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Using Micro-Content Modules to Enhance Students' Critical Reading Ability

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Abstract
This study set out to accomplish two main goals: first, an assessment of how well micro-content modules improved students' critical reading abilities, and second, a look at students' attitudes and perspectives on incorporating micro-content modules into critical reading instruction. A quasi-experimental methodology was used to achieve these goals, giving treatment group (n = 28) participants access to nine different critical reading micro-content modules and control group (n = 26) participants traditional language teaching. Critical reading assessments were administered to both groups before and after the implementation, with only the treatment group providing feedback on the efficiency of the micro-content modules. The results showed significant improvements in the treatment group's critical reading skills compared to the control group. The micro-content modules' convenience, use, visual and auditory clarity, support for self-directed learning, and critical thinking promotion were highly praised by treatment group participants. They also suggested adding more participatory and exciting activities to enhance the long-term success of these modules.

INTRODUCTION

Reading comprehension is a multifaceted skill that involves extracting meaning from text, a process influenced by individual cognitive abilities and social contexts (Grabe & Stoller, 2019). For English as a Foreign Language (EFL) learners, reading for general comprehension serves as the foundation for more advanced objectives, such as integrating and critiquing information. However, the challenges associated with comprehending informational texts, even at a general level, are often underestimated (Sahin, 2013).

In recent years, the digital era and the COVID-19 pandemic have significantly impacted students' attention spans, creating new challenges in classroom management, particularly in higher education. Studies indicate that many students reported a decreased ability to focus following the pandemic (Quintiliani et al., 2022). For example, Thai university students often attend

three-hour classes involving lectures and activities, with some adopting blended or hybrid learning formats. This prolonged duration can be particularly taxing for students in critical reading classes, where maintaining attention is crucial but difficult due to the inherently receptive nature of the skill. As a result, teaching strategies that align with students' limited attention spans—such as 30- and 21-minute activities—should be considered to enhance engagement (Anusha et al., 2018).

One promising approach is fostering metalinguistic awareness, which involves understanding text structures, patterns, and genres, as well as recognizing connections within texts. Such awareness, combined with cognitive and metacognitive reading strategies, is essential for EFL learners to comprehend informational texts successfully (Wilawan, 2022). However, current EFL reading instruction often emphasizes tasks like identifying, analyzing, guessing, and summarizing, which can limit deeper engagement with texts. Consequently, critical reading skills—including questioning, evaluating, reflecting, concluding, comparing, contrasting, and responding—remain underexplored in EFL contexts, particularly at the higher education level (Correia, 2006; Ilyas, 2023; Tomitch, 2000).

Developing critical reading skills is undoubtedly challenging but invaluable for EFL students. These skills not only promote active text engagement but also foster a more balanced relationship between readers and writers (Pardede, 2007; Wallace, 1992). To address these challenges, this study introduces micro-content modules as an instructional approach. Micro-content modules condense complex information into manageable, bite-sized portions, often incorporating multimedia elements and interactive formats (Gikas & Grant, 2013). This method supports personalized online learning experiences, enabling learners to practice metalinguistic awareness and critical reading through short, focused activities that can be integrated into pre-class, in-class, or self-study contexts within 15-minute sessions (Marinskaya, 2020). Given these considerations, this study thus aims to explore the following research questions:

1. To what extent do micro-content modules enhance students' critical reading abilities?
2. What are students' perceptions and attitudes toward using micro-content modules for critical reading instruction?

LITERATURE REVIEW

The significance and differentiation between reading for comprehension and critical reading

Critical reading, particularly in English Language Teaching (ELT) for English as a Second Language (ESL) and English as a Foreign Language (EFL) students, extends beyond language acquisition to encompass vocabulary, grammar, and overall linguistic proficiency (Villanueva de Debat, 2006). While reading comprehension forms the base of Bloom's Taxonomy, critical reading explores deeper levels of cognition, requiring analysis, evaluation, and a nuanced engagement with texts (Anderson & Krathwohl, 2001). Critical reading, on the other hand, fosters critical thinking skills by encouraging students to analyze, recognize bias, and assess evidence, thereby

promoting both cognitive and linguistic growth (Li & Wan, 2022; Nasrollahi et al., 2015; Pardede, 2007). Consequently, integrating critical reading strategies into language education can facilitate cognitive development and instill a lifelong passion for learning.

Challenges in developing critical reading skills among EFL

Critical reading skills require higher-order cognitive abilities beyond surface-level understanding (Anderson & Krathwohl, 2001), which involve challenging premises, recognizing biases, and assessing the validity of the author's claims (Pardede, 2007). As texts become more complex, students need more profound critical reading skills to engage with intricate arguments and rhetorical devices (McNamara et al., 2012). Therefore, advancing critical reading skills involves ascending Bloom's Taxonomy, from basic comprehension to sophisticated analysis and evaluation (Anderson & Krathwohl, 2001; Ilyas, 2023). However, when it comes to critical reading in EFL, the elements found in the reading instructions were comprised of tasks such as identifying, analyzing, guessing, and summarizing, and very few elements of critical reading. Even questioning elements related to critical thinking were not found as Ilyas (2023) suggested, "Teachers could ask students to question the purpose of writer's writing the text or the message behind the text".

