

Exploring the Effects of Digital Writing Software on Pre-Service Teachers' ESL Academic Writing

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The preparation of pre-service teachers (PSTs) for future English as a second language (ESL) writing instruction requires not only strong writing knowledge but also effective pedagogical practices. Despite growing interest in digital technologies, little is known about how digital writing tools can support PSTs' academic writing development. Addressing this gap, this study explores the effects of digital writing software on pre-service teachers' ESL academic writing. Grounded in Vygotsky's social constructivism theory, 20 PSTs in their second semester of a one-year foundation program for the Bachelor of Teaching (TESL) at one Institute of Teacher Education (ITE) in Malaysia engaged in White and Arndt's (1991) process approach to writing, integrated with Elola and Oskoz's (2017) digital literacies framework. Participants produced academic writing projects (i.e., digital writings) through e-book publication, combining textual and visual elements via digital writing software. Using a deductive approach and qualitative content analysis of reflective journal entries (n = 20) and semi-structured interviews (n = 6), the study identified seven major themes. Four positive themes emerged are better-managed process writing, increased writing motivation, ease of process writing, and increased recursion of process writing while three challenges were noted: insufficient tool features, technical issues, and time constraints. Findings indicate that digital writing software can meaningfully affect the pre-service teachers' ESL academic writing, although technical limitations require careful instructional planning. These results contribute to the evolving discourse on digital writing pedagogies and suggest avenues for future research on sustainable technology integration in ESL teacher education.

Keywords: digital writing software, ESL academic writing, pre-service teachers, process approach to writing, EFL

INTRODUCTION

Success in teaching and learning of English language, particularly of English as a second language (ESL) academic writing relies on the teachers and pre-service teachers' (PSTs') ability to assume control of their proficiency development. They need to continuously identify the flaws in their classroom instruction, keep updated with the viable teaching practices, and stay motivated to apply any changes to their teaching practices whenever necessary (English Language Standards and Quality Council [ELSQC], 2015). In line with this vision, it is essential for PSTs to be prepared with the necessary skills to teach English language, including ESL writing, to their diverse learners (Lu, 2002; Moody, 2020). Equipping PSTs with both writing knowledge and writing pedagogies during their teacher training is considered crucial for enabling them to provide effective ESL writing instruction to their future students (Kee et al., 2023).

The incorporation of technology into the process writing requires greater rigor, as evidenced by the rapidly increasing use of technology in classrooms. Through the use of a range of digital technologies, it will inspire students to produce and publish written works in digital form. Teacher education programs such as Teaching English as a Second Language (TESL) programs have embedded courses

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to garner the PSTs' digital literacies, especially in English language teaching (Aziz, 2008; Costa, 2023). In this regard, Shiratuddin et al. (2004) as well as Kee and Razali (2022) observed the advantages of producing digital writings (i.e., improved essay presentation, better storage of digital writings, establish writer's authorship, enhance writer's experience in writing alternative genre, encourage self-publishing, and ease the provision of lecturer's digitized feedback), which enable the teaching of writing using process approach to writing in a more flexible and recursive way.

Problem Statement

Many ESL teachers struggle to decide on the best writing approach to be used in their writing classrooms (Kee & Razali, 2019; Li, 2021; Pour-Mohammadi et al., 2012). Palpanadan et al. (2014) stated that many writing teachers consider process approach to writing to be time-consuming, leading them to prefer the traditional method (i.e., product approach to writing) in teaching ESL writing to their students despite its weaknesses (i.e., too structural and teacher-fronted). Many educators, including teacher educators at the Institutes of Teacher Education in Malaysia appear to prefer product approach to writing over process approach to writing in teaching ESL writing in general although there are adverse perceptions given on it. Similarly, the unfamiliarity with English grammar rules, limited vocabulary, and difficulty expressing complex ideas in English language, and a lack of confidence in language proficiency further contribute to the difficulty in teaching ESL writing among many students (Hossain, 2024).

This issue needs to be rectified as early as during the PSTs' teacher training tenure. In resolving the abovementioned issue, both schools and tertiary educational institutions take on the responsibilities to shape the effective practices, especially in the provision of writing instruction (Bowden et al., 2021; Hudson et al., 2009). Writing skills have to be not only taught but also experienced, hence the PSTs ought to be made aware of and write on using process approach to writing, which is amalgamated with digital technologies as opposed to the usual way they produce their writings. In sum, Kee et al. (2018) alerted the stakeholders such as teacher educators and PSTs on the importance to strengthen teacher education to determine and address the PSTs' writing weaknesses above all else.

