

ENHANCING ESL LEARNERS READING COMPREHENSION AND MOTIVATION VIA AI-GENERATED PERSONALISED READING TEXTS

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ABSTRACT

This study identifies the effect of AI-generated personalised reading texts on ESL learners' reading comprehension and motivation at the secondary school level in Sabah, Malaysia. Drawing on the research of Jendia and Ismail (2023), the current study extends the exploration of AI's potential in tailoring reading materials to cater to individual learner needs. Conducted with 20 students from SMK Desa Kencana, Lahad Datu, the study employed a mixed-methods approach that incorporates both quantitative (pre-assessment and post-assessment scores) and qualitative (open-ended questions) data. The findings reveal significant improvements in reading comprehension, specifically among low and intermediate-proficiency groups. Advanced learners, however, failed to show maximal gains from the intervention which suggests the need for materials challenging materials yet suitable for higher proficiency levels. The intervention's effectiveness is due to the personalised and engaging nature of the AI-generated texts, which enhanced learners' motivation and engagement. Qualitative feedback obtained from the students also indicates the relevance of the personalised materials in the classroom. Despite the positive outcomes, limitations such as small sample size, external factors, and convenience sampling that may affect the generalizability of data are recognized. The study concludes with practical and theoretical implications, recommending integrating AI-based personalised materials in ESL education to support differentiated instruction and meet diverse learning needs. Future research should consider more extensive yet diverse samples and control for external variables to validate and broaden these findings.

Keyword(s): *AI-generated reading texts, ChatGPT, personalised learning, reading comprehension, reading motivation*

INTRODUCTION

Reading comprehension is never just a read-and-understand process. It entangles the interaction process with the written text to construct meaning (Snow, 2002, as cited in Butterfuss et al., 2020). Nevertheless, a study conducted in the United States revealed a concerning trend where students face challenges in reading comprehension, contributing to a decline in academic performance (Spencer & Wagner, 2018). This trend highlights the need for effective strategies to enhance reading comprehension, particularly among ESL learners. Addressing the challenge, this

current study proposes using AI-generated personalised reading texts to boost reading comprehension and motivation among ESL learners.

Reading, a seemingly ordinary aspect of our daily lives, is profoundly significant in self-discovery and cognitive development (Kaya, 2015). This happens as metacognitive and cognitive efforts are put in when readers try to break down the information conferred within the text to create meaning (Kaya, 2015). While the ability to read is a fundamental skill, mere reading proficiency does not guarantee a deep understanding of the text's underlying meaning; in this connection, reading comprehension should be put further concern by English teachers to ensure that all ESL learners are given opportunities to master this skill in reading.

While it can be arduous for teachers to teach reading comprehension in the classroom, students must feel motivated to learn. Only then will they be interested in engaging during the reading activity. There are two types of motivation: intrinsic motivation and extrinsic motivation. Intrinsic motivation can be maximized in the classroom by knowing the learner's interest. Previous research found that when learners' reading motivation is low, their reading competency may decline, which also causes them to fail to interact with the text effectively (Guthrie et al., 2007, as cited in Ullah & Fatema, 2013). For ESL learners, Darmayanti (2021) observes that low results often reflect a lack of interest in the reading material, indicating a need for targeted interventions.

In today's modern world, teachers need to shift the traditional classroom into a modern one by adapting technology in education. At the same time, numerous studies have discussed the implications of AI in education. However, a discernible research gap persists, particularly concerning the utilization of AI to augment reading comprehension among ESL learners within the context of Sabah, Malaysia. ChatGPT was chosen as the primary platform for generating AI-personalized reading text for ESL learners in the present study. By discerning the efficacy of the software in reading, this study offers advanced teaching strategies and methodologies whereby researchers can adopt and adapt from these findings in their research. Since the learner's motivation drives reading, this study offers valuable insights into how personalized reading text may enhance the learner's motivation. Moreover, examining which proficiency level benefited the most and the least during the intervention can help future researchers devise targeted interventions for students struggling with reading comprehension.