Apart from the level of difficulty of the text students face, fundamental or traditional pedagogical approaches have shortcomings when teaching critical reading. A conventional three-stage reading process with pre-reading, while-reading, and post-reading stages, described by Brown (1994), are essential for thorough comprehension; however, students may become overwhelmed due to their extensive character, especially when working with challenging materials (Giurgiu, 2017). The lengthy time and effort needed for each step may unintentionally prevent students from developing the critical reading skills necessary for comprehension and engaging deeply with the text (McNamara et al., 2012). Grabe (2009, 2014) lightened the idea of locating important information in the text by emphasizing the significance of understanding metalinguistic awareness, known as discourse or text structure, particularly at the level of text organization. This structure refers to how information is arranged within a text and commonly involves various formats like description, definition, sequence, procedure, cause-effect, compare-contrast, and problem-solution (Akhondi et al., 2011; Grabe, 2009). These formats are often employed in informational texts to provide facts about specific topics tailored to the text type and the writer's purpose. Recognizing the distinct signal words and phrases associated with each discourse structure aids readers in identifying organizational patterns in texts. In short, understanding these structures helps readers comprehend how main ideas and supporting details are structured, enabling them to locate important information more effectively and enhancing their overall understanding of the text.

Incorporating questioning elements and promoting the awareness of discourse structures at the text level could empower and solve reading challenges among EFL readers. Therefore, to promote metalinguistic awareness, EFL readers should be allowed to experience questioning elements aimed at analyzing and evaluating elements, analyze discourse or text structures (how information is organized in text) through the tone, point of view, and purpose of the text, evaluate the content knowledge of the text through different informative text types, draw

connections among different parts of the text, recognize the pattern of text organization, and identify text types. By adding these steps in the reading process, especially during the while-reading stage, readers can locate crucial information more effectively and enhance their overall understanding of the text, developing critical reading skills.

The principles and application of micro-content in education

The condensing of complex knowledge into manageable, bite-sized bits is known as micro-content and characterizes a transformative approach to instructional design (Gikas & Grant, 2013). Micro-content modules are created to give brief, interactive, and targeted information that aligns with learning objectives. They are based on the ideas of providing a small amount of content at a time (a single module) and learner engagement (Dwinggo et al., 2023). The small amount of information emphasized by this pedagogical innovation aims to provide students with what they need within a short amount of time and in doing so, maximize the learning experience (Rajashekar & Sridhar, 2019).

The defining characteristics of micro-content modules are their conciseness and precision. A single learning topic or target is covered in each module, which prevents cognitive overload and allows students to focus on a critical concept, and would usually last no longer than fifteen minutes at a time (Gikas & Grant, 2013). Additionally, during this fifteen-minute timeframe, micro-content modules encourage active learning by encouraging interaction with the material through interactive features such as images, animations, and other multimedia components (Rajashekar & Sridhar, 2019). This method is consistent with constructivism's guiding principles, which hold that students actively construct their knowledge through practical applications (Jonassen, 1999). As a result, micro-content modules are promising tools for improving educational practices because they clarify complex subjects and encourage student engagement and retention.

The inclusion of multimedia elements can significantly increase the impact of micro-content modules. To aid learning and recall, visuals, animations, and frequent repetition are deftly included (Marinskaya, 2020). These components accommodate visual and kinesthetic learners, appealing to various learning preferences (Clark & Mayer, 2011). For instance, visual aids can make abstract notions more concrete by simplifying complex concepts. Videos and animations may also depict dynamic processes and situations that are difficult to describe through text alone (Mayer, 2005). Additionally, adding multimedia elements to micro-contents is consistent with the cognitive paradigm of multimedia learning (Mayer, 2005). According to this hypothesis, information delivered in verbal and visual formats—rather than verbal information alone—helps learners develop knowledge more efficiently (Mayer, 2005). Thus, micro-content uses multimedia components to address the cognitive preferences of various learners to improve understanding, retention, and overall learning outcomes.

Using micro-contents in education also represents a change from conventional, linear instructional strategies. Micro-content enables flexibility and personalization in learning by giving students brief, self-contained modules that align with specific learning objectives (Dwinggo et al., 2023). By accepting differences in pace, prior knowledge, and learning style, educators

can customize learning experiences to meet the needs of each student (Rajashekar & Sridhar, 2019). Micro-content integration in educational settings is prevalent in online and blended learning environments in addition to traditional classrooms (Marinskaya, 2020). Technology-mediated platforms allow for the seamless distribution of micro-content modules, giving students access to course materials from any location and at any time (Gikas & Grant, 2013). The demands of modern education are met by this flexibility, which caters to learners' dynamic lifestyles and encourages engagement through learner-centered, on-demand learning experiences (Marinskaya, 2020).

