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A Concept Paper: The Role Of Artificial Intelligence In Promoting International Baccalaureates Students' Essay Writing Skills Using Self-Regulated Learning Model (SRL)

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Abstract

Academic essay writing and artificial intelligence (AI) such as ChatGPT and Gemini converge to establish a revolutionary intersection in education, each refining and reforming one another. AI improves academic writing by providing dynamic, interactive learning environments and individualised educational experiences through cutting-edge technologies and adaptable learning methodologies. The purpose of this study is to explore the role of ChatGPT and Gemini in academic essay writing from the perception of the International Baccalaureate Diploma Programme (IBDP) students. To meet these aims, this research builds upon Zimmerman's Cyclical Model of Self-regulated Learning (SRL) and a quantitative approach involving 600 respondents from Kolej MARA Banting (KMB), Malaysia, to gain insight into students' attitudes towards AI tools in writing academic essays that reflects their essay writing skills. This study follows the Zimmerman's Cyclical model of self-regulated learning which serves as the foundation hypothesis by outlining three recursive stages planning, performance and reflection. PLS-SEM measurement is proposed as the method to be used for this research as it has several formative indicators that to be analyzed. Hypotheses testing using 5000 samples through replication bootstrapping approach to test the non-parametric PLS estimation. This includes tests to determine the f2 value, VIF and P value for the internal model. Findings predicted that the use of ChatGPT and Gemini will enhance students cognitive and metacognitive skills consists of planning, performance and reflection indicators. ChatGPT and Gemini will help to enhance student's essay writing process through idea generation, organization of points, develop sentence elaborations and making conclusions. Findings will also indicate the reception of how well AI-powered writing tools are received in the essay writing skills of IBDP students and demonstrates how AI helps students in metacognition to a considerable extent. Ultimately, the findings suggest that AI helps promote essay writing skills using the Self-Regulated Learning Model and it is beneficial to provide creative and interactive learning experiences. It is recommended for future research to design practical hypotheses, construct and analyze the possible indicators from qualitative or mixed method approach.

Keywords **:** *AI tools; Chatgpt; Essay writing; Gemini; Self-regulated learning; Self-assessment*

I. INTRODUCTION

Essays have been a component of academic evaluation since the early 1800s, when students at several European colleges were expected to compose intellectual articles for seminar discussions [44]. New students in writing English essays are often confused about how to begin writing because of difficulties in presenting ideas, word choices, organizing sentences effectively, and making errors in spelling [67]. Artificial Intelligence (AI) are portable and accessible on mobile devices hold promise for helping students develop and enhance writing abilities that are hard to learn from traditional training [46], [57], [30]. As AI is a field of computer science dedicated to solving cognitive issues related to human intellect, such as understanding, problem-solving, and pattern identification [4]. A revolutionary integration in education occurs when academic essay writing and AI converge, enhancing and modifying one another [7], [49].

Particularly, pre-university International Baccalaureate Diploma Program (IBDP) students ought to demonstrate an advanced level of writing proficiency as their assessments require producing a variety of intricate both official and informal

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writings [1], [69], [58], [62]. This curriculum is a well-known learning program that promotes international mindedness in learners that comprises international understanding, multilingualism, and global engagement [13], [5]. This formed skill, particularly cognition and metacognition, fall under the umbrella of a nexus that is Self-Regulated Learning (SRL) [36], [21]. Cognitive are skills that require the elaboration and organisation of information which plays an essential role in the processing and retention of new information, connecting it to prior knowledge so that it can be easily retrieve it for later [22]. While metacognitive skills are routines that students use to organise, track, and assess their cognitive processes, such as performing a task analysis of an issue or skimming a text before reading it assists students in preparing for an analytical approach to learning [60]. As a result, other innovative AI dialogue systems and Chat Generative Pre-Trained Transformer (ChatGPT) and Gemini have transformed the field of education owing to their vast knowledge base and exceptional conversational language interaction capabilities [69]. Along with offering significant support in the educational process, AI opens up new opportunities for creative approaches to evaluation [68]. This study aims to provide an integrated overview of AI adoption tools which are ChatGPT and Gemini on essay writing skills among students enrolled in the International Baccalaureate Diploma Program at Kolej MARA Banting (KMB). And complementing it with the Zimmerman's model of self-regulated learning theoretical framework as a lens in discussing the role of AI in essay writing skills.