In essence, this research is poised to raise awareness about alternative methodologies and strategies educators can employ to enrich reading comprehension skills among ESL learners. Since this study has not been explored yet, the findings will provide a foundation for educators as they can consider incorporating AI-generated personalized reading texts in their instructional repertoire. Hopefully, this study will guide educators in optimizing the use of technology to enhance ESL learner's reading comprehension in Sabah, Malaysia.

Therefore, this present study tries to identify in what way does ESL learners' reading comprehension and motivation are enhanced via AI-generated personalised reading texts. The three research questions constructed are as below:

1. What are the effects of using AI-generated personalised reading texts in enhancing ESL learners' reading comprehension?
2. How does the use of AI-generated personalised reading texts enhance ESL learners' reading motivation?
3. Which proficiency level group shows significant reading comprehension improvement after using AI-generated personalised reading texts?

LITERATURE REVIEW

Self-determination Theory (SDT)

According to Joulide et al. (2020), self-determination theory posits that motivation can have positive effects, especially in the learning context (Joulide et al., 2020). The motivation type related to this theory is intrinsic motivation, where an individual may engage in something out of interest (Winberg et al., 2022). An example taken from a broader context in education explains that a person who is intrinsically driven may love doing a math equation because it is gratifying; thus, intrinsically motivated to find a solution to it as they feel a sense of pleasure when accomplishing the question (Kum, 2022). Indeed, reading comprehension requires ESL learner's intrinsic motivation, especially when reading academic text. Therefore, autonomy, competence and relatedness are the three psychological needs (Deci & Ryan, 2017, as cited in Guay, 2022) that must be fulfilled when enhancing intrinsic motivation in the classroom.

First, by definition, autonomy is explained as the freedom to make choices (Guay, 2022). In this connection, teachers should provide procedural autonomy support in the classroom (Núñez & León, 2015), especially when deciding the reading text employed in the reading activity. Incorporating learners in making choices for the lesson will give them a sense of being an initiator through their participation, making them more interested in learning (Guay, 2022).

Second, according to White (1959 as cited in Guay, 2022), competence need is one's passion to interact efficiently with one's surroundings. In the same way, this claim is supported by Ariani (2019), who stated that individuals will achieve maximum outcomes if they communicate with their environment effectively. Thus, catering to students' competence needs in the classroom through implementing personalised text can enhance ESL learners' motivation throughout the reading comprehension activity.

Third, the sense of relatedness should be supported by providing contextualisation in the personalised reading text. Relatedness, described as the feeling of relating with and receiving recognition from others (Ariani, 2019), is crucial in maintaining motivation in the lesson. Implementing personalisation of text can support cultural relevance in the classroom as it will help ESL learners become more connected to the material, thus leading them to become more motivated to engage with it. By employing students' cultural relevance in the personalised text, the relatedness needed in SDT can be supported as it can promote learners' intrinsic motivation in reading comprehension.

To sum up, by acknowledging the psychological needs of autonomy, competence and relatedness, educators can provide a supportive learning environment that cultivates ESL learners' interest, relation and proficiency.

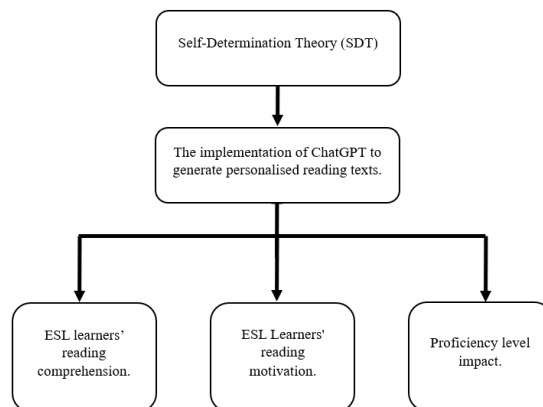


Figure 1: The theoretical framework of this study employed the Self-Determination Theory (SDT).