The promise of micro-content for critical reading

Time restrictions have consistently made it difficult to teach critical reading skills in-depth in the context of schooling. The pre-reading, while-reading, and post-reading stages described by Brown (1994) are frequently followed by conventional instructional approaches, which are essential but time-consuming (Giurgiu, 2017). This comprehensive strategy comprises introducing students to a text, assisting them as they read, and finishing with comprehension exercises and conversations. Although these stages are crucial for comprehensive comprehension, they require much instructional time and may subject students to information overload.

However, micro-content modules provide a decent alternative in this time-constrained environment. This innovative approach to education by Gikas and Grant (2013), promotes condensing complex material into smaller and manageable chunks. The condensed and interactive information distribution principles are perfectly aligned with the micro-content modules' multimedia components, such as images and animations (Rajashekar & Sridhar, 2019). As a result, educators can deliver critical reading more effectively by breaking it down into manageable, focused courses. These content chunks that fit into students' schedules would assist them in turn by lowering the time barrier usually associated with developing crucial reading abilities. Their capacity to encourage self-paced learning is another encouraging feature of micro-content modules. Traditional educational methods frequently follow a one-size-fits-all approach and do not accommodate students' varied learning paths (Dwinggo et al., 2023; Mohammed et al., 2018). Micro-content modules, in contrast, are intended to be self-contained learning tools, each focusing on a different aspect of critical reading. With this modular approach, students may take charge of their learning process and move through the courses at their own pace, whether teachers assign the lesson as pre-, while, or post-classroom activities.

The transformative impacts of this strategy were emphasized by Alias and Abdul Razak (2023), which showed that stimulating and cognitively demanding reading activities within a short period of time challenge learners to employ complex and critical thinking. This adaptability embraces modern educational ideas, emphasizing learner autonomy and individualized learning opportunities. Along with meeting each student's specific needs, it also does away with the strict time restrictions imposed by traditional critical reading training.

TPACK framework

Technological Pedagogical and Content Knowledge (TPACK) is a framework for teachers implementing technology in a dynamic classroom that allows transactional relationships among content, pedagogy, and the incoming technology (Koehler et al., 2014). According to Mishra and Koehler (2006), seven sub-dimensions of TPACK include:

1. Technological Knowledge (TK) which is the teachers' ability to operate a variety of technologies for instructional purposes,
2. Pedagogical Knowledge (PK) refers to teachers' competency in utilizing teaching strategies to improve student learning,
3. Content Knowledge (CK) deals with teachers' knowledge and skills of the subject matter,
4. Technological Pedagogical Knowledge (TPK) is associated with teachers' ability to employ teaching strategies supported by technologies,
5. Technological Content Knowledge (TCK) deals with teachers' knowledge of using technologies to improve student learning of subject matter,
6. Pedagogical Content Knowledge (PCK) concerns teachers' knowledge of employing various teaching strategies to represent subject matter and
7. Technological Pedagogical and Content Knowledge (TPACK) requires teachers to help students acquire content using specific teaching strategies.

Applying TPACK in developing micro-content modules for the digital age could be a practical framework. According to Tseng et al. (2022), previous research that applied TPACK indicated that TPACK-informed language learning courses and platforms were perceived to be helpful and practical. Given these factors, the study's two main goals are [1] to determine whether micro-content modules effectively enhance students' critical reading abilities and [2] to examine students' opinions and attitudes toward using micro-content modules in critical reading training.

METHOD

In this section, we present the methodological framework and design underlying our study, describe the characteristics of our participants, detail the data collection procedures, provide an overview of the development of our micro-content modules, and explain how the data will be analyzed and interpreted.

Research design

This study applied a quasi-equivalent control group design, a crucial factor in evaluating the efficacy of metalinguistic awareness (awareness of discourse structure at the text level) embedded in micro-content modules in enhancing students' critical reading proficiencies. This approach was selected due to its capacity to provide a systematic framework for comparing two groups and deriving accurate inferences concerning the results of our intervention. For the participants, they were selected through a purposive random sampling method to

ensure both groups shared similar characteristics on average, minimizing potential bias. This randomization process aimed to create an equal footing for comparing the treatment and control groups.