Research Objective

In this study, the researcher explores the effects of digital writing software on PSTs' ESL academic writing within teacher education programs offered by the Institutes of Teacher Education in Malaysia.

Research Question

This study attempts to answer the following research question: How does the use of digital writing software affect PSTs' ESL academic writing?

LITERATURE REVIEW

The literature review for this study is organized into three main sections: (1) social constructivism theory, (2) process approach to writing, and (3) digital literacies.

Social Constructivism Theory

Vygotsky's social constructivism theory emphasizes that individuals' learning occurs as a result of social interaction (Storch, 2018). According to Derry (2013) and Saleem et al. (2021), social interaction not only facilitates but also precedes a learner's cognitive development. Through interaction, learners collaboratively construct knowledge, leading to more effective understanding. In the context of contemporary education, the integration of digital tools further amplifies opportunities for collaborative engagement. In this study, the social interactions underpinning the PSTs' academic writing involved communication with the researcher/lecturer and peers within a digital writing environment, facilitated by the digital writing software.

Process Approach to Writing

White and Arndt (1991) described the process approach to writing as a recursive, non-linear method involving six stages: planning/generating ideas, focusing, structuring, drafting, evaluating, and reviewing. Recognizing that writing is a complex cognitive activity, Rahman (2017) stressed the importance of understanding appropriate writing practices, as students articulate ideas and experiment with language. In Malaysia, the process approach to writing has been incorporated into the ESL writing curriculum; however, concerns persist regarding its inconsistent and inadequate implementation (Kee & Razali, 2019). In addition, difficulties in writing skills stem from students' lack of technique, which process writing addresses through stages like planning, drafting, and revising (Mlundi, 2024). Addressing these concerns, this study applied the writing stages more flexibly and recursively, enabling PSTs to navigate the process writing dynamically while producing their academic writing (i.e., digital writings) using digital writing software.

Digital Literacies

Pre-service teachers (PSTs) are positioned as the future catalysts for digital technology integration within educational settings, particularly in primary schools (Samani et al., 2014). Teachers and students can integrate digital technology to enhance the engagement and relevance of learning, as research indicates that students have a positive attitude toward the inclusion of digital technology and prefer its use across all subjects (Karakostantaki et al., 2025). In line with this vision, the digital literacies acquired during teacher training are expected to be transferred to future students, especially in the instruction of writing skills, making the learning of it more interesting and meaningful. Furthermore, Foltos (2017) highlighted that digital technologies not only diversify instructional strategies but also enhance the accessibility and comprehensibility of pedagogical practices. In this study, PSTs employed Elola and Oskoz's (2017) framework of digital literacies to produce academic writing in alternative genres. Their work incorporated the modality of e-book publication, multimodal representations through textual and visual elements, and the use of digital writing software as the primary medium.

METHOD

This section discusses the research design, research participants, and research procedure. It also describes the data collection methods and data analysis methods.

Design of the Study

Guided by a theoretical and conceptual framework, a deductive approach was employed to compare existing constructs with the data obtained (Elo & Kyngäs, 2008; Pearse, 2021). This study used a deductive qualitative design, guided by a theoretical framework. Reflective journals entries and focus group interview responses were coded, categorized, and organized into themes and sub-themes based on established theories.

Research Participants

The study sample consisted of 20 PSTs; all aged 19 years old. These PSTs enrolled at one Institute of Teacher Education (ITE) after completing the Malaysian Certificate of Education or *Sijil Pelajaran Malaysia* (SPM). All participants had achieved distinctions in at least one of five subjects, including English Language, and obtained at least a credit in Malay Language and History. The cohort comprised 3 males and 17 females, who were in the second semester of a one-year foundation program for the Bachelor of Teaching (TESL).

Setting Context

The course undertaken by the PSTs was Language Support II (a pseudonym). This course focused on enhancing lexical resource, analyzing features of different academic papers, reading and reviewing academic texts critically, and ultimately producing 1000-word academic papers as digital writing projects.

Research Procedure

The researcher/lecturer provided initial training on how to use the digital writing software (i.e., iSpring). The PSTs were introduced to a process writing module, which they accessed and worked on using the digital writing software (see Appendix A). The intervention was conducted from Week 1 to Week 10, comprising a total of 20 hours of face-to-face sessions under Language Support II, which formed part of their undergraduate support program.

