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Development of Microlearning-Based and Problem-Solving Infused English Reading Materials for Non-English Major: a Needs Analysis

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ABSTRACT

This study aimed to analyse the English reading materials currently used by non-English major students and evaluate the extent to which they incorporate microlearning and problem-solving skills. The study was conducted at a public university in Bogor, Indonesia. The research utilized qualitative content analysis to examine a set of existing learning materials, consisting of a coursebook, PowerPoint slides, explainer videos, and infographics. Interviews with five English instructors were also conducted to explore the needs of learning materials further. The findings reveal a gap between the current materials and the descriptors of microlearning and problem-solving. Therefore, it indicates an urgency of developing new English reading materials that promote problem-solving and incorporate microlearning to facilitate the needs of non-English major students better.

INTRODUCTION

The demand for English language proficiency among non-English major students is continuously increasing, leading to the improvement of this field. English reading materials are essential in enhancing students' reading comprehension, vocabulary, and grammar skills (Tolstikh, Pankova, & Krasnova, 2021). However, traditional classroom-based instruction may not fully meet the needs of today's learners, who require more effective and innovative pedagogical approaches to master these skills for their academic and professional success. Therefore, incorporating such approaches for non-English major students is necessary to overcome these challenges. One of the ways is through the incorporation of microlearning and problem-solving skills.

In recent times, the educational sector has shown significant interest in microlearning and problem-solving skills due to their ability to enhance the learning experience and improve students' academic performance. Microlearning is a pedagogical approach that delivers learning materials in small, focused bursts and promotes students-centred learning (Leong, Sung, Au, & Blanchard, 2021; Olivier, 2021). However, research on microlearning-based English reading materials for non-English majors in Indonesia is limited. Although many teachers believe that microlearning is suitable for English classrooms, further research is necessary to explore its potential benefits. Thus, this study aims to contribute to the existing literature on microlearning in language pedagogy by analysing existing learning materials used by non-English major students as the basis for designing microlearning.

Meanwhile, problem-solving skills prioritize the utilization of analytical thinking and innovative techniques to address complex problems (Singh & Singh, 2021; Clark & Mayer, 2016). integrating these skills into English reading materials can significantly impact students' understanding and enhance their overall learning process. As a result, the objective of this study was to examine the existing English reading materials used by non-English major students to evaluate the extent to which they incorporate microlearning and infuse problem-solving skills. The research was conducted at a public university in Bogor, Indonesia, and focused on the English reading materials used by instructors in the compulsory "English Reading" course. The outcomes of this study are expected to make a valuable contribution to the development of English reading materials that cater to the needs of non-English major students by incorporating microlearning and infusing problem-solving skills.

THEORETICAL REVIEW

Microlearning

In today's digital age, microlearning has emerged as a practical and convenient approach to learning. With its focus on delivering small, bite-sized learning content, microlearning is well-suited to meet the needs of independent learning experiences. This study specifies the incorporation of microlearning in the learning materials or also known as microlearning objects. Microlearning objects refer to concise and targeted instructional resources that aid learners in

acquiring knowledge and skills in a more engaging and pleasurable way (Atef, Gamalel-Din, & Tharwat, 2022).

Some related studies on the development of microlearning object materials have been conducted (Sulistyaningrum, Iskandar, & Dewanti, 2022; Tan, 2017; Zamata-Aguirre, Choquehuanca-Quispe, Machaca-Huamanhorcco, Begazo, & Málaga, 2023). They emphasize the significant impact of microlearning on the English pedagogical practice providing students with easily accessible materials with achievable learning outcomes to improve the instructional designs.

Therefore, using microlearning as a delivery method for English reading materials has the potential to improve learners' engagement, motivation, and, ultimately, their reading proficiency. The significance of this research lies in its contribution to the field of materials development for English reading instruction through needs analysis. Moreover, microlearning objects are carefully refined and relevant content focused around one specific learning objective with meaningful visual graphics in the delivery of the materials (Manning, Spicer, Golub, Akbashe, & Klein, 2021; Redondo, Rodrıguez, Vilas, & Fernandez, 2021). Subsequently, this study utilizes the following descriptors in Table 1 that are combined from scholars as guidance to identify whether the existing learning materials have incorporated microlearning as the pinpoint to develop microlearning objects in the next research stage.