The study began with a pre-test to set the stage for our research. This pre-test aimed to establish a starting point for evaluating participants' critical reading skills. The questions in this pre-test also explored their capacity to engage critically with a given text, forming a baseline for our study. The primary emphasis of the study focused on the treatment group. To explore the potential of micro-content modules tailored to improve critical reading skills, these modules were carefully designed based on the insights gained from the literature review. This resulted in a structured but engaging approach to improving critical reading abilities. Subsequently, both the treatment and control groups underwent a post-test, evaluating the immediate outcomes of the intervention. This stage was of utmost importance in determining the immediate influence of our intervention and exemplified its alignment with the essential reading abilities.

Participants

This study comprised 54 undergraduates in the field of English at the School of Liberal Arts, Mae Fah Luang University. The participants were enrolled in English Reading and Writing 2 during the second semester of 2022. The participants were divided into two groups using purposive random sampling to create a fair comparison. One section, which included 28 participants, was assigned to the treatment group, while the other section, which included 26 participants, was designated as the control group. The treatment group received specialized micro-content modules designed to enhance critical reading skills. In contrast, the control group did not receive any such intervention. The participants' reading skills were assessed as average and classified as multi-ability students.

Data collection procedure

In this section, we explore the significant occurrences that influenced the development of our data-gathering methodologies. This stage established crucial groundwork that enabled a comprehensive analysis of the central concept of the study. To illustrate the intricate interconnection of our data collection attempt, the complex procedure was divided into five principal parts explained below.

Micro-content module development

The development of micro-content modules influenced the foundation of our study, which was intentionally created to equip the participants with enhanced critical reading abilities. During this phase, the notion of collaboration emerged as our team of researchers collaborated with experienced language educators to produce these modules using the TPACK framework (See Diagram 1 and Appendix).

Collaborative feedback of language educational experts

In conjunction with our team, this partnership expanded to encompass a cohort of specialists in language acquisition and educational course design wherein they evaluated our efforts to ensure the precise positioning of each component. The absolute integration of pedagogical objectives, learning aims, and an informational framework proved vital. The peer examination resulting in discerning perspectives and insightful feedback was particularly useful in ensuring a thorough and rigorous approach for our scholarly inquiry.

Data collection from participants

The research was initiated by involving our participants, who played a significant role in our investigation. We followed the systematic procedure of a critical reading test. Initially, we evaluated the critical reading abilities of the participants through a pre-test. Consequently, both the treatment and control groups were given instructions on critical reading strategies through the stages of pre-, while-, and post-reading. However, the treatment group was introduced to our micro-content modules, while the control group continued their customary reading practices. It is crucial to acknowledge that the activities within the micro-content modules were conducted outside regular class hours, and it took approximately three weeks to complete all nine modules as supplementary exercises. Furthermore, the participants could visit the modules at their convenience.

The primary measure undertaken was the post-test, which replicated the pre-test but demonstrated the immediate impact of our intervention. This measurement revealed the results of our efforts, allowing us to reach a conclusion with the collected data. Input was also collected from the participants, which would later provide a helpful perspective. Moreover, our investigation adhered to rigorous ethical principles. Each subject voluntarily enrolled in our examination, and their knowledge agreement was acquired. Measures were also implemented to safeguard their privacy and confidentiality, while guaranteeing their entitlements as participants in our inquiry. Ethical considerations persisted as the fundamental essence of our examination, guiding us at every point of this human-focused venture.

Pre-test and post-test specifications

The test encompassed nine reading paragraphs, each representing a distinct discourse structure in different informative text genres. These genres include cause-and-effect, simple listing, classification, descriptive or spatial pattern, problem-solution, compare-contrast, chronological order or sequence, order of importance, and definition-and-example. After each genre-specific reading passage, four questions were presented. The first three questions focused on analyzing that passage's point of view, tone, and purpose. In contrast, the fourth question focused on the inferences drawn from the participants after reading each passage. All of these elements align with the critical reading skills that participants were set to study through the micro-content modules. For each question, participants were also provided multiple-choice options (question items one and two) and short-response items (question items three and four). The test was administered in a digital format using Google Forms, and the

time taken by participants to complete the test was considered. The same test was administered as a pre-test before any intervention and as a post-test after the intervention, allowing us to gauge the impact of our micro-content modules on the participants' critical reading skills.

Feedback from participants

In the data collection procedure, participant feedback was collected through an online questionnaire created using Google Forms. This questionnaire featured a 5-point rating scale for the participants to express their opinions on the effectiveness of the micro-content modules in enhancing their critical reading abilities. The participants could express their views through the following ratings: 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; and 5 = strongly agree. An open-ended space was also provided to invite the participants to share additional comments or suggestions, enabling us to gather more comprehensive feedback on their learning experiences and the intervention's impact. Through this mixed-methods approach, we were able to understand participants' perceptions and allow them to contribute valuable insights beyond numerical ratings.

Development of nine micro-content modules

Content planning and structure

In order to obtain nine micro-content modules to enhance participants' critical reading skills, six dimensions of TPACK were applied. The three main dimensions of TPACK, which include Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), together with three sub-dimensions of TPACK, namely (TPK), (TCK), and (PCK), were used to design, develop, and define micro-content modules as shown in Diagram 1 below.