ChatGPT to Generate Personalised Reading Texts

Artificial Intelligence “AI refers to systems that display intelligent behaviour by analysing their environment and taking action – with some degree of autonomy – to achieve specific goals” (p 1, Boucher, 2020). AI has greatly supported teaching as it can transform the classroom environment into personalised learning (Bojorquez & Vega, 2023). The fundamental reason for implementing ChatGPT to generate personalised reading text is that it can produce text in a particular style and topic as requested by the user (Frye, 2022). Cultural differences depicted in the English language textbook may lead to learners struggling to understand the content because they are not familiar with the context due to cultural differences (Jendia & Ismail, 2023). So, there is a need to find other reading material relevant to learners’ local context. Despite authentic materials within Malaysia’s local contexts, such as newspapers and essays, that can be adapted to improve learners’ reading skills, some ESL learners may struggle to understand the text (Jendia & Ismail, 2023). This happens as the reading text is not meant to be used academically but for real-world use. For instance, the vocabulary used may not be suitable for students with low proficiency level learners as it may be too hard for them to comprehend, thus making them uninterested in reading the text. Ultimately, ChatGPT is an engaging platform that aids in personalising reading materials as it considers learners’ sense of connection in learning.

ESL Learners’ Reading Comprehension

Reading comprehension enhancement among ESL learners is paramount as it can affect their language proficiency and academic success. Jendia and Ismail (2023) stated in their research that many pupils struggle to meet the CEFR framework expectations within the Malaysian education curriculum because they possess limited reading comprehension skills. While this may be true because English is not the mother tongue for ESL learners, it is very likely for them to struggle in mastering reading comprehension skills. Based on the previous research, personalised reading approaches, including those facilitated by personalised reading texts, can help address the diverse learning needs of ESL learners (Kim & Choi, 2021). ESL learners usually encounter trouble understanding academic passages due to a lack of familiarity with the vocabulary, complicated sentence structures, and cultural unrelatedness (Cheng, 2019). These challenges can be overcome by integrating AI-generated reading texts tailored to learners’ needs, such as interest, proficiency levels and cultural backgrounds, thus improving their comprehension ability in the classroom. Besides, the personalisation of texts can aid in scaffolding learners’ comprehension skills, and the teacher can increase the complexity of texts when their proficiency is improving (Chapelle et al., 2020).

ESL Learners’ Reading Motivation

Providing learners with appropriate reading material for their interest and level will enhance their reading motivation because the materials are engaging and interesting (Brown, 2014), as cited in (Jendia & Ismail, 2023). Complex texts beyond ESL learners’ competency level may cause them to lose interest in reading and make them unmotivated to read. As a result, students who are uninterested in doing the reading activity will avoid engaging in the activity (Alhamdu, 2016). It is best to employ simple reading materials that are familiar to them as they have vocabulary deficiencies, so teachers must provide comprehensible inputs close to their schemata (Jendia & Ismail, 2023). AI-generated personalised reading texts offer an auspicious avenue for enhancing ESL learners’ reading motivation through relevant and engaging reading materials that align with their interests and preferences (Guthrie et al., 2020). Essentially, providing opportunities to connect ESL learners with culturally relevant reading materials that relate to their living

experiences and identity will enhance their sense of inclusion and motivation to interact with the text (Wong et al., 2020).

METHODS AND SAMPLING

Methodology

This research is intended to explore the enhancement of reading comprehension by implementing AI-generated personalised reading text among ESL learners in Sabah. Hence, a mixed-methods approach is employed in this study with twenty students from SMK Desa Kencana, Lahad Datu divided into three levels of proficiency based on their pre-assessment scores which are low, intermediate and advanced level.