Table 1. Microlearning Descriptors (Allela, 2021; Kasenberg, 2018; Torgerson & Iannone, 2020)

Microlearning Descriptor	Code
Bite-sized content of information	MCL-1
Specific and single learning objective	MCL-2
Self-paced learning	MCL-3
Engagement and interactivity	MCL-4
Mobile-friendly accessibility	MCL-5
Multimedia use and visual aids	MCL-6

Problem-solving skills

Problem-solving is one skill to master in the 21st-century learning to prepare today's learners to face and solve real-world problems (Dwiyogo, 2018; Kumar, 2020; Sari, Sumarmi, Utomo, & Utomo, 2021). Having problem-solving skills means that learners can break down problems and come up with solutions by stimulating their ways of thinking and gathering information. This skill is believed to help learners apply and validate their knowledge (Luy-Montejo, 2019).

In Indonesia, the National Qualification Framework for Higher Education, as outlined in Presidential Regulation 08/2012 and Minister of Education and Culture Regulation 73/2013, highlights the significance of problem-solving skills. The Directorate General for Higher Education document (2013) specifies that undergraduate degrees correspond to level 6 in the framework, which requires proficiency in adapting to situations, formulating procedural problem-solving, and making strategic decisions among alternative

solutions. The framework connects education with employment by defining expected learning outcomes, emphasizing the need for problem-solving skills in higher education to prepare students for the workforce. Therefore, this illustrates the importance of infusing problem-solving skills into the learning materials, particularly in an English course.

A previous study analysed existing learning materials to develop critical thinking teaching materials in a problem-based learning design (Perdanasari, Sudiyanto, & Sangka, 2021). Meanwhile, to contribute to the literature, this study specifies problem-solving descriptors to be examined in the existing English reading materials. There are eleven problem-solving descriptors modified and used in this study as shown in Table 2.

Table 2. Problem-Solving Descriptors (Jonassen, 2011; Jensen, Stentoft, & Ravn, 2019; Richards, 2015).

Problem-Solving Descriptor	Code
Getting the gist of the text	PS-1
Defining problem	PS-2
Making predictions based on context	PS-3
Identifying potential causes of the problem	PS-4
Differentiating fact from opinion	PS-5
Making inference: making sense of information by identifying underlying meanings and patterns	PS-6
Transferring Information: organizing data by a visual representation	PS-7
Generalizing: drawing conclusions based on the information analysed	PS-8
Summarizing: providing a brief overview of the information analysed	PS-9
Generating a solution based on the problem analysed	PS-10
Justify the reasoning of solution with evidence	PS-11

Table 2 presents the codified descriptors of problem-solving skills, which can be used as guidelines for analysing existing learning materials. Questions and instructions in English reading comprehension practices may function as robust scaffolds in learning to solve problems. Hence, this illustrates how problem-solving skills can be infused into the English reading materials and how they can encourage student engagement with the lesson. In short, this study highlights the importance of adapting English reading materials to enhance students' overall problem-solving skills, improve their ability to comprehend and apply English reading materials and contribute to their success in their academic studies.

METHODOLOGY

This study utilized needs analysis to examine the existing learning materials and explore teachers' perceptions of the needs of non-English major students of English reading materials. Needs analysis is considered the first and most important step in creating effective English instructional materials (Nashir, Laili, Sholihin, & Wirawati, 2022). This study employed needs analysis to identify the gap between the existing learning materials and the descriptors of microlearning and problem-solving. The needs analysis results can guide for

the development of new English reading materials (Chemir & Kitila, 2022; Meadseena, 2023; Sukarni & Imansyah, 2022) that better cater to the needs of non-English major students.

