

THE INFUSION OF PROBLEM SOLVING SKILLS IN MICROLEARNING VIDEOS OF ENGLISH READING MATERIALS FOR NON-ENGLISH MAJOR

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Abstract: Problem solving skills as one of the 21st century skills should strongly be focused in education because when students practice problem solving consistently, they can develop better social and situational awareness – the ones required in this social impact era. This study aimed at describing the infusion of problem solving skills in microlearning videos for non-English major students. In addition, it delineates the feasibility of the materials using a small-scale piloting. The study employs library research for the procedures of infusion and pilot study for the feasibility of the designed materials. The findings encompass detailed descriptions and procedures of the learning materials enclosed with a feasibility measurement conducted by a panel of three English learning materials experts and 50 participants as target users. The participants involved eleven English course instructors and thirty-nine students. The feasibility measures indicate that the microlearning video prototypes received satisfactory results. These results suggest that microlearning videos have the potential to enhance problem solving skills which in turns revamp the 21st century skills. The naturally determined characteristic of microlearning videos are also befitting the demand for bite-sized content of information, self-paced learning, mobile-friendly accessibility which undergo learning experience of students in digital era, especially in EFL context within higher education.

Keywords: *English reading materials; non-English majors; microlearning videos; problem-solving skills.*

INTRODUCTION

It is undeniable that 21st century poses meta challenges to human life. Volatility, uncertainty, complexity, and ambiguity which sets out the situation of constant, unpredictable change in areas of the business world force to shift education direction from traditional to making decisions and solving problems-oriented. The 21st century skills are tools that can be universally applied to enhance ways of thinking, learning, working and living in the world. Problem solving is one of the 21st century skills and reading literacy is another. Problem solving is often broadly defined as "the ability to understand the environment, identify complex problems, review related information to develop, evaluate strategies and implement solutions to build the desired outcome" (Fissore, C. et al, 2021). At a basic

level, this includes an ability to identify an issue and take in information from multiple sources to evaluate options and making decision. Developing problem-solving skills and their application to real-life situations are crucial for enhancing students' competencies, as problem-solving is widely recognized as one of the key skills demanded by employers in the 21st century (Clark & Mayer, 2016). Subsequently, it is important to note that problem-solving skills do not only enhance academic performance but also serve as invaluable assets in equipping students to meet the demands of today's rapidly evolving world.

The skills are crucial because they greatly impact decision-making skills. Wang (2021) confirmed that the new generation requires high levels of support to develop creativity and

integrate diverse subjects such as nature, humanities, and technology in a world where choices abound, the ability to weigh options, consider consequences, and make well-informed decisions is crucial. Critical thinking and problem solving skills equip young people to analyse and evaluate whether the information they are receiving is just reliable. The function of education is to teach one to think intensively and to think critically.

A number of studies dealing with the incorporation of problem solving skills in education field have been conducted. (Salim and Alnoori, 2021; Riyadi, et al., 2021; Muhlisin, et al., 2022; Kök and Duman, 2023; Adeoye and Jimoh, 2023). Salim and Alnoori aimed at proving the efficacy of problem solving and development of students' critical thinking while working with professional teaching process. They confirmed that the approach will not only increase the acquisition of foreign languages but will also contribute to vocational skills by developing the critical thinking of learners. Riyadi, et al. believed that elementary school students have problem-solving skills. Muhlisin, et al. focused on the use of a RIAS (Reading, Identification, Analysis, and Self reflection) model that proved to have a considerable impact on students' problem solving skills. Kök and Duman revealed that problem-based learning improves problem-solving skills, academic skills, social skills, and language skills. Adeoye and Jimoh claimed that promoting innovation and creativity among 21st-century learners is essential for preparing them for the future. Problem-solving skills are essential in promoting innovation and creativity among learners. Educators can use various strategies to promote problem-solving skills, such as project-based learning, experiential learning, cross-disciplinary collaboration, and technology integration.