The PSTs received input on academic writing formats and were tasked with selecting a topic related to given themes for their digital writing projects. The e-mind map templates for planning/generating ideas, focusing, and evaluating, along with a 1000-word digital writing template for structuring, and drafting features (e.g., typing, inserting, deleting, adding) and the preview function available in the digital writing software, supported their process writing.

During the planning/generating ideas, focusing, and structuring stages, PSTs developed ideas, formulated thesis statements, and organized content into categories. Drafts were produced during the drafting stage. Feedback from the researcher/lecturer and peers was incorporated during the evaluating stage, while revisions were made during the reviewing/revising stage. The process writing allowed for recursion, with PSTs moving back and forth between stages as necessary. The final drafts were published as e-books. Following each stage, PSTs completed reflective journals based on Gibbs' Reflective Cycle, a reflective learning model (University of Birmingham, 2015).

Data Collection Methods

Two qualitative data collection methods were used. The first method involved analyzing the reflective journals entries written by PSTs. To triangulate the data, a focus group interview was conducted as the second method.

Data Analysis Methods

The reflective journal entries and focus group interview responses were analyzed in two stages. A coding frame was constructed based on established theoretical constructs. Meaning units were coded, data were categorized according to commonalities, and key quotes were highlighted. The categories, codes, and themes were discussed, and the underlying meanings were organized into themes and sub-themes.

FINDINGS AND DISCUSSION

The findings of the study consisted of the positive as well as the negative ways the digital writing software affected the pre-service teachers' ESL academic writing. The findings were further discussed with current and relevant literature review.

Positive Ways Digital Writing Software Affected the Pre-Service Teachers' ESL Academic Writing

Better Managed Process Writing

When the PSTs reviewed more rigorously their academic writing, this improved their writing skills as they participated in a better managed process writing. The PSTs reviewed their digital writings with

more rigors as opposed to the usual way they reviewed their previous writings. RP10 (A) analyzed, “I was able to reflect upon my writing[,] which gave me a chance to check the end result of the e-book”. The PSTs improved their writing skills when they used the tool. RP10 (A) felt, “I was really glad that I was given the opportunity to enhance my writing skills using this e-book writing software. I think that this will really help me in the upcoming years of my teaching course”. The PSTs noted that they participated in a better managed process writing. RP19 (A) concluded, “My overall experience is I’m glad to be exposed to this way of learning”.

It was worth mentioning that the analysis of focus group interview responses supported the developed theme of better managed process writing. RP19 (A) improved her writing skills: “Okay, eh em, [*sic*] from these past weeks, I think my writing becomes more good [*sic*] and I improve a lot because using e-book, the the [*sic*] words, the the [*sic*] use of font is quite big, so I can see clearly what I’m writing and I can see what [*sic*] what is my grammatical error [*sic*] and something like that, so I think this software is so good for me and I think I do improve a lot using this software”. As a conclusion, the use of digital writing software resulted in a better managed process writing.

Increased Writing Motivation

The PSTs wrote the academic writing with more excitement. RP14 (A) felt excited: “I am always excited and happy to learn something new”. In addition, the PSTs possessed a good opinion of the tool. RP4 (A) felt glad: “I am very happy that this software was created and can be platform for students to do an effective writing”. On top of that, the PSTs felt satisfied with their final products. RP10 (A) felt the satisfaction: “Upon publishing the e-book I was able to reflect all the benefits that I have gained writing it throughout this session from the beginning till the end”. Lastly, the PSTs expressed the intention to continuously use the tool in the future. RP5 (A) planned, “I will try to learn more about the software and explore more about it so that I can use it more often in the future”.

Additionally, the analysis of focus group interview responses advocated the increase in writing motivation. RP15 (A) thought that writing was exciting: “I thought it is interesting and I’m amazed with this new techniques [*sic*] because it could enhance my ah [*sic*] writing skill in academic writing so I think this tool is very helpful for me”. In sum, the use of digital writing software resulted in an increased writing motivation.

Ease of Process Writing

The PSTs found that the digital writing software was a helpful tool in their academic writing. RP15 (A) felt, “I’m hoping this software can be used for the other students as well as it is a really helpful tool”. Additionally, the PSTs thought that the tool was user-friendly. RP18 (A) felt the easiness, “I think that e-book is more user-friendly as it is a virtual big. I am amazed that we can write our own book easily”. The PSTs also noted that the use of the tool was time efficient. RP4 (A) concluded, “My overall experience using this software is I am satisfied with the e-book writing software and I can save more time when [I] write an academic writing”.