The study was conducted at a public university in Bogor, Indonesia, and focused on the compulsory "English Reading" course for non-English major students. Data collection and data analysis were conducted in two stages. Firstly, the existing learning materials, consisting of one main coursebook and other supplementary materials, were subjected to document and content analysis (Dewi, et al., 2023) and were analyzed and discussed in relation to the descriptors of microlearning and problem-solving skills.

The method of using microlearning and problem-solving descriptors involved understanding each type of the descriptor's purposes and functions. Microlearning descriptors are designed to evaluate the features of existing learning materials and how the learning material is designed and presented. They also evaluate whether it is bite-sized, self-paced, engaging, and accessible on mobile devices. On the other hand, problem-solving descriptors are used to analyse the content of materials within a specific learning resource, in this case, the coursebook covering the course's overall learning plan and outlines. These descriptors focus on the types of problem-solving skills that are being taught within the material.

Secondly, five English instructors of the "English Reading" course were interviewed to gather data on their experiences and perspectives on the existing English reading materials and their specific needs. The instructors were selected based on their varying periods of teaching experience and educational backgrounds. The details can be seen in Table 3. This study adhered to ethical research guidelines, ensuring confidentiality and anonymity for respondents. Informed consent was also obtained before conducting interviews.

Table 3. Respondents of the study

Teacher	Gender	Age	Years of experience	Education
IR	Female	60	30 years	Master of Arts
WD	Male	54	25 years	Master of Arts
HR	Female	38	13 years	Master of English Education
AV	Male	36	10 years	Master of English Education
FA	Female	33	5 years	Master of Linguistics

RESULTS

Through a needs analysis, this study aimed to gain insights into the development of microlearning-based and problem-solving infused English reading materials for non-English major students. The results section presents the research findings, including an analysis of existing learning materials based on microlearning and problem-solving skills descriptors.

Figure 1 displays that out of 40 identified learning object materials in the course; there are 14 coursebook units, 14 sets of PPT slides, 9 explainer videos, and 3 infographics. These results suggest that the most frequently used learning

materials were the coursebook units and PPT slides as the primary learning materials used by all classes. On the other hand, explainer videos and infographics were used to a lesser extent as supplementary learning materials.

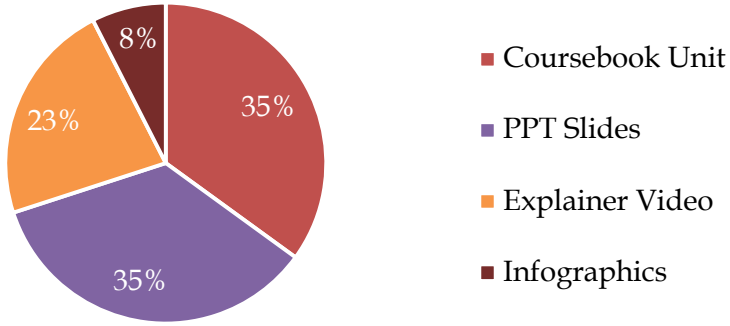

Figure 1. Existing learning materials for Non-English Major Students

Coursebook Units

Based on the content analysis of the coursebook used in the English reading course for non-English major students, it was found that there were 14 topics covered in the book. Among these topics, some were identified as having potential for problem-solving elements such as text organizations of cause-effect and comparison and contrast, transferring information, making inferences, making predictions, and distinguishing fact from opinion. However, it was observed that there were no specific problem-based scenarios included in the coursebook, as the coursebook mainly focuses on the reading skills and strategies of the students, such as skimming, scanning, references, and vocabulary building.

In other words, while the coursebook touches on certain topics with potential for problem-solving elements, it does not explicitly incorporate problem-based scenarios in its content. This finding highlights a potential area for improvement in developing new English reading materials for non-English major students, which could incorporate problem-solving scenarios in addition to teaching reading skills and strategies.