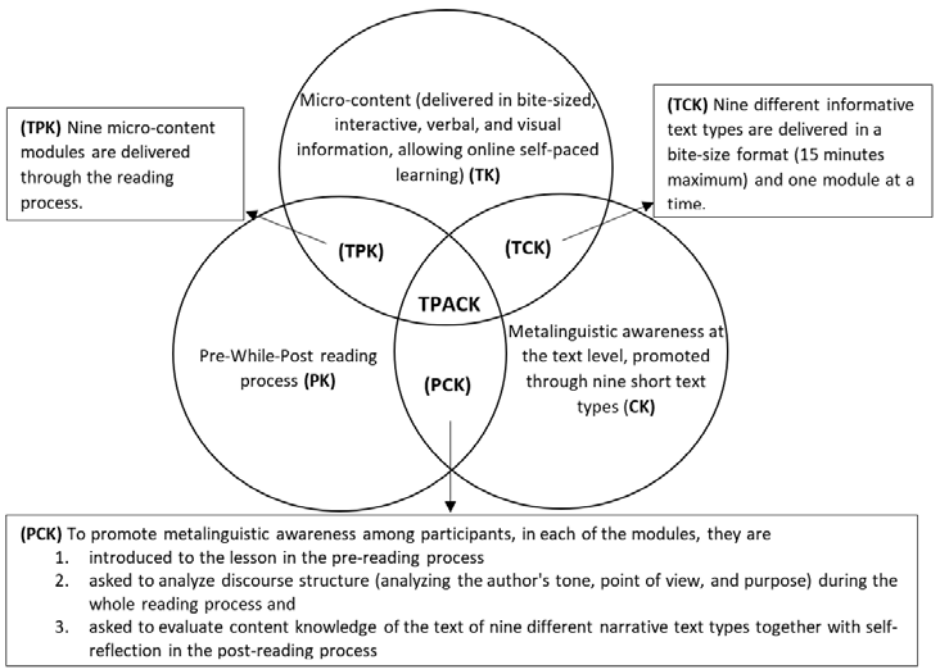

Diagram 1 The application of TPACK in micro-content modules development

As can be seen from Diagram 1 above, each module was developed through the application of the three main dimensions of TPACK. First, we applied *micro-content*, a pedagogical innovation aiming to deliver a single topic or bite-size information within a fifteen-minute timeframe in Technological Knowledge (TK), or the first dimension of TPACK. Second, *nine short informative texts*, namely [1] cause and effect, [2] simple listing, [3] classification, [4] descriptive or spatial pattern, [5] problem-solution, [6] compare-contrast, [7] chronological order or sequence, [8] order of importance, and [9] definition and example, were used to promote metalinguistic awareness at the text level, enabling participants to analyze the writer's strategies and discourse structures in the Content Knowledge (CK) dimension. Third, the regular *pre-while-post reading process* used in Pedagogical Knowledge (PK) is drawn into ten small stages, which are [1] objectives of the module; [2] definition of critical reading; [3] pre-stage of reading; [4] pre-vocabulary; [5] introduction of three main elements of the critical reading strategies: analyzing the author's tone, point of view, and purpose of the text; [6] practice and answer keys on 'point of view' [7] practice and answer keys on 'tone'; [8] practice and answer keys on 'purpose'; [9] reflection on learning (evaluating content knowledge of the text); and [10] self-evaluation.

Moreover, to complete the six dimensions of TPACK, the other three sub-dimensions were developed. This began with Technological Content Knowledge (TCK), where nine different informative text types were delivered in a bite-sized format (15 minutes maximum) and one module at a time. Next, for Pedagogical Content Knowledge (PCK), to promote metalinguistic awareness, participants were: [1] introduced to the lesson in the pre-reading process; [2] asked to analyze discourse structure (analyzing the author's tone, point of view, and purpose) during the whole reading process; and [3] asked to evaluate content knowledge of the text of nine different narrative text types together with self-reflection in the post-reading process. Moreover, to employ the reading process in Technological Pedagogical Knowledge (TPK), participants were exposed to all nine modules, repeated the reading process nine times, and experienced nine microcontent modules at their own pace and time. Combining all six dimensions of TPACK with the last dimension, which is TPACK itself, we drew the definition of *micro-content modules (TPACK)* as follows:

TPACK: Online micro-content modules, available for participants to learn at their own time and pace as a self-study, promoting metalinguistic awareness and enhancing critical reading ability.