Sampling

Initially, random sampling was utilised to answer the research question of identifying the effects of AI-generated personalised reading text on ESL learners' reading comprehension. This method is chosen to ensure that a broader population of ESL learners in Sabah, Malaysia, is represented in this study. Not only that, but random sampling can also help to minimise selection bias that may occur if the characteristic of the population is being overrepresented or underrepresented in the sample. Since one of the research questions aims to classify which proficiency level group shows significant improvement in reading comprehension after the intervention, systematic biases in the data can be avoided, thus making the inference more valid and reliable.

However, due to practical constraints such as students' absence during pre-assessment and post-assessment, the final sample managed to get only 20 participants present during both assessments. Through the adjustment, the sampling method shifted from random sampling to convenience sampling because the selection was mainly based on students' availability to participate in the study. Besides, most of the students who did not participate in this study also had inconsistent school attendance, which could have affected the result of the intervention. Thus, the 20 students selected in the study were chosen due to their active participation in the classroom and continuous involvement during the intervention.

Moreover, convenience sampling is also applicable in attaining qualitative data for the research question of acknowledging how AI-generated personalised reading texts enhance ESL learners' reading motivation. Since the research duration is limited, having participants with quick and easy access can improve accessibility during the data collection process. Five students were elected to participate in the open-ended questions through demographic factor filtration, including gender and proficiency level. In addition, this method is used to achieve data saturation to ensure the richness of data collected from all the participants.

Pre-Assessment and Post-Assessment

A pre-assessment and post-assessment test were employed to assess the effects of AI-generated personalised reading texts on ESL learners' reading comprehension. A standardised reading comprehension test was done regardless of learners' proficiency level to sort out their baseline in reading comprehension (Smith, 2018). The assessment materials include a reading passage and comprehension questions that follow the SPM format for Part 3, Reading Comprehension. While the pre-assessment established the baseline scores, the post-assessment scores measured the change after the intervention.

Open-ended Questions

Apart from that, five open-ended questions were asked to explore the effects of AI-generated personalised reading texts on ESL learners' reading motivation. The questions focus on the learner's level of engagement, interest and motivation after implementing AI-generated personalised reading texts while aligning with the theoretical framework (Ryan & Deci, 2021). In addition, these questions focused on factors such as learners' connections with the materials and intrinsic motivation.

Statistical Data Analysis

A statistical data analysis was conducted to analyse the effects of AI-generated personalised reading texts on distinct proficiency-level groups. Using SPSS to analyze quantitative data, inferential statistics and paired sample t-tests or mixed analysis of variance (ANOVA), were utilised to determine significant differences in reading comprehension improvement within the proficiency level groups (Field, 2016). This way, the statistical analysis helps identify the trends and patterns related to improving reading comprehension among ESL learners via AI-generated personalised reading text.

FINDINGS & DISCUSSION

Previous research by Jendia and Ismail (2023) discovered the possibilities of personalising reading materials for primary school pupils using ChatGPT. The past study focused on reading materials that are personalised and culturally relevant to learners using AI technology. This motivates and engages the learners more effectively than traditional texts. Building upon the insights from the previous study, the current study aims to identify the effects of using AI-generated personalised reading text on ESL learners' reading comprehension and motivation at the secondary school level in Sabah. Notably, it also intended to determine which level of proficiency, such as low, intermediate or advanced, showed significant enhancement after the intervention.

Quantitative and Qualitative Data Collection

The study was conducted in SMK Desa Kencana, Lahad Datu, with 20 students from 4 Perniagaan. The participants were chosen based on their consistent attendance because it can enhance their active participation in the classroom during the intervention. Then, they were divided based on their pre-assessment score to determine their current level of proficiency during the study, such as low (1-3), intermediate (4-6) or advanced (7-8). The pre-assessment score provided a baseline of each participant's reading comprehension level, whereas the post-assessment score identified the changes after the intervention was implemented during the study. Additionally, qualitative data were obtained to support the quantitative measure taken through open-ended questionnaires. Questions aimed to determine the student's view on their reading motivation, engagement and overall experience with the AI-generated reading texts. Thus, a more profound comprehension of students' subjective experiences complemented the quantitative findings using pre-assessment and post-assessment scores.