The coursebook also includes a total of 1,400 questions, which are categorized into different types of exercises. Figure 2 shows that most the questions (294) are related to asking for details, which test students' comprehension of specific information in the reading passages. Grammar and vocabulary questions comprise a significant portion of the exercises, with 252 and 237 questions, respectively. There are also questions related to references (155), transfer information (129), topic identification and getting the gist (97), text organization (80), conclusion (49), fact/opinion differentiation (47), inference making (41), and predicting (19).

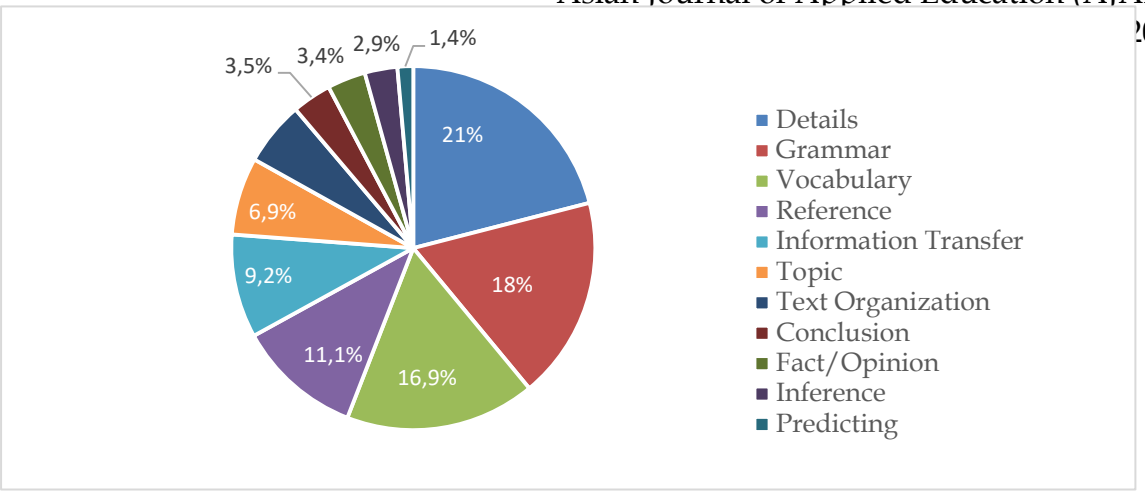

Figure 2. Reading Skills and Strategies in the Coursebook

Upon matching these findings with the problem-solving descriptors, it can be concluded that some exercises in the coursebook align with certain problem-solving descriptors. For example, getting the gist of the text (PS-1) aligns with the exercises related to topic identification (n=97), while differentiating fact from opinion (PS-5) aligns with the exercises of distinguishing between facts and opinions (n=47). Making inferences (PS-6) aligns with the exercises related to inference making (n=41), while information transfer (PS-7) aligns with the exercises related to transferring information from the text into graphic organizers (n=129). Generalizing (PS-8) is reflected in the exercises of drawing conclusions (n-49), while Summarizing (PS-9) is reflected in identifying text organizations by signifying the signal markers and summarizing the whole text (n=80).

However, some descriptors, such as defining the problem (PS-2), identifying potential causes of the problem (PS-4), generating a solution based on the problem analysed (PS-10), and justifying the reasoning of the solution with evidence (PS-11), were not explicitly found in the exercises of the coursebook. In short, while the coursebook used for the English reading course for non-English major students contains exercises that align with some problem-solving descriptors, there is still room for improvement in incorporating more problem-solving strategies in the exercises.

Moreover, the coursebook does not fit well with the microlearning concept. Microlearning emphasizes bite-sized content of information and specific, single learning objectives that can be achieved in a self-paced manner. However, the coursebook contains a large amount of information, covering various language aspects such as grammar, vocabulary, text organization, and more. The learning process is also conducted with teacher guidance, which means that students are not learning in a self-paced manner. The coursebook is meant to be used in a traditional classroom setting with lectures, which contradicts the idea of self-paced learning.