Implementation and evaluation

Participants of the study were exposed to micro-content modules during the implementation and evaluation phase to enhance their critical reading abilities. Participants had access to the modules via an online platform, which let them view the learning materials whenever it fit their schedules outside of typical class hours. Participants were free to attend the modules on their own terms according to their personal preferences. Over a course of three weeks, participants were granted unlimited access to the modules online. This flexibility in module access was integral to the study's design, enabling participants to progress through the modules at their own pace. The asynchronous nature of this online learning experience offered

the advantage of accommodating various learning styles and preferences, as participants could examine the materials in a manner that best suited their needs. Some participants completed each module within the expected timeframe of fifteen minutes, while others moved through the content at a different pace. This flexible access approach sought to maximize participant engagement with the micro-content modules. This element of flexible access was also a deliberate choice, recognizing the diverse nature of participants' commitments and learning preferences. It was intended to encourage participants' active engagement with the modules and create a conducive environment for effective learning. This approach ensured that the research captured the most authentic responses and outcomes related to participants' interaction with the micro-content modules.

In the following stages of the study, the pre-test and post-test assessments were employed to evaluate the immediate impact of the modules on participants' critical reading skills. Additionally, feedback was collected from participants, enabling them to provide impressions and insights into the effectiveness of the micro-content modules. This evaluation aimed to offer a comprehensive understanding of the modules' impact and potential improvement areas.

Data analysis and interpretation

Our study featured a sample size of n = 54, comprising 28 participants in the treatment group and 26 in the control group. These participants were all students majoring in English and enrolled in the English Reading and Writing 2 courses. To unravel the impact of our intervention, we conducted pre- and post-tests to assess the participants' critical reading abilities. The results from these tests provide a comprehensive picture of how the micro-content modules influenced their skills. In our analysis, we considered various statistical measures, including means, standard deviations, and *p-values*, to gauge the significance of the changes observed in the participants' performance.

The following sections provide an in-depth analysis of the results, including a detailed examination of the effectiveness of micro-content modules in improving critical reading abilities and the broader implications of these findings for educational practice. It is also important to note that a five-rating scale questionnaire was used to elicit responses and thoughts from participants, which added comprehensible information to the study. The data was calculated using arithmetic means. Participants were also asked to fill in the open-ended section of the questionnaire with any remarks or suggestions. Following the collection of the responses, they were categorized into major themes. The number of participants who shared the same ideas was also counted.

RESULTS

This section presents the findings from a comprehensive analysis of the two main research subjects that serve as the foundation of this study. The first investigation examines the extent to which micro-content modules aided participants in developing their analytical reading

abilities. Through quantitative research, we assessed these courses' effectiveness in fostering critical reading skills among English major students. The second investigation shifts our focus to both the quantitative and qualitative side, which seeks to clarify the participants' attitudes and viewpoints toward using micro-content modules for critical reading instruction.

Abilities of participants' critical reading on micro-content modules

The study results indicate that the use of micro-content modules significantly improved the participants' critical reading skills. Initially, the pre-test results for both the treatment and control groups were comparable, with mean scores of 16.43 (SD = 2.92) for the treatment group and 14.58 (SD = 3.80) for the control group, indicating no significant differences in their baseline critical reading abilities (p = 0.0146).

Following the intervention, Table 1 highlights the post-test outcomes. The treatment group, which utilized the micro-content modules, achieved a mean score of 21.61 (SD = 2.73), whereas the control group, which received traditional instruction, had a mean score of 18.35 (SD = 3.59). This significant improvement in the treatment group's scores underscores the effectiveness of the micro-content modules.

Table 1

Pre-post test results of micro-content modules on participants' critical reading abilities

Group	Experimental (n = 28)	Control (n = 26)	*p*-value
	x̄ (*SD*)	x̄ (*SD*)	
Pre-test	16.43 (2.92)	14.58 (3.80)	.0146*
Post-test	21.61 (2.73)	18.35 (3.59)	

* $p < .05$, indicating statistical significance

The *p-value* from the independent samples t-test was 0.0146, signaling statistical significance at the conventional alpha level of 0.05. These results prove that the micro-content modules implemented in the treatment group significantly enhanced participants' critical reading abilities compared to the control group.

The fact that participants who studied the micro-content modules showed a considerable improvement in their critical reading skills supports the efficacy of this pedagogical strategy. Ultimately, these courses made it easier for participants to read and comprehend critical texts, which improved their critical reading abilities. The results also imply that educators who want to develop students' critical reading skills may find micro-content helpful with its concentrated and interactive style. The personalized content and self-paced nature of micro-content modules have aided the students' development in critical reading and as a result, they could critically interact with the text, evaluate the arguments, and use higher-level cognitive abilities.

Feedback from participants on the micro-content modules

This part focuses on the participants' perceptions concerning the use of micro-content modules for critical reading teaching. This qualitative segment adds to the quantitative evaluation of

critical reading skills and provides a clearer view of how micro-content modules affected the participants' learning experiences. An overview of the participants' perspectives and attitudes concerning micro-content modules for critical reading teaching can be found in Table 2 below.

