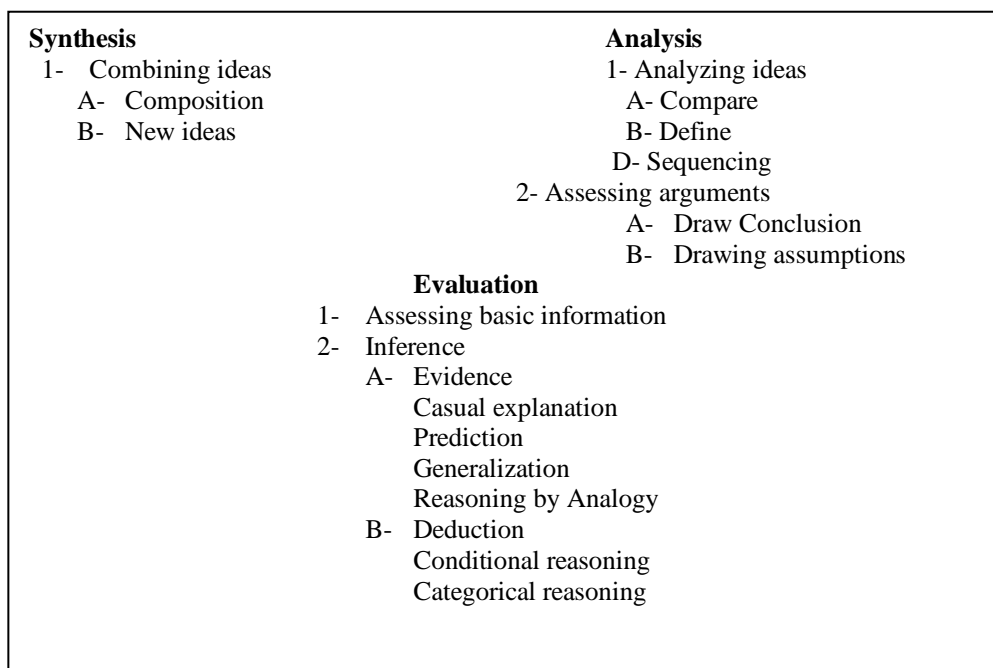
Teaching HOTS for postgraduate students is significant for the better result of the teaching and learning process. Additionally, "HOTS are not only improving student's thinking skill but also their writing performance" (Brookhart, 2010). This can be achieved by focusing on students' knowledge to increase their potential and understanding as well. In others word, the

benefit of teaching HOTS is helping students to learn something meaningful as a process to improve the student's overall performance as well as writing performance.

8. TEACHING STRATEGIES OF HOTS

Strategies of HOTS are used to develop students' thinking skills. In this case, teachers need to depend on certain models or frameworks like Bloom's Taxonomy. This framework includes three main skills to form HOTS for instance analyzing, synthesizing, and evaluation (O'Dowd, 2007; Swartz, 2014).

This framework provides students with the basics of HOTS to expand their insights for their educational goals. To emphasis the use of HOTS, a comprehensive overview of essential skills has to be taught at colleges during students learning. The diagram bellow presents the main skills of Bloom's Taxonomy: analysis, evaluation, and synthesis (Swartz, 2014).

Synthesis   **Analysis**
  1- Combining ideas   1- Analyzing ideas
    A- Composition   A- Compare
    B- New ideas   B- Define
                                              D- Sequencing
                           2- Assessing arguments
                                      A- Draw Conclusion
                                    B- Drawing assumptions

                      Evaluation
             1- Assessing basic information
             2- Inference
                A- Evidence
                    Casual explanation
                    Prediction
                    Generalization
                    Reasoning by Analogy
                B- Deduction
                    Conditional reasoning
                    Categorical reasoning

Conceptualizing HOTS

The above framework is about teaching HOTS regarding certain skills. As an example, as part of HOTS, O'Dowd (2007) mentioned that students may organize information by arranging the written structures into different parts. While in synthesizing, students can apply HOTS by creating academic context to make new patterns. The last element of HOTS is evaluation that urges students to evaluate academic context by assessing, summarizing, and giving positive or negative feedback of that context. Therefore, by using these skills, students can develop their writing skills by acquiring comprehension abilities.

9. Using Effective Strategies to Enhance Students' HOTS

Using strategies may facilitate the development of teaching HOTS for students to help them express their abilities writing critically. For this, effective strategies are much in need for the process of teaching HOTS (King, 1998).

The use of strategies requires instructors to have more efforts when apply HOTS by acquiring effective procedures such as thoroughly explanation of ideas, writing directions, and conceptual evaluation (Kauchak, 1993; Thomas, 1996). To use these strategies, instructors should set short and long runs of aims to avoid students' anxiety. Thus, those students may achieve these goals by reasonable efforts to monitor their progress (Kaminsky, 1997).

Hines (1999) recommended various factors regarding the strategies of HOTS; organization of activities, explanations, modelling of thinking, such as of applied feedback, thinking on students' thinking. The factors contribute to the development of HOTS among students. For the first factor, students need to be prepared for certain activities such as tasks analysis, problem solving, and development strategies with guidance, and after the sequence of activities. The second factor contracts with the clarification of responsibilities with sure activities for example determining the goals, providing instances, presenting responsibilities with a clear idea, and making ideas visualizing pictures. The third factor is the transition of ideas communication. The other factor deals with corrective feedback to simplify students' mistakes.

To conclude, effective strategies need to be used by the lecturers by depending on several factors such as the subject taught and the approach taken by lecturers themselves. a key point that the project team members should consider in developing instructional strategies to enhance HOTS.

10. CONCLUSION

Teaching and learning HOTS among postgraduate students may enhance their writing performance in research writing. Teaching HOTS also needs an insight and comprehensive instructions particularly at tertiary level to inspire students to engage in higher order intelligent skills. Besides, instructors have to acquire and apply effective strategies for the development of students' writing skills. Additionally, students have to practice these skills to enhance their writing performance. Thus, certain techniques need to be used by instructors to promote HOTS among postgraduate students. In other words, those instructors may use effective strategies to encourage HOTS to examine learning outcomes among postgraduate students. In this case, when using those strategies, the instructors may be able to create an academic environment for teaching HOTS in academic research writing.

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