While the coursebook does contain some visual aids, such as charts, these are not used consistently throughout the book. Moreover, the coursebook is not designed to be mobile-friendly, which is another important aspect of microlearning. The book is meant to be used in a classroom setting with access to printed materials, making it less accessible for learners who prefer to study

on-the-go using their mobile devices. Therefore, it can be concluded that the coursebook used in the English reading course for non-English major students does not fit well with the concept of microlearning.

PowerPoint Slides

According to the findings of this study, the PowerPoint slides used in the English reading course are not aligned with the microlearning descriptors. Since each unit has one PowerPoint file, it does not fit the "bite-sized" (MCL-1) and "specific and single learning objective" (MCL-2) descriptors, as it covers the entire unit and is used in a synchronous class session that lasts for 90 minutes. Furthermore, it does not meet the "self-paced learning" (MCL-3) descriptor, as it requires continuous guidance from a teacher. Although PowerPoint slides align with MCL-5 and MCL-6 descriptors due to their availability in the Learning Management System and their use of multimedia and visual aids, they do not meet the engagement and interactivity (MCL-4) descriptor. While visual elements can help engage students, the interactivity is insufficient since students are in the role of knowledge receivers who listen to teachers' explanations compared with the employment of surveys, polls, or quizzes that can make the materials more interactive and engaging.

Explainer Videos

Explainer videos can be an effective tool for implementing microlearning strategies in education. The duration of microlearning activities (Redondo, Rodrıguez, Vilas, & Fernandez, 2021) is recommended to last less than five minutes to capture students' attention and achieve maximum efficiency. Videos longer than five minutes in length produce a drop in attention, causing students to skip parts of the video. Table 3 presents information on the existing explainer videos used in the course.

Table 4. Existing Explainer Videos used for Non-English Major Students

	Topic	Duration	Source	Platform
1.	Text Organization: Process	16:08		
2.	Definition and Exemplification	20:50	Teacher-made	
3.	Facts and Opinion	09:40		Learning
4.	Making Inferences	10:26		Management
5.	Comparing and contrast	4.44		System
6.	Cause and Effect	13:47	YouTube	
7.	Fact and opinion	3.50		
8.	Making inferences	5:30		

The bite-sized content of information is a key component of microlearning, and videos can be an effective medium to deliver small, manageable pieces of information that learners can easily absorb. Based on the data presented in Table 3, only three out of eight videos met the descriptors of MCL 1 and MCL 2 based on the duration of under five minutes and the topic coverage. In addition, in promoting self-paced learning (MCL-3), all the

explainer videos meet the criteria because learners can watch and re-watch the videos at their own pace, reviewing and revisiting content as needed to reinforce their understanding of the material. This approach allows learners to take control of their learning and progress at a speed suitable for them.

Furthermore, explainer videos can be accessed from various devices, including mobile phones, tablets, and laptops. This makes them easily accessible and aligns with the "mobile-friendly accessibility" (MCL-5) descriptor of microlearning. Multimedia use and visual aids (MCL-6) are also key features of explainer videos. They include animations, graphics, and voice-over narration to help learners better understand the content and help them retain the information. However, regarding engagement and interactivity (MCL-4), the existing explainer videos used in the course may not fully meet the criteria. While the videos use visual aids and multimedia (MCL-5 and MCL-6), they are mostly presented in a lecture-style format where the learners are passive recipients of information, without interactive elements that require learners to apply what they have learned. While learners can pause, rewind, or fast-forward the video to review specific parts, they are limited in terms of the amount of control they have over the learning experience.

Overall, explainer videos can be an excellent tool for delivering microlearning content as they are concise, engaging, and effective in promoting learning retention. However, in this case, it has yet to maximize its potential because the videos still cover large information that may overwhelm the learners to learn in one go.

Based on the topics covered in the explainer videos, PS-5 and PS-6 descriptors are explicitly identified, i.e., facts vs. opinion and making inferences in which each video contains explanations and exercises about distinguishing facts and opinions and making inferences, respectively. Moreover, students can practice defining a problem (PS-2) and identifying the potential cause of a problem (PS-4) within the topic of Cause and Effect. However, the videos also do not have PS-10 and PS-11 descriptors in which students are asked to generate a solution based on the problem and justify it. In other words, the existing learning materials are still in the stage of understanding to analysing, and not yet synthesizing and creating as the higher order of thinking.