Table 2

Perceptions of participants on micro-content modules

Item	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	$\bar{x}$	SD
Usage							
The modules are modern and different from traditional learning.	0	0	0	14	14	4.50	0.50
The modules are convenient and easy to use.	0	0	0	6	22	4.79	0.41
The modules have clear pictures and sound.	0	0	1	2	25	4.86	0.44
Content							
The modules are interesting and stimulates curiosity in the subject matter to be studied.	0	0	3	16	8	4.14	0.61
The modules facilitate self-directed learning.	0	0	0	11	17	4.61	0.49
The modules stimulate critical thinking, analysis, and evaluation of the topic being read.	0	0	0	9	19	4.64	0.47
The modules facilitate self-generated summarization.	0	0	6	10	12	4.21	0.77
The modules promote long-term retention of learning.	0	1	7	9	11	4.07	0.88

Overall, most participants strongly agreed that the micro-content modules were practical, easy to use, had clear graphics and audio, encouraged self-directed learning, and sparked critical thought, analysis, and review of the reading material. Participants also agreed that the micro-content modules were interesting, encouraged curiosity about the topic matter, helped with self-generated summaries, and supported long-term learning retention. However, they only somewhat (not strongly) agreed that they did. Additionally, participants provided insightful feedback on how to improve the modules. These suggestions included enhancing the narration, instructions, and graphics for more significant impact, adding more interactive activities, and thinking about pacing changes, perhaps with subtitles for better comprehension.

The participant evaluation indicates that micro-content modules have helped them develop critical reading skills. Participants not only found these modules modern, user-friendly, and visually and audibly clear, but that they also promoted self-directed learning and critical thinking. While there is room for improvement in certain aspects, such as enhancing engagement and adjusting pacing, the overall positive perceptions underscore the fruitful potential of micro-content modules in facilitating critical reading skills.

DISCUSSION

In this discussion, we discuss the main results and implications of the study. We begin by examining the effectiveness of micro-content modules in improving students' critical reading skills. We then explored participants' positive perceptions of the modules and areas for suggested improvements. Then, we emphasize the importance of active participation in learning and its connection to critical thinking and long-term knowledge retention. Finally, we discuss practical implications for teachers and instructional designers. This multifaceted discussion highlights the importance of micro-content modules in educational settings and paves the way for a deeper understanding of their potential to promote critical literacy.

Effectiveness of micro-content modules

The micro-content modules significantly improved students' critical reading skills when implemented in the study's treatment group. Compared to the control group, students with access to these modules demonstrated significantly higher average mean scores and less variability in their work. This notable difference between the two groups demonstrates the real benefit of the micro-content modules in raising students' proficiency in critical reading. Moreover, each module's metalinguistic awareness strategies and practices (discourse or text structure) suit learners with short attention spans in this era. In terms of information repetition, the structure of providing them with bite-sized information to study within fifteen minutes for each module, but requiring repetitiveness when comprehending all nine informative texts through nine micro-content modules allows students in the treatment group to analyze information through a set of higher-order thinking questions and is effective in developing their critical reading ability. This idea corresponds with Wallace's (1991) idea that developing practical critical reading abilities involves navigating complex routes, requiring in-depth training and consistent practice. In addition, recognizing the distinct signal words and phrases associated with each discourse structure in each text type in the modules aids participants in the treatment group in identifying organizational patterns in texts. Awareness of discourse structures is intertwined with other reading strategies, such as identifying main ideas, recognizing discourse markers, and understanding text genres (Grabe, 2009). This awareness empowers readers to employ reading strategies deliberately, solving reading challenges and engaging actively with the text content.

These results are also significant for the education sector. Critical reading skills are integral to academic and professional success, enabling students to investigate different types of text and respond critically to information. The results of the study show that micro-content modules in the form of short, interactive, and tailored content offer an innovative approach to promoting this critical skill. In terms of education, the effectiveness of micro-content modules paves the way for more flexible and learner-centered teaching strategies. Educators can use these modules to design engaging lessons that improve reading comprehension. Furthermore, this study favors using quasi-experimental approaches to assess educational interventions. Future research can advance evidence-based teaching practice by utilizing treatment and control groups to collect valuable data regarding the effects of creative teaching strategies.

Active engagement and retention

The following key issue concerns the most critical role of active participation in the learning process and its profound impact on retention, especially for micro-content modules. Active participation is the cornerstone of effective learning. This study shows that students exposed to micro-content modules improved their critical reading skills. It is vital to remember that the success of these modules is primarily a result of the active participation they promote. Participation involves interacting with multimedia elements and stimulating higher-order cognitive processes such as analysis, assessment, and critical thought.