In the contemporary digital age, the integration of technology into education has offered boundless potentials for the enhancement and refinement of instructional approaches and learning resources. There is a rising interest in the development of learning materials that align with the needs and characteristics of modern-day learners as digital natives, in the context of 21st century learning, which encompasses skills such as communication, collaboration, creativity, critical thinking, and problem-solving. Microlearning stands out as a notable approach in this regard. Microlearning, characterized by short

and focused learning units, has gained prominence as an effective pedagogical strategy. Alella (2021) defines microlearning as the process of learning through bite-sized, well-planned modules, and short – term learning activities. Valamis (2022) asserts microlearning as short and small chunks of information used to meet a specific learning outcome and there is no definitive time requirement for microlearning, but typically microlearning content takes the learner 1-10 minutes to consume.

Studies have demonstrated the positive impact of microlearning on students' learning outcome (Almazova et al., 2018; Miloserdova & Belyaeva, 2019; Hosseini et al., 2020; Wenhui et al., 2020), particularly in the field of English language teaching and learning in higher education settings. Microlearning videos are one of the microlearning object materials. gaining credence among educators to suit millennial learners to conduct self-learning and enhance their autonomy in learning.

In many tertiary educations, English has been designated a compulsory subject as one of the core subjects in the 21st century learning framework (Partnership for 21st Century Skills, 2019). The growing demand for English language proficiency among students specializing in non-English disciplines has prompted continuous advancements in the field, particularly in the enhancement of reading skills (Tolstikh et al., 2021). Proficiency in reading, an essential skill within academic contexts, plays a significant role in nurturing students' literacy development. However, despite the persistent efforts of educators to promote reading habits at the university level, students' reading proficiency and English language competence remain unsatisfactory (Poedjiastutie et al., 2018). Similarly, Phuong, et al. (2021) discovered that many non-English majors at universities in Vietnam have problems in English reading comprehension. An interview with an English lecturer in one of the universities in Thailand also gives almost identical situation. In four English courses taken by non-English majors – Accounting, Tourism, Business Management - the students still have problems in reading comprehension. This highlights the need for improvements in supporting students in developing their English reading skills, particularly in the digital age, where distractions such as social media may significantly impact students' reading habits. Non-English major students are targeted in this study due to their

background which is not English that they need harder efforts to read in English. In actual fact, they have to achieve reading skills – referencing, inferencing, guessing meaning from context, scanning, skimming, and other related reading skills – to cope with their learning materials, future carriers and work demands.

In alignment with the Partnership for 21st Century Skills framework, the importance of problem-solving skills, and the nature of millennial learners this study attempted to infuse problem-solving skills into microlearning videos English reading materials for non-English major. This study sets out as the next stage of the previous study - a needs analysis study conducted prior to this study regarding the needs to design problem solving skills-infused microlearning videos of English reading materials for non-English major. The needs analysis findings reveal a gap between the current materials and the descriptors of microlearning and problem-solving indicating an urgency of developing English reading materials that promote problem-solving and incorporate microlearning to facilitate the needs of non-English major students. In short, this study provides two focuses: the descriptions of the materials and the feasibility measurement of the materials.

METHOD

This study employed library research to design the infusion of problem solving skills in the microlearning videos of English reading materials for non-English major. The materials were then piloted to see their feasibility. The pilot study involved 53 participants, consisting of two subject matter experts, one media expert, 11 course instructors, and 39 non-English major students. The experts hold master degree in TEFL and have working experience in the field of English language education for more than 20 years. The media expert also holds a master's degree and have worked in the field of ICT and English language education for 10 years. Meanwhile, the teachers have teaching experience ranging from <10 years (n=3), 10-20 years (n=3), and >20 years (n=6 years). The 39 students are the first-year students enrolled in *Integrated English Reading* course as a compulsory subject. Formal permission was obtained from subject matter experts, media experts, and teachers who were invited to take part in the study. This was done through written communication with clear information of its purpose. Participants were given the chance to ask questions and seek

clarification before giving their consent. The experts assessed the relevance, engagement, and clarity of the materials through interview. Their feedback and suggestions were considered in refining the materials. Meanwhile, the target users' feedback was obtained through questionnaire. The evaluation focused on their satisfaction with the content and overall learning experience. The data collected from the users were analyzed to reveal their perceptions on the microlearning videos.

RESULTS AND DISCUSSION

The infusion of problem solving skills in microlearning videos of English reading materials for non-English major resulted on six prototypes, each containing three episodes of microlearning videos with a duration ranging between 2 to 3 minutes. The sequence of the series followed a structured approach to facilitate students' reading activities and stimulate their problem-solving skills.