Infographics

The study found that three infographics were used in this course, with the topics of Definition and Exemplification, Comparison and Contrast, and Cause and Effect. While these topics may have the potential to trigger problem-solving skills, the infographics found in this study only covered the signal markers of the text organizations along with a sample text. Hence, it cannot be considered to infuse problem-solving skills. Instead, they provide visual aids to help students understand the organization and structure of texts, which is a valuable skill for reading comprehension. However, to fully develop problem-solving skills, it may be necessary to incorporate additional materials that offer opportunities for students to apply these skills in practice.

Regarding the microlearning descriptors, the learning object materials cover the bite-sized content (MCL-1) since one infographic means one page or image of information. It only meets the specific and single learning objective (MCL-2) as the basis of the infographics to explain a specific topic or concept. It is also self-paced (MCL-3), allowing learners to go through the material at their own speed and take in the information they need. The infographics are also mobile-friendly and accessible (MCL-5), as they can be easily viewed on various devices and platforms. This makes them ideal for learners who are always on the go and need access to learning materials from their smartphones. While infographics are valuable for delivering bite-sized and visually appealing content, they may not be enough to fully engage and interact with learners (MCL-4). In this case, the infographics in the course only cover signal markers of text organization and lack problem-solving skills. They did not have interactive elements such as clickable buttons, animations, or quizzes that can increase engagement and promote problem-solving skills. Nonetheless, infographics are still a valuable resource for delivering information efficiently and effectively in a visually appealing way.

Needs analysis of English reading materials for non-English major students: Teacher Perception

The key themes that emerged from the interviews regarding the development of microlearning-based and problem-solving-infused English reading materials for non-English majors. The first two categories, learning materials, represent the challenges identified in the existing materials and the potential solutions that were suggested. The third category, microlearning, reflects the teachers' familiarity and perception of this approach to learning. Finally, the problem-solving category highlights the importance of this skill in the curriculum and the need for it to be incorporated into the existing materials.

Table 5. Summary of Interview Results

Key-Theme	Sub-Theme	Coded Response
Existing learning materials	Challenges	Students' different levels of proficiency Motivating students Out-of-dated reading topics Time constraints
Micro-learning	Familiarity	Some are not familiar with the concept
	Perception	Agree of its usefulness for students
Problem-Solving	Importance	Recognize the importance of problem-solving skills but feel the existing materials may not fully address these skills
	Reflection	Some see a correlation between the problem-solving skills and the existing materials
Materials development	Expectation	Incorporating digitalization and visual elements to the learning materials and up-to-date reading topics to engage students

The respondents shared several common challenges they faced in delivering reading lessons in the classroom. Firstly, accommodating students with different levels of proficiency was a significant challenge. Respondents noted that some students struggled to follow and keep up with the lesson, while others had good proficiency. This made it challenging to facilitate every student equally, especially when some had limited background knowledge. Secondly, motivating students was another common challenge. Some students found the materials difficult, which hindered the learning process.

Thirdly, using appropriate materials was also a challenge. Respondents noted that coursebooks and PowerPoint slides were already enough to teach reading skills and strategies. However, some reading passages needed to be updated and modified, and additional reading materials were needed to engage students. Lastly, accommodating weaker students within a limited time was a challenge noted by Respondent IRB. Weaker students struggled to understand concepts and texts, do the exercises, and follow the pace of the lesson. They also struggled with some of the reading passages and exams, and the average exam results were not satisfactory. Improvements were needed to accommodate weaker students without making the lesson too boring for higher-achieving students.

Next, four out of five respondents (IR, WD, HR, and AV) have not heard of microlearning before. However, all respondents agree that microlearning-based materials can be useful and suitable for their students, especially in breaking down complex learning objectives into smaller, more manageable ones. HR even shared her positive experience with shorter video recordings being more engaging and effective for her students. FA also sees the potential of microlearning in helping students stay focused on one specific learning goal. Overall, while the concept of microlearning is new to some of the respondents, they all believe that it can be a valuable tool in enhancing their teaching and students' learning.