Moreover, the theme of ease of process writing was clearly highlighted via the focus group interview responses. RP7 (A) experienced the time saving factor: “Ah, so, [*sic*] for me, I think it makes my process writing become faster because the organization is easier, we did our mind map and everything and ya [*sic*] we also identified the purpose and the audience for our writing so it makes writing faster and ya [*sic*] it save [*sic*] my time”. Thus, this summed up that digital writing software indeed facilitated and eased the process writing.

Increased Recursion of Process Writing

The PSTs visited or revisited the process writing stages more recursively than the usual way they participated in process writing when producing their academic writing. RP16 (A) planned, “I would

rewrite my paragraphs if it is not good enough by checking the supporting details that are used in a paragraph to make sure no points are repeated”.

Furthermore, the responses from the interview acknowledged the final developed theme of increased recursion of process writing. RP7 (A) experienced a process writing, which is recursive: “Em, [*sic*] basically I won’t follow the sequence because every time I review my essay, there’s something I need to amend and [*sic*] so I would go back to the drafting stage and add on the ideas because sometime [*sic*] I found that my there’s [*sic*] some clashes between my I em [*sic*] between my topic sentence [*sic*] so I have to review back my idea before, then make changes”. Hence, the use of digital writing software resulted in an increased recursion of process writing.

All in all, four themes were developed from the analysis of the reflective journal entries and which were triangulated with the analysis of focus group interview responses to illustrate the positive ways the use of digital writing software affected the PSTs’ ESL academic writing. The four developed themes were concluded as such: (1) better managed process writing, (2) increased writing motivation, (3) ease of process writing, and (4) recursion of process writing which were summarized by the researcher in a thematic map (see Figure 1) as follows:

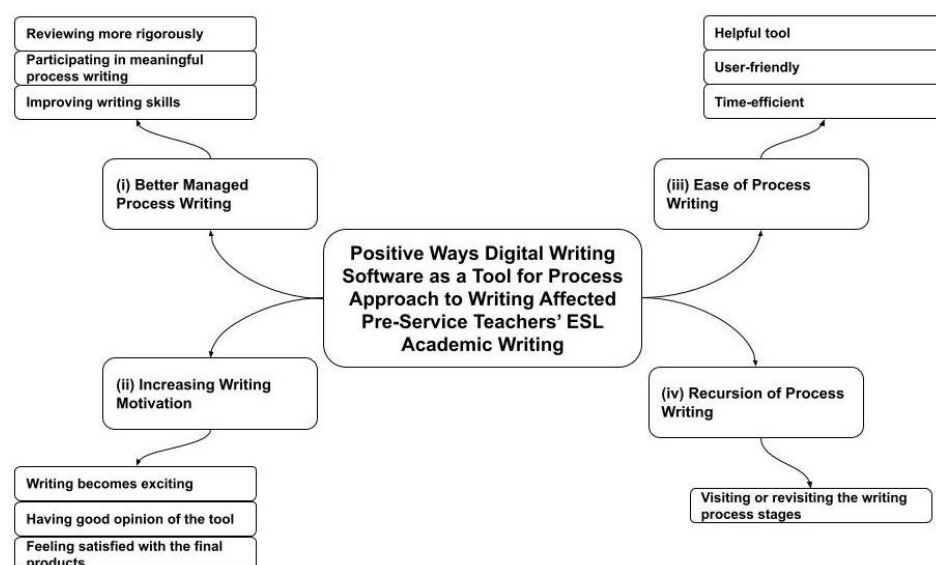


Figure 1

Positive ways digital writing software affected pre-service teachers' ESL academic writing

To further discuss, the digital writing software leads to a better managed process writing. With the tool, the PSTs supply and obtain feedback and further review and revise their digital writings. This improves the PSTs’ writing skills, especially when they participate in a better managed process writing. This finding corroborates Ali and Yunus (2004) and Hassan et al.’s (2020) views; the students who understand and experience process writing will possibly produce a better piece of writing. The PSTs write and publish the digital writings in an e-book form with better quality alongside improving their writing skills when participating in the better managed process writing.