AI tools such as ChatGPT and Gemini have been extensive research subjects in recent years and have been successfully used in various fields, including education, where they hold great promise for improving and enhancing the teaching and learning process. However, there hasn't been much research on how these prospects are achieved in the context of imparting academic writing [50]. Thus, this study tackles the issue and presents the findings of an analysis of AI's potential in essay writing among the IBDP students at KMB.

II. LITERATURE REVIEW

1) Artificial Intelligence in Education

The integration of AI and education has become increasingly emerged as a subject of interest [64]. The current use of AI and the potential advancement of AI applications can significantly transform the education industry and support international students [50], [43], [61], [70]. By decrypting students' clickstream data, AI analytics allows teachers to gain insight into students' performance, progress, and potential [37]. AI-powered tools have the potential to enhance a student's learning progress by automating a tracker of skills that need improvement and alerting a human teacher to assist them [42]. It has been demonstrated that using learner-centred AI tools, like ChatGPT and Gemini, increases the learning experience and may result in better learning outcomes for international students by creating unique and tailored content according to their skills and needs [64], [16].

2) Essay Writing Skills among IB Students

English academic writing is a complex, necessary, and integrative endeavour that native and international students find challenging [46]. Academic essay is an intensive endeavour involving comprehensive study, structured argumentation, and coherent writing to advance academic discussion. Students must immerse themselves in fundamental ideas that are essential to scholarly writing in order to establish the foundation for excellent writing [7]. The rigorous nature of IB assessments, including internal assessments, examinations, Theory of Knowledge (TOK) and the Extended Essay (EE), ensures that students engage in meaningful experiences that broaden their worldview and equip them with the skills to communicate and collaborate effectively across cultural boundaries [25]. A research study involving 58 IBDP alumni examined their satisfaction with their writing abilities after completing a two or four-year post-secondary program. The findings revealed that the IBDP significantly contributed to developing their writing skills, making it easier for them to succeed in college courses [65].

3) Use of Artificial Intelligence in Essay Writing

Writing for academic purposes may be challenging, emotional, and complicated [46]. The ability of advanced AI writing tools such as ChatGPT and Gemini to quickly generate content enables writers and content producers to compose lengthy documents with impressive efficiency [26]. Since these writing tools are helpful for students when it comes to providing instant feedback and improving writing abilities [29], have demonstrated how these tools boost students' writing skills and sense of self-efficacy.

However, it is pointed out that more developments in AI technologies are needed to enhance students' conceptual comprehension and efficiency in a variety of academic domains [18]. Concerning ethics, analysing the impact of ChatGPT and Gemini on plagiarism detection, highlighting the need for clear regulations, and teaching students about the limitations and proper use of AI [24]. Furthermore, ChatGPT and Gemini

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have proven to promote originality in essay writing [69], [58], [62], presenting fresh perspectives on the potential applications of AI beyond mere encouragement [7], [49].

Figure 1 below illustrate the process of how ChatGPT and Gemini assist student's essay writing process. The first step starts with students inserting an appropriate prompt text to generate the content based on the interest keywords and issues. Once the main content was developed, student will further regenerate the ideas to get further exploration of concept and discussion. All points and ideas will be compiled and organize to develop the essay writing. Final step is to do assessment on grammar and paraphrasing the sentences before the final essay writing. Throughout the process, student will learn on how to be creative to produce a good essay. These process also will benefit the students to be smart to use the technologies and time-savvy.

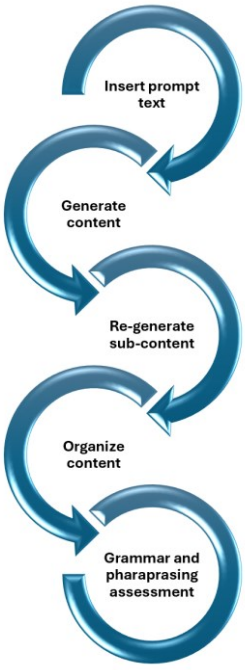

Figure 1 Essay writing process with the use of ChatGPT and Gemini

4) *Self-Regulated Learning (SRL)*

This study follows the Zimmerman's Cyclical model of self-regulated learning (2000). It serves as the foundation for this study's hypothesis by outlining three recursive stages that facilitate self-regulated learning: the forethought phase (planning), the performance phase (doing) and the self-reflection phases (reflecting), making it in accordance with the aim of this study, which is to investigate the way IB students engaged in promoting their essay writing skills, mainly cognition and metacognition, through the use of ChatGPT and Gemini [36], [48], [59].