Moreover, it appears that problem-solving skills are generally considered important for university students, particularly in preparation for their future careers. However, the current materials used in the courses do not seem to address this skill adequately, and there are few specific lessons or activities that focus on problem-solving. Some instructors suggest that discussions and group work can stimulate analytical thinking and problem-solving skills, while others mention that providing scenarios and cases for students to solve can be effective. However, there is also concern that weaker students may struggle with these types of activities.

Interview results suggest that modifications and improvements are needed in the existing English course materials to better facilitate the learner. Incorporating technology, digitalization, and visual elements to the learning materials is also crucial to capture the students' attention and enhance the learning experience. The aim is to provide students with interesting and engaging materials to help them gain knowledge and enjoy the learning process.

DISCUSSION

This research focuses on the analysis of existing learning materials in an English reading course for non-English major students at a public university in Bogor. Based on the analysis of existing documents, it can be concluded that the English reading materials available for the non-English major students are still inadequate. The coursebook used in the English reading course for non-English major students consists of 14 topics, some of which have the potential to incorporate problem-solving skills such as cause and effect, comparison and contrast, transferring information, making inferences, and distinguishing fact and opinion. However, the primary focus of the coursebook is still on reading skills and strategies rather than problem-solving scenarios. This makes generating a solution based on the problem analysed (PS-10) and justifying the reasoning of the solution with evidence (PS-11) do not have a direct correlation with any of the types of exercises in the coursebook, as the focus of the book is on reading skills and strategies rather than problem-solving scenarios.

Overall, while the coursebook does not explicitly focus on problem-solving skills, it offers a range of exercises that challenge students to apply critical thinking and analytical skills to comprehend and interpret English texts. However, it may be beneficial to incorporate more problem-solving scenarios in the future to further enhance students' problem-solving abilities.

The data shows that the majority of the exercises in the coursebook focus on grammar, vocabulary, and transferring information. However, the exercises dealing with higher order thinking skills (HOTS) questions such as predicting, inference, and fact/opinion are limited. This indicates that the coursebook may not fully develop the problem solving skills of the students. While it is important to have a strong foundation in grammar and vocabulary, it is also essential for students to develop problem solving skills, which are highly valued in real-life situations. Thus, the limited exercises dealing with HOTS questions may hinder the development of these skills among students.

Therefore, it is recommended that future materials development incorporate more exercises that promote problem solving skills, such as those that require students to analyse and synthesize information, evaluate arguments and evidence, and apply critical thinking. This can enhance the overall effectiveness of the coursebook and better prepare students for real-life situations that require problem solving skills.

Moreover, the incorporation of microlearning descriptors in the existing learning materials is not evenly distributed. While the materials include a variety of formats, such as explainer videos, PPT slides, and infographics, only a small subset of microlearning descriptors are present in these materials. The absence of adherence to microlearning descriptors can have important implications for the effectiveness of the materials in meeting the needs of non-

English major learners. such, this study highlights the need for the development of English reading materials that are more closely aligned with microlearning principles in order to better meet the needs of non-English major learners.

The current finding is consistent with several previous studies (Khusniyah, 2022; Perdanasari, Sudiyanto, & Sangka, 2021; Sulistyaningrum, Iskandar, & Dewanti, 2022; Muhlisin & Prajoko, 2019). These studies conducted needs analysis and some analysed the existing learning materials. Perdanasari, Sudiyanto, and Sangka (2021) found that the existing teaching materials did not effectively enhance students' thinking skills. Therefore, they further emphasized the need to develop materials based on the results of the needs analysis. Similarly, Sulistyaningrum, Iskandar, and Dewanti (2022) discovered that the existing English materials used by teachers of Junior High School X had not been fully integrated with microlearning. Hence, the development of new materials was also necessary. Meanwhile, Khusniyah (2022) also highlighted the importance of digital learning media for English reading comprehension classes, as the limited resources in the materials led to low reading comprehension skills among students. Lastly, Muhlisin and Prajoko (2019) argued the significance of developing textbooks that could improve problem-solving skills, thereby enhancing students' high-order thinking skills.