The design framework revolves around the issue of environments as one of key aspects of global awareness that 21st century learners need to acquire. Hence, the prototypes are based on two topics: plastic pollution and human-wildlife conflicts. Each topic consisted of three videos with specific learning objectives. First, the video aims to activate students' prior knowledge by introducing the topic and facilitate the vocabulary building. Second, the video aims to revisit and reinforce reading comprehension, ensuring that students not only read but also understand the material. Third, and perhaps most crucial, the video aims to encourage students to apply problem-solving techniques by solving problem cases through reflective questions and task instructions. In addition, it is also important to note that while the video-based activities are designed to enhance the learning experience, the actual reading of the materials takes place outside of the videos. The videos serve as complementary resources that are intended to motivate, clarify, ask reflection questions, review important points, and provide task instructions to support the reading process.

Table 1 displays the cover or thumbnail images for the prototypes of three learning object materials (LOMs) for each topic in which each topic has 3 LOMs. These visual representations play a role in providing a visual preview of the prototypes and serving as an initial point of engagement for learners. They also serve as the

first impression for the learners and helps them understand what to expect from the video content.

Table 1. *Prototype covers*

LOM 1	LOM 2	LOM 3

The first LOM, entitled "Get to Know the Context", plays a foundational role within the microlearning materials. Its purpose is to offer learners an introduction to the background and context related to the reading materials. Through the first video, students are expected to be able to understand the relevance and importance of the topic they will be exploring. The second LOM, entitled "Reading Review", signifies a video that focuses on reviewing the key points and main ideas of the reading materials. It aims to confirm learners' understanding and reinforce the important concepts covered in the texts. By

revisiting the central ideas of the reading text, the second video ensures the students' grasp of the subject matter and prepares them for deeper engagement with the content. The third video, entitled "Solve the Case", represents a video that presents a problem-solving activity related to the reading materials where learners are encouraged to apply problem-solving skills to analyze and find solutions to a specific case or scenario.

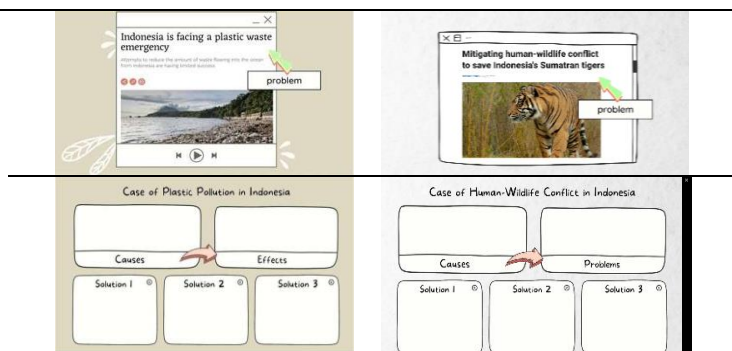
Table 2 displays the samples of prototype design as the output of this study, along with the infusion of problem-solving and the intended learning objectives.

Table 2. *Prototype design*

Problem solving stage	Learning objective	Topic 1: Plastic Pollution in the Sea	Topic 2: Human-Wildlife Conflict
Exploring the Problem	Students can activate their prior knowledge by recognizing the topic of the text and vocabularies		
Analyzing the Problem	Students can apply previously learned information about the text		

Proposing
Solution

Students can organize
informa-tion into
visual representation
and propose solutions



In LOM 1: Recognizing the problem of plastic pollution, the focus is on helping learners recognize the problem of plastic pollution as a global environmental issue. The video content serves as an eye-opener, introducing the case of plastic pollution and emphasizing its significance and its impact on the environment. Real-life examples are shared to illustrate the direct and indirect effects of plastic pollution on ecosystems. Learners are expected to gain a deeper understanding of the harmful effects of plastic pollution and the urgent need to address it. Meanwhile, in LOM 2: analyzing the problem, the focus shifts to defining the problem of plastic pollution more comprehensively. The videos will explore the various factors contributing to plastic pollution, such as improper waste management, single-use plastics, and plastic production and consumption to equip learners to analyze the challenges and identify possible solutions. Lastly,

in LOM 3: organizing information, prompt questions are provided as guidance to assist learners in creating their concept maps or graphic organizer that summarizes the problem case. By following the prompts, learners are expected to help learners in examining different dimensions of plastic pollution, such as its causes, consequences, and potential solutions.