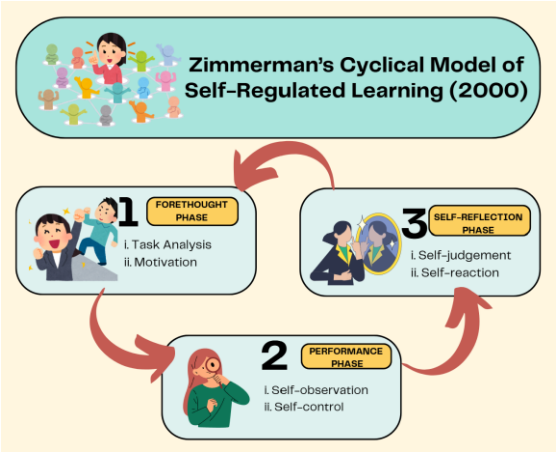

Figure 2 Self-developed graphical process adapted from Zimmerman's Cyclical model of self-regulated learning (2000)

A. *The Forethought Phase*

The initial phase involves the students approaching the work, analysing it, determining their ability to execute it successfully, and designing strategies and goals on how to do it. The students complete two primary tasks during this phase. First, they start by analysing the characteristics of the task and developing a preliminary model of how it ought to be completed. Second, they condition their motivation and effort by analysing the task's value to them [19].

i. Task Analysis

The self-regulatory cycle starts with the task analysis where this is fragmented into smaller pieces and the personal strategies [54], [43]. In this phase, goal-setting and strategic planning are established as crucial prerequisites for self-regulation. While establishing their goals, students consider two key factors: the performance level they aim to achieve and the assessment criteria [5], [46].

The standards that will be used to evaluate the performance are known as the assessment criteria (e.g., a criterion for a summary must include the primary idea from the material summarises). The second component that influences goal setting is the student's intended level of performance, which interacts with the assessment criteria [46], [55]. For instance, achieving an exceptional performance is not the aim, and the student shows little interest in the activity. This student will perform mediocrely since they don't value the task enough to put in the effort required for a high level. By selecting the

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tactics required to complete the job, strategic planning creates an action plan. Whereby planning is a crucial self-control mechanism and a reliable indicator of success [12]. According to research, the former spend more time planning, which is crucial for their higher achievement [34], [8], [19]

ii. Self-Motivation

Learners foster their motivation by addressing variables such as self- efficacy and outcomes expectations [11], [46]. The first refers to the individuals' convictions about their ability to succeed in completing tasks [2], [47].and the second entails expectations about the success of a learning activity [10], [19]. In a word, the higher these convictions and expectations, the more a learner becomes motivated to make the necessary efforts to deal with the task [36].

B. *The Performance Phase*

In this performance phase, students must maintain focus and employ suitable learning techniques mainly for two reasons. First, to ensure they remain motivated, and second to monitor their advancement towards their objectives. Both entail distinct behaviours and procedures that vary based on the self-regulation methodology employed. [9] state that self-observation and self-control are the two primary processes that occur during the performance [19].

i. *Self-Observation*

There are two kinds of actions that students may perform to be able to successfully self-observe: cognitive actions and acts which need external support. Self-monitoring, sometimes known as metacognitive monitoring or self-supervision, is the first type of exertion. Self-monitoring involves assessing the quality of the process, followed by comparing the quality that is produced originally with detailed criteria [53].

The second action type that encourages self-observation is self-recording, which involves encoding the activities performed throughout a performance. Following the completion of the activity, it is an external method to help monitor and enhance reflection. Students can use self-records to identify things that could have previously gone unnoticed [19].

ii. *Self-Control*

Self-control includes metacognitive and motivational strategies aimed at maintaining concentration and motivation such as self-instructions and help seeking [11]. In simpler terms, learners need to remain motivated and focused to accomplish their goals; thereby, they may give themselves instructions to raise their interest in the task and focus on their goals. Further, they may consult a more knowledgeable source for assistance (e.g., instructor, peer, parent...) [42], [15].