Lastly, in terms of the teachers' perception of the needs analysis of English reading materials for non-English major students, their feedback indicated that the existing learning materials used in the classroom have not fully accommodated the learners' needs. It seems that updating and modernizing the reading passages in the coursebook is a common concern among the teachers. This is especially evident in the materials' relevance, as the teachers noted a lack of 21st-century skills and little use of technology. Additionally, the reading topics provided in the materials were found to be outdated and did not align with the learners' interests. These findings suggest that the current learning materials may not be fully effective in engaging the learners and promoting their learning outcomes. This implies that the development of new materials based on microlearning and problem-solving skills is necessary to bridge the gap between the existing materials and the learners' needs. Additionally, making sure that the learning resources are interconnected and easily accessible for all teachers is also highlighted as important. These suggestions are helpful in considering how to improve the current learning materials for better student learning outcomes.

CONCLUSION AND RECOMMENDATIONS

In conclusion, the study found that in the existing learning materials, some problem-solving descriptors can be identified, such as getting the gist of the text (PS-1), differentiating fact from opinion (PS-5), making inferences (PS-

6), transferring information (PS-7), generalizing (PS-8), and summarizing (PS-9) as these descriptors are in line with the strategies of reading comprehension. However, some descriptors that specifically reflect problem-solving activities, such as defining the problem (PS-2), identifying potential causes of the problem (PS-4), generating a solution based on the problem analysed (PS-10), and justifying the reasoning of the solution with evidence (PS-11) are still not identified.

In addition, some microlearning descriptors are also identified in the existing learning materials of explainer videos and infographics, including bite-sized content of information (MCL-1) and specific and single learning objective (MCL-2) for infographics; and self-paced learning (MCL-3), mobile-friendly accessibility (MCL-5), and multimedia use and visual aids (MCL-6) for both infographics and explainer videos. However, the descriptor of engagement and interactivity (MCL-4) is still not evident. Despite the identification of microlearning descriptors in the existing learning materials, the number is still insignificant to facilitate the whole learning process and the learning object materials also need more improvements so that all the descriptors of microlearning can be met.

Subsequently, this study highlights the need for the development of learning materials that incorporate a variety of microlearning strategies to effectively engage non-English major students in the reading process. The microlearning approach emphasizes the delivery of small, focused learning units that are tailored to the learners' needs, preferences, and interests. This means that the new materials should be designed to address the learners' specific needs and to provide them with relevant and up-to-date information that matches their interests. Similarly, problem-solving skills require learners to think critically, analyse information, and develop innovative solutions to real-world problems. The new materials should, therefore, incorporate problem-solving tasks and activities that enable learners to apply their knowledge and skills to real-world situations. This will help them develop higher-order thinking skills and become better problem solvers.

Recommendations are made to develop new English reading materials that incorporate microlearning and problem-solving skills, cater to the needs of non-English major students, and provide a better learning experience. Further research will cover the development process of the new English reading materials and the evaluation of their effectiveness in improving the academic success of non-English major students.

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FURTHER STUDY

The limitations of the study may include a small sample size for data collection and limited generalizability of the findings. This study was conducted at one university in Bogor, Indonesia, which means that the findings may not be representative of non-English major students' needs in other contexts or regions. Furthermore, the study only focused on English reading materials and did not explore other English language skills, such as speaking and writing. The content analysis method used in the study may not have captured the full range of non-English major students' needs or perspectives.

Despite these limitations, the study provides valuable insights into the needs of non-English major students in terms of English reading materials. It emphasizes the importance of adapting learning materials to enhance the academic success of these students. However, further research is necessary to evaluate the effectiveness of the new learning materials and to address the limitations of the study.

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