Furthermore, the study analysed the data collected using statistical and thematic methods. A paired sample t-test and mixed ANOVA were used to analyse quantitative data to observe the significant difference in participants' reading comprehension scores before and after implementing AI-generated personalised reading text in English lessons. Conversely, qualitative data were studied through thematic analysis to identify the recurring themes akin to students' motivation and engagement during the intervention. Integrating both analytical approaches contributes to a comprehensive comprehension of the data while providing insights into the

measurable effects on reading comprehension and subjective review from the participants. Hence, the duality of the approaches helps to ensure that the findings were multifaceted and robust as they address both statistical implications and the qualitative nuances of the intervention's influence.

The study's findings concede a few significant outcomes on the effects of AI-generated personalised reading texts on ESL learners' reading comprehension and motivation. The study also tried to identify which level of proficiency benefits the most from implementing the intervention in the classroom.

Enhancement of Reading Comprehension

Based on the quantitative analysis using the paired sample t-test, the intervention led to a statistically significant improvement in reading comprehension scores. To explain, the initial average score in the pre-assessment increased from 5.35 to 6.35 post-assessment, resulting in a -1.000 ($p = 0.008$) mean difference. This statistically significant increase emphasises the effectiveness of personalised reading materials in enhancing reading comprehension among ESL learners in Sabah. The personalised texts likely provide related and relevant content to the students, facilitating better understanding and retention of the material. Inevitably, these findings are consistent with the previous research done by Jendia and Ismail (2023), suggesting that tailored educational resources can address individual learning needs better than generic materials.

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test	5.35	20	1.531	.342
	Post-test	6.35	20	1.040	.233

Figure 2: Paired Samples Statistic for pre-assessment and post-assessment.

Enhancement of Reading Motivation

The thematic analysis of the open-ended questions responses underlines some key factors that led to the enhancement in students reading motivation. Some students described the AI-generated texts as relatable yet engaging, and their interest and enjoyment in reading increased. Besides, the comprehensibility of the text while tailoring it to learners' proficiency level allowed them to read with confidence and easier, encouraging their motivation to read. Positive classroom experiences also played a compelling role in maintaining students' active engagement as they can discuss and share the personalised content provided. Overall, AI-generated personalised reading texts demonstrate motivational benefits among learners as they reported increased confidence, engagement and motivation in reading English texts.

Proficiency Level Improvements

The analysis achieved by using mixed ANOVA revealed a significant improvement across all proficiency levels. It was found that the low proficiency group had the most notable gain upon implementing the intervention. This may suggest that tailored educational interventions can effectively bridge the learning gaps across learners, specifically learners who struggle with standard texts.

STUDENTS CODE	PROFICIENCY LEVEL
S01	Low (1-3)
S02	Low (1-3)
S03	Intermediate (4-6)
S04	Intermediate (4-6)
S05	Intermediate (4-6)
S06	Intermediate (4-6)
S07	Advanced (7-8)
S08	Advanced (7-8)
S09	Advanced (7-8)
S10	Advanced (7-8)
S11	Intermediate (4-6)
S12	Low (1-3)
S13	Advanced (7-8)
S14	Intermediate (4-6)
S15	Low (1-3)
S16	Intermediate (4-6)
S17	Intermediate (4-6)
S18	Intermediate (4-6)
S19	Advanced (7-8)
S20	Intermediate (4-6)

Table 1: Learners' level of proficiency.

Within-Subjects Factors

Measure: MEASURE_1

Intervention	Dependent Variable
1	Pre_Score
2	Post_Score

Figure 3: Within-subject factors.