C. *The Self-Reflection Phase*

Throughout this phase, students evaluate their work and create arguments on their findings. The individual's feelings, good or bad, depend on their sense of style and how they defend their achievements or shortcomings. These emotions will impact their drive and self-control in the future [19].

i. *Self-Judgement*

Students assess their performance using a process known as self-judgment, which compromises Self-evaluation and causal attribution. Students utilise self-evaluation to assess their performance about the assessment criteria and their desired performance level [61]. For students to develop the ability to evaluate themselves using the assessment criteria, teachers must provide opportunities for reflection on their mistakes [9], [20], [6]. In contrast, students' self-explanations regarding the reasons for their success or failure in a task are referred to as causal attributions. Since the attributions are based on success or failure, as discussed in the next section, they trigger emotions that affect motivation and expectations for future task performance [19].

ii. *Self-Reflection*

According to Zimmerman and Moylan (2009), the principle of the process is to take into account two when talking about self-reaction: self-satisfaction/affect and adaptive/defensive decisions. Self-satisfaction is when students evaluate themselves according to their subjective and cognitive reactions [9], [15]. This process has been extensively researched: acts with favourable results enhance motivation for future performance, while actions with negative outcomes avert the task [3], [56]. Making defensive or adaptive judgements to achieve better results is the second phase. Students who make adaptive decisions are willing to repeat the activity, whether they employ the same strategies or attempt new ones [19].

5) Cognitive Skills

The integration of Artificial Intelligence (AI) tools into modern education presents a significant opportunity to enhance cognitive skills development, particularly in critical thinking [23]. ChatGPT and Gemini can analyze student performance and provide customized support, ensuring that each learner receives instruction that is aligned with their proficiency level and learning style [23], [17], [31]. Fundamental cognitive capabilities allow students to comprehend information, solve issues, and make decisions. For students to thrive academically and in their future

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employment, it is imperative that they develop these skills. ChatGPT and Gemini can create innovative approaches in improving the development of cognitive skills, especially in the areas of analytical reasoning, problem-solving, and critical thinking [17], [31]. AI tools play a major role in the development of cognitive skills through creating dynamic and interactive learning environments.

6) Metacognitive Skills

The metacognition is crucial for learning because students must understand the requirements of their assignments and objectives, as well as how to employ methods and what is needed to accomplish those requirements [33], [35]. Metacognitive abilities are believed to be crucial for identifying reliable information and for independent, lifelong learning [35], [52]. In education, metacognition is essential because it helps students become self-aware, introspective, and capable thinkers. Examples of exercises that teachers can use to promote critical thinking and metacognitive abilities are covered, including constrained choice tasks and metacognitive prompts. Furthermore, generative AI tools like ChatGPT and Gemini can be integrated to produce engaging and customised learning experiences that promote metacognitive reflection and standardise the growth of critical thinking abilities [33], [35], [52], [28]. By integrating these tools into the classroom, teachers can track student progress, create customised learning materials, encourage group discussions, give personalised feedback, and assess their own teaching methods.

III. PROBLEM STATEMENT

The use of AI in writing essays has become a necessity and is considered a facilitation tool that not only saves a lot of time but also facilitates the process of composing and forming interesting sentences [45], [23]. Among the frequently used applications are ChatGPT, Gemini, Jasper AI, Quillbot, Grammarly, Copy.ai and Notion AI [40]. However, to what extent can this AI application improve the quality of students in planning and producing quality essay writing? Can this AI application help improve students' performance and skills? In these proposed research, two most commonly used AI writing tools will be used for analysis which are ChatGPT and Gemini. In order to use these AI tools, student needs to be proficient in terms of understanding and should have knowledge in operating the application. In addition, appropriate skills are required for students to master the technology while complying with the technological and AI etiquette [38], [23], [17], [31], [28], [35].

Self-regulated learning is believed to help in evaluating and measuring the level of students' skills and competence in writing essays [39]. SRL is also expected to be used as a reference for self-reflection that helps students to assess their own strengths and weaknesses in the use of AI for essay production [41]. It can also provide references for improving the skills and competencies required by students. By adapting the Zimmerman's Cyclical model of self-regulated learning (2000), thus the research question was developed;

RQ: To what extent does ChatGPT and Gemini assist IB students engaged in essay writing in deploying their metacognitive abilities to perform academic tasks?