During the evaluation of the prototypes, feedback from the participants regarding the design of the microlearning materials were gathered to assess their quality in improving English reading skills, engagement, and overall learning outcomes. Based on Table 4, it can be concluded that the overall quality of the video prototypes is in *Satisfactory* (average score of 4.4 for students' evaluation) and *Very Satisfactory* (average score of 4.6 for experts, and 4.8 for course instructors) categories.

Table 3. *Prototypes' evaluation scores*

Evaluator	Score obtained	Category	Information
Experts	92	Very Satisfactory	Suggestions for quality improvement
Course Instructors	96		
Students	88	Satisfactory	Minor revision

Subject matter experts focused on evaluating the accuracy and relevance of the content to the learning objectives, specifically in terms of engagement, reading materials, and problem-solving infusion. First, in terms of engagement, it is noted that the prototype videos are attractive and enjoyable to watch, likely to capture the students' attention. However, one expert suggests specifying the topics further to facilitate deeper discussions and exploration. In terms of problem-solving activities, one expert suggests providing examples before assigning more challenging tasks, such as in creating a graphic organizer. This approach helps prepare learners and provides a demonstration of the expected learning output. Consistent guidance throughout the tasks is also emphasized, as it can create a smoother progression from easier to more difficult tasks. In short, the evaluation from subject matter experts highlights the strengths and areas for

improvement in the learning prototypes. Enhancements related to specifying topics, organizing materials, contextualizing vocabulary, reinforcing comprehension, and providing consistent guidance can further enhance student engagement, reading skills, and problem-solving abilities.

In the same fashion, the media expert's comments provide valuable insights into enhancing the quality of the prototype learning materials. His feedback emphasizes the importance of adjusting the pacing of the videos, clarifying the main objectives, improving the visual aspects such as font usage and subtitles, and maintaining consistency within a video series. These suggestions aim to optimize audience engagement, comprehension, and overall viewing experience.

The results reported the designs of the prototypes while aligning the stages of problem-

solving to enhance learning experience for students in the English reading course. By addressing real-world problems as the main learning topics, the prototype is expected to foster active engagement and interests of the learners. This study attempted to provide alternative for teaching and learning English reading by designing microlearning videos of English reading materials with problem-solving infusion. The prototypes have fulfilled the features of learning materials in the video-based learning, including visual representation, narration, visual aids and graphics, interactive elements, real-life examples, and pace and timing.

The prototypes facilitate students to develop a deeper understanding of English reading while honing their problem-solving skills by applying strategies in English reading, such as making prediction, making inference, and drawing conclusion. In addition, the prototype's design also takes into consideration the pre-reading and post-reading stages, offering activities that align with these phases. Pre-reading activities such as vocabulary preview and pre-reading questions help activate prior knowledge and set a purpose for reading. Post-reading activities like comprehension questions and summarization promote comprehension and reflection, allowing students to consolidate their understanding and demonstrate their grasp of the reading material.

Moreover, in facilitating the students' self-learning, this study particularly focused on pre-reading and post-reading stages. In line with the main objective of this study, creating microlearning video prototypes, a previous study highlighting that the more learners feel safe and motivated, their reading comprehension texts increased (Fauzi, Saman, Zannah, Octaviani, & Girlani, 2022). The stages represent some of the basic and necessary reading skills evident in several previous studies (Elleman & Oslund, 2019; Hmelo-Silver, 2004).

The structural elements of video-based learning materials in this study consist of previewing and introducing lessons, reviewing key points, question-answer inquiry, and applying content to real-world applications (Allela, 2021; Ou, Joyner, & Goel, 2019). Previewing and introducing the lesson aligns with the pre-reading stage, which aims to activate students' prior knowledge by providing context and the topic. Meanwhile, key point review and question-answer inquiry match the post-reading stage as students can confirm their understanding of the text and apply what they learn to another context, such as

by creating a graphic organizer that summarizes the reading.

The result is in line with several related studies. A study highlighted the needs of improving students' reading comprehension and made some suggestions, including better text selection, building a solid vocabulary, making use of technology, and increasing learner autonomy (Al-Noursi, 2014). Meanwhile, a study emphasizes on vocabulary building and background knowledge of the learners to activate their prior knowledge (Kendeou, McMaster, & Christ, 2016; Sadri, Fithriani, Saidurrahman, Salmiah, & Hamidah, 2019; Saeidi & Ahmadi, 2016). In addition, a study exemplifies the use of pre-reading stages through sharing knowledge of the context, building trust and interests, and motivating the learners (Sabet, Zafarghandi, & Karkara, 2018; Al-Noursi, 2014).