Affirmatively, the use of the digital writing software results in an increased writing motivation when the PSTs write academic writing with more excitement, have a good opinion of the tool, feel satisfied with their final products, and express the intention to continuously use the tool in the future. Vengadasamy (2002) indicated that teachers have to motivate their students to learn English language,

and ESL writing in particular. In addition, the results correspond with Razali (2013) and Mo's (2024) views on the viability of digital technologies in enhancing writing instruction with the elements of multimodality and interactivity. The use of digital writing software enhances process writing and produces digital writings in an e-book form; hence, the PSTs experience increased writing motivation.

Consequently, using the digital writing software adds convenience to the process writing when the PSTs find it to be a helpful tool in their academic writing, is user-friendly and is time efficient. The PSTs experience an ease of process writing when they write the digital writings and publish the final drafts in an e-book form within the time allocated for the deadline, all of which is made possible using the digital writing software.

Lastly, an increased recursion of process writing is brought about through the use of the digital writing software. In this context, the PSTs do many writing tasks simultaneously when they move back and forth the process writing stages. The idea of process approach to writing as postulated by White and Arndt (1991) claims that the writers move back and forth the process writing stages of planning/generating ideas, focusing, structuring, drafting, evaluating, and reviewing/revising before finally producing their final drafts in an e-book form. As a conclusion, the results indicate that the use of digital writing software affects positively the PSTs' ESL academic writing.

Negative Ways Digital Writing Software Affected the Pre-Service Teachers' ESL Academic Writing

Insufficient Tool Features

The PSTs endured the challenge of insufficient tool features when using the digital writing software. RP15 (A) noted the limited design of the e-mind map templates: "The design for template is limited". In addition, RP19 (A) highlighted the dullness of the e-mind map templates: "Some of the templates are quite boring". On top of that, RP13 (A) confessed on the limited editing options: "It was bit dull as there is not much [sic] options to edit your work".

Technical Problems

The PSTs faced the challenge of technical problems when using the digital writing software. RP6 (A) noted the technical problem she experienced: "The negative aspect is writer might take time to deal with the technical and software issues". Additionally, RP5 (A) noted her limited computer skills, which hindered her writing progress: "It does not feel that good because I prefer doing draft on structuring my essay with pen and paper. I don't use gadget or computer much to write essay". RP20 (A) related her bad writing experience: "I was so happy that I almost finished doing my e-book! However[,] unfortunate moment happened when the computer I used was having some problems, making me failed to save the e-book that I have done. I was so sad, because I have to start from zero again."

Time Constraints

The PSTs encountered the challenge of time constraints when using the digital writing software. RP4 (A) noted the extra time spent in exploring the tool: "The only negative aspect that I go through while using this e-book writing software is I need some times [sic] to learn and explore the use [of] this software because this is my first time using it". On top of that, RP12 (A) spent a considerable amount of time in writing using the tool: "However, the negative aspect of it is that it consumes so much of time". In addition, RP20 (A) noted the need to spend more time and effort in producing the digital writing: "It does take a lot of [sic] efforts especially for a first-timer".

In essence, the negative ways the use of digital writing software affected the PSTs' ESL academic writing based on the three developed themes were summarized by the researcher in a thematic map (see Figure 2) as follows:

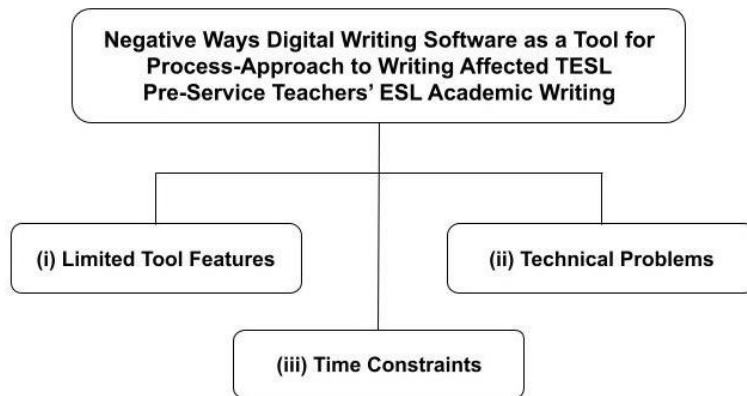


Figure 2

Negative ways digital writing software affected pre-service teachers' ESL academic writing

To explore this aspect further, the use of digital writing software entails certain limitations, including insufficient tool features, technical problems, and time constraints, which pose challenges for the PSTs in producing their academic writing. Even though the students are known as digital natives who have never experienced life before the Internet, many are unable to apply their digital technology knowledge in formal English language learning (Razali, 2018). Not all PSTs are proficient with the use of digital writing software in producing their academic writing (i.e., digital writings); hence, the challenges faced by PSTs are anticipated and needed to be attended to. To conclude, the use of digital writing software results in the positive ways the tool affects the PSTs' ESL academic writing as well as the challenges faced when using the tool.