Between-Subjects Factors

		Value Label	N
Proficiency level	1.00	Low (1-3)	4
	2.00	Intermediate (4-6)	10
	3.00	Advanced (7-8)	6

Figure 4: Between-subject factors.

Firstly, for low proficiency level N=4, the mean difference between pre-assessment and post-assessment scores was -3.500, which is highly significant considering that $p < .001$. From the mean, it shows that the reading comprehension of students with low proficiency levels was enhanced extensively. So, the customised texts help them grasp the concept quickly, leading them to establish their reading comprehension skills effectively and gradually over time.

Secondly, the mean difference for intermediate proficiency level was -0.700 for both assessments with N=10 while the significance level of $p = .010$. Despite having a smaller effect size than the low proficiency level, significant improvement was still in students' reading comprehension. Similarly, as the low proficiency level group, personalised materials provide pertinent support to facilitate better learning outcomes among intermediate learners.

There was no significant improvement in reading comprehension for advanced proficiency level where N=6. The p-value of .600, with a mean difference of 0.167 between pre-assessment and post-assessments, indicates that the intervention was less effective for the group. However, it is also possible to consider that they face less trouble in understanding the text, thus preventing them from being affected by the intervention. Thus, advanced learners may find that tailored materials were not challenging and led to negligible gains.

Pairwise Comparisons

Measure: MEASURE_1

Proficiency level	(I) Intervention	(J) Intervention	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
						Lower Bound	Upper Bound
Low (1-3)	1	2	-3.500 [*]	.382	<.001	-4.306	-2.694
	2	1	3.500 [*]	.382	<.001	2.694	4.306
Intermediate (4-6)	1	2	-.700 [*]	.242	.010	-1.210	-.190
	2	1	.700 [*]	.242	.010	.190	1.210
Advanced (7-8)	1	2	.167	.312	.600	-.492	.825
	2	1	-.167	.312	.600	-.825	.492

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Figure 5: Pairwise Comparisons for proficiency levels.

Limitations

Several limitations were noted in the current study despite the positive findings, which include the sample size, external factors and convenience sampling. The small sample size and lack of control over external factors such as students' home environment may introduce variability and bias in the results. In addition, the shift from random to convenience sampling due to practical constraints may limit the study's validity and representativeness. Addressing these limitations in future studies will be crucial as it can validate and expand upon the positive outcomes observed in this research. This will ensure that the benefits of personalised reading interventions are reliable and can be extended to a broader population of ESL learners.

CONCLUSION

The study's findings underscore the effectiveness of personalised reading materials in enhancing ESL learners' reading comprehension, particularly for those at lower and intermediate proficiency levels. This highlights the potential of AI-generated texts to address individual learning needs and gaps in comprehension. The broader implications of this research suggest that personalised learning tools powered by AI could be pivotal in designing targeted educational interventions that cater to diverse learner profiles. By incorporating such technologies, educators can create more engaging and relevant reading experiences that align with students' varying proficiency levels and motivations, ultimately contributing to improved educational outcomes in ESL contexts.

Considering the findings and limitations of this study, several recommendations for future research can be suggested to address the identified gaps, including sample size and control for external factors. To ensure the generalizability of the findings, it is recommended that future studies should involve enormous and more diverse samples. Expanding the sample size to include participants from various demographic backgrounds, educational settings, and proficiency levels would provide a more robust analysis. Moreover, it is also advised that future research should aim to control for external factors such as home environment and background knowledge. For example, controlling for socioeconomic status, parental involvement, and additional learning resources would help researchers to attribute changes more effectively in reading comprehension and motivation to the intervention. Thus, addressing these recommendations in future research can advance the field of ESL education significantly. It can provide comprehensive and generalisable insights into using AI-generated personalised reading texts in education. Hopefully, this study will be highly beneficial to ESL education, significantly helping learners who struggle to comprehend the text provided in the classroom.

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