The literature on educational psychology has demonstrated the value of active participation in learning. According to engagement theory, when students actively participate in learning, their grasp of the subject deepens and becomes more meaningful (Kearsley & Shneiderman, 1998). This interaction, usually facilitated by the interactive elements of micro-content modules, is crucial in improving cognitive processes (Clark & Mayer, 2011). In addition, the relationship between active participation, critical thinking, and knowledge retention is particularly noteworthy. Critical thinking involves actively and thoughtfully analyzing information, evaluating arguments, and forming reasoned judgments. In micro-content modules, students engage in cognitive activities as they interact with content, make decisions, and explore concepts (Anderson et al., 2001). Many educational theorists and researchers have emphasized the link between active learning and increased long-term knowledge retention. Mayer (2014) introduced a cognitive theory of multimedia learning, emphasizing the importance of active information processing in long-term retention. When students actively participate in micro-content modules, such as making choices or answering built-in questions, they trigger a cognitive process that improves information encoding into long-term memory. Active engagement improves critical thinking and promotes long-term retention of knowledge. Thus, educators and instructional designers should embrace the multifaceted role of active engagement, considering it a key element when creating and implementing micro-content modules in instructional materials.

Participant perceptions and feedback

This study has also investigated participants' perceptions towards the efficacy of micro-content modules and their role in enhancing critical reading skills. Positive feedback commended the modules' convenience, unique teaching methods, clear visuals, and high-quality audio (Giurgiu, 2017; McNamara et al., 2012) . However, participants also suggested improvements in creating curiosity, interactive elements, storytelling, instructions, graphics, and pace adjustments (Gikas & Grant, 2013; Rajashekar & Sridhar, 2019) .

Practical implications for educators and instructional designers

This research yields practical implications for educators and instructional designers. Micro-content modules effectively enhance critical reading skills by offering concise, interactive, and targeted content aligned with effective pedagogical principles (Lee & Chen, 2020). For educators, integrating these modules can foster active learning and critical thinking. Instructional designers

can tailor micro-content to specific learning objectives, employing multimedia principles for engaging and impactful learning resources (Clark & Mayer, 2011).

Research design and methodological implications

The quasi-experimental design used in this study has effectively evaluated micro-content modules, offering insights for future educational research (Shadish et al., 2002). Balancing control and practicality, this method enables investigations into specific intervention effects, design nuances, and diverse educational contexts (Shadish et al., 2002). These findings also underscore the potential of quasi-experimental designs in educational research to analyze instructional strategies' impact on student outcomes, emphasizing the need for innovative teaching approaches (Shadish et al., 2002).

LIMITATIONS AND AREAS FOR FUTURE RESEARCH

While valuable, this study on micro-content modules' impact on critical literacy and usage understanding has limitations that signal potential future research paths. The study's restricted sample size suggests the need for broader demographic variations to gauge micro-content effects across diverse learners (Giurgiu, 2017). Future studies could explore more interactive module designs, including gamification or adaptive learning, to compare against traditional designs and assess enhanced interactivity benefits in micro-learning (Gikas & Grant, 2013). Moreover, investigating the long-term retention of critical literacy skills acquired through micro-content is essential for understanding sustained learning effects (Giurgiu, 2017). Expanding research beyond English majors to diverse learner groups and contexts can elucidate the universality and adaptability of micro-content modules for critical reading improvement (Gikas & Grant, 2013).

Despite its contributions, this study's limitations also pave the way for future research, encouraging the exploration of interactive module designs in examining long-term skill retention and extending studies to diverse learner populations and settings (Gikas & Grant, 2013; Giurgiu, 2017). Addressing these aspects will further refine and broaden the pedagogical role of micro-content modules in education.

CONCLUSION

In summary, this study has demonstrated the significant effectiveness of micro-content modules in improving students' critical reading skills. The findings suggest that these modules, with their positive reception and emphasis on active participation, hold great promise for educators seeking to improve students' critical reading literacy. In addition, the study contributes to the educational research landscape by highlighting the potential of a quasi-experimental design. This work highlights the valuable role that micro-content learning can play in fostering students' essential critical thinking skills.

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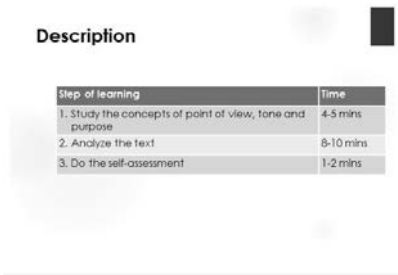
Appendix

Sample design of a micro-content module: cause and effect

Page 1



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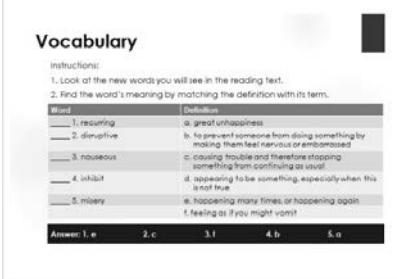

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