The following hypotheses are suggested as answers to the previously mentioned research question:

H_1: The use of ChatGPT and Gemini will engage students and influence the planning process of essay writing

H_2: The use of ChatGPT and Gemini will engage students and influence the performance of essay writing

H_3: The use of ChatGPT and Gemini will engage students and influence the students' self-reflection

IV. CONCPETUAL FRAMEWORK

Figure 3 illustrate a conceptual framework on how the AI were predicted to help student engagement and influence the student's essay writing based on three indicators which are the planning process, the performance process and the self-reflection process.

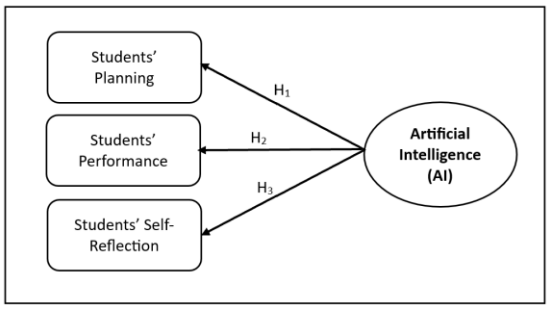

Figure 3 Conceptual Framework

V. PROPOSED METHODOLOGY

This research will investigate on how AI contributes to the enhancement of SRL among IB Diploma students in Kolej MARA Banting, Malaysia. A quantitative approach has been adopted to conduct this study by collecting and analyzing data involving 600 respondents. Questionnaire developed and employed to report on student's thought, assumptions, perceptions, and decisions with regards to the use of AI applications and software to

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promote their cognitive and metacognitive thinking. The data collected were then analysed using the SEM-PLS measurement software to test the hypothesis formed. The bootstrapping method was used to test the constructed hypothesis because it is a non-parametric method that can determine the accuracy of PLS estimation [4]. This PLS and bootstrapping method is recommended in the structuring model using an estimate of 5000 samples through replication to examine the research hypothesis. This includes tests to determine the f2 value, VIF and P value for the internal model [66], [27].

VI. DISCUSSION

This study sought to delve into the impact of AI tools which are ChatGPT and Gemini in assisting language learning on the essay writing skills of International Baccalaureate students. To provide a comprehensive analysis of this research, a quantitative method using SEM-PLS method will be used. Hypotheses will be tested to yield a significant insight, revealing substantial enhancements in the IB student's essay writing for both cognitive and metacognitive aspects in which later categorized into three dimensions: student's planning; student's performance; and student's reflection [14], [23], [17], [31], [28], [35]. Results will generate empirical report on how ChatGPT and Gemini will help to enhance student's essay writing process through idea generation, organization of points, develop sentence elaborations and making conclusions.

VII. CONCLUSION

Although generative AI such as ChatGPT and Gemini has the potential to offer students highly customised and interactive learning experiences, its incorporation into educational practices must be approached responsibly and ethically, with the assistance of the Self-Regulated Learning (SRL) theoretical framework [32]. The framework has tended to examine how AI tools plays a role in enhancing the International Baccalaureate (IB) students' essay writing skills. In this study, we have explored and expanded on how students of the IB Diploma at Kolej MARA Banting (KMB), Malaysia, adopted the facilitation tools of AI in their proficiency of understanding knowledge in applying essay writing and academic tasks.

Based on the SRL framework, the study has presented a generalised Zimmerman's Cyclical model of self-regulated learning (2000) that abstracts three recursive phases that support self-regulated learning: the forethought phase (planning), the performance phase (doing) and the self-reflection phase (reflecting), suggesting ways in which helps students evaluate and measure their skills and competence in essay writing with the presence of AI. It is predicted that the use of artificial intelligence will engage students and influence the planning process, the performance and the students' self-reflection in essay writing. This will provide an empirical evidence and have significance impact towards the teaching and learning methodology that can be practiced by the educators.

The given work is also intended to serve as a guide serve as a guide for future research and design, helping others to navigate this vast space design, constructing practical hypotheses, and distinguishing between essentially distinct types of combination methods.

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