IMPLICATION

This study uncovers the positive as well as the negative ways the digital writing software affects pre-service teachers' ESL academic writing. In doing so, the study sheds light on the way to better implement process writing in Malaysian writing classrooms, especially given the inclusion of digital technologies to teach writing skills in process approach to writing. Stakeholders interested in the amalgamation of digital technologies and process writing will find evidence of links between the utilization of digital writing software and the PSTs' ESL academic writing useful.

SUGGESTIONS

The findings from this study may guide future research to focus on maximizing the use of digital writing software in enhancing PSTs' ESL academic writing. This includes improving their writing knowledge and pedagogical practices. Additionally, the identified limitations that hindered the PSTs' writing progress suggest directions for future studies to explore alternative strategies for using digital writing software more effectively in academic writing instruction, with the aim of minimizing these challenges.

CONCLUSION

Integrating comprehensive pedagogies with digital technologies is essential to enhance students' interactivity, communication, and overall learning outcomes. A key challenge in teacher education is equipping PSTs with the necessary knowledge and skills to teach effectively later on and support their future students' language development. Addressing this challenge, the use of digital writing software appears to meet these needs. While the tool positively impacts PSTs' ESL academic writing, it also presents certain challenges. Recognizing these findings, additional efforts can be directed toward

optimizing the use of digital writing software to further improve PSTs' ESL academic writing, better preparing them for future writing classroom teaching.

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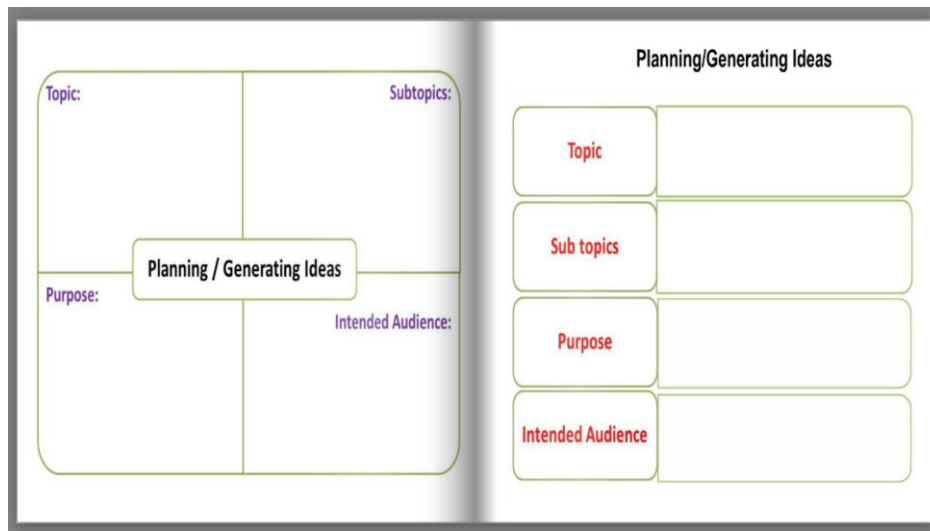
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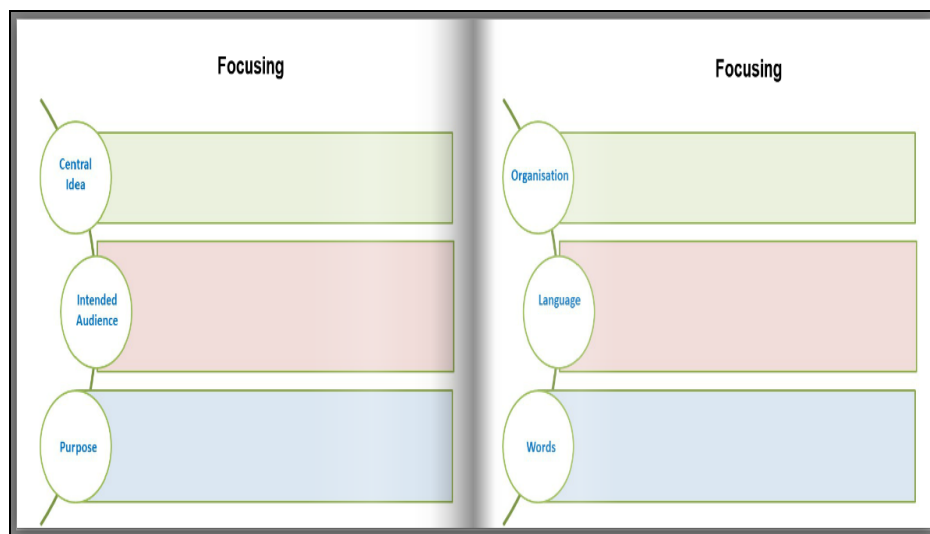
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APPENDIX A

The Stages in Process Writing Module



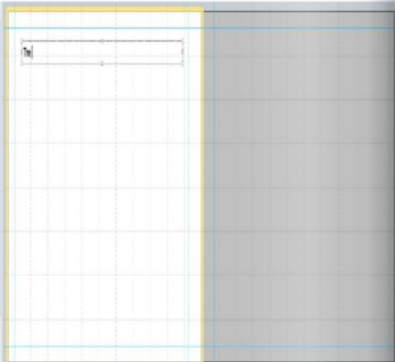
E-mind map template for planning/generating ideas stage



E-mind map template for focusing stage

3. Body Paragraphs		3. Body Paragraphs (continued)	
i. Topic Sentence 1 + Supporting Details with Examples + Concluding Statement		ii. Topic Sentence 2 + Supporting Details with Examples + Concluding Statement	

The 1000-word ESL academic writing template for structuring stage

Drafting	Drafting																		
	<table border="1"><thead><tr><th>Structuring Checklist</th><th>Drafting Checklist</th></tr></thead><tbody><tr><td>1. I relate all ideas to the central idea.</td><td>1. I decide on the amount of information to be stated explicitly in the digital academic paper.</td></tr><tr><td>2. I relate all supporting details to all ideas.</td><td>2. I utilise online writing tools to equip the content of the digital academic paper.</td></tr><tr><td>3. I structure the message for the intended audience.</td><td>3. I emphasise the importance of audience awareness.</td></tr><tr><td>4. I structure the purpose of the digital academic paper.</td><td>4. I follow the conventions the audience expects.</td></tr><tr><td>5. I combine ideas and put them into categories.</td><td>5. I plan how to start, proceed with and end the digital academic paper.</td></tr><tr><td>6. I alter the organisation of the digital academic paper.</td><td>6. I design the physical layout of the digital academic paper.</td></tr><tr><td>7. I alter the language structures of the digital academic paper.</td><td>7. I form understandable sentences according to the grammar of English.</td></tr><tr><td>8. I shape the words of the digital academic paper.</td><td>8. I choose the appropriate words to</td></tr></tbody></table>	Structuring Checklist	Drafting Checklist	1. I relate all ideas to the central idea.	1. I decide on the amount of information to be stated explicitly in the digital academic paper.	2. I relate all supporting details to all ideas.	2. I utilise online writing tools to equip the content of the digital academic paper.	3. I structure the message for the intended audience.	3. I emphasise the importance of audience awareness.	4. I structure the purpose of the digital academic paper.	4. I follow the conventions the audience expects.	5. I combine ideas and put them into categories.	5. I plan how to start, proceed with and end the digital academic paper.	6. I alter the organisation of the digital academic paper.	6. I design the physical layout of the digital academic paper.	7. I alter the language structures of the digital academic paper.	7. I form understandable sentences according to the grammar of English.	8. I shape the words of the digital academic paper.	8. I choose the appropriate words to
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Drafting features for drafting stage

Evaluating (+)		Evaluating (-)	
Content	<input type="radio"/>	Content	<input type="radio"/>
Ideas	<input type="radio"/>	Ideas	<input type="radio"/>
Intended Audience	<input type="radio"/>	Intended Audience	<input type="radio"/>
Purpose	<input type="radio"/>	Purpose	<input type="radio"/>
Organisation	<input type="radio"/>	Organisation	<input type="radio"/>
Language	<input type="radio"/>	Language	<input type="radio"/>
Words	<input type="radio"/>	Words	<input type="radio"/>

E-mind map template for evaluating stage



Preview function for reviewing/revising stage