Another study also included task of analytical thinking skills to allow students make decision in which English language teachers need to put more emphasis on the problem-solving tasks to enable students to solve problems in their real lives (Hamsia & Erydani, 2022). Furthermore, the provision of reading passages under the topics of environmental issues to stimulate students' problem-solving skills is in line with what is suggested in a previous study (Priyatni & Martutik, 2020), in which they provide news item texts that focused on social problems to enhance students' problem-solving abilities.

Nonetheless, in designing the prototype, this study selected reading passages related to the current global issues to trigger students' interest and allow them to relate the passages to their real lives. In addition, the microlearning videos of pre-reading stages provide students with a set of vocabularies needed to comprehend the overall topics and issues. By using technology in a form of microlearning videos, the prototypes facilitate students' self-learning in which they can access the learning materials anywhere and anytime without any restriction.

Based on the evaluation, the overall scores indicate that the prototypes are overall satisfactory in terms of the use of audio-visuals and the relevance, engagement, clarity, and problem-solving infusion within the reading materials. However, there are details needed to be improved based on the inputs and feedback from the experts. The evaluation findings should be considered as valuable feedback for materials development. They highlight the strengths and areas for improvement in the prototypes, helping

the developers identify what aspects of the materials are well-received, and which areas can be further enhanced to better meet the students' needs and preferences. Therefore, while the positive average score is encouraging, it should be seen as a starting point for further iteration and refinement of the prototypes by addressing any concerns or suggestions raised by the evaluators and create a better quality of final products.

Therefore, the experts' inputs and feedback were taken as consideration in improving the video prototypes to have better quality. The target users' feedback also provides valuable information regarding the relevance, clarity, and engagement of the content, as well as the overall user experience. They find the topics relevant, the content interesting, and the delivery clear and understandable. The videos are seen as helpful for understanding the topics while also providing an enjoyable learning experience. The visuals and language style are considered suitable, and the students express a desire for more videos of similar quality.

To sum up, this study highlights the potential of the prototype in addressing the challenges of English reading instruction, particularly in the digital age where students are easily distracted and may struggle to maintain reading habits. The combination of microlearning principles and problem-solving skill infusion offers a promising approach to engage students, enhance their reading abilities, and equip them with essential skills for future academic and professional endeavors. By designing microlearning videos that integrate problem-solving skills into English reading materials, this study seeks to not only enhance students' language proficiency but also equip them with 21st-century skills. The findings of this research can inform educators, curriculum developers, and policymakers on effective strategies for fostering a more dynamic and skill-oriented learning environment.

CONCLUSION

This study focuses on the infusion of problem solving skills in microlearning videos of English reading materials for non-English major. In consequence, it comprises the descriptions of the materials and their feasibility measurement. The materials are six prototypes of problem solving skills infused microlearning videos of English reading materials for non-English major, each containing three episodes of microlearning videos with a duration ranging between 2 to 3 minutes. The sequence of the series followed a structured

approach to facilitate students' reading activities and stimulate their problem-solving skills. The prototypes were validated for their feasibility. The validations confirm the quality and instructional design of the videos, highlighting their relevance, engagement, and clarity. The results indicate that the microlearning videos are seen relevant to pre-reading and post-reading activities, offering strategies for activating prior knowledge, reflecting on reading materials, and applying problem-solving skills.

However, it is important to acknowledge the limitations of this study. The sample size was relatively small, and further research with larger and more diverse samples would enhance the generalizability of the findings. Additionally, longitudinal studies to assess the long-term impact of the microlearning videos on reading comprehension skills would provide valuable insights.

In conclusion, this research supports the implementation of microlearning videos with problem-solving infusion as an effective tool to enhance reading comprehension among non-English major students. The findings highlight the relevance, instructional quality, and satisfaction associated with these videos. It is recommended that educators and materials designers consider developing and integrating microlearning videos into their teaching practices to support the learning needs of non-English major students and foster their reading comprehension and added value of 21st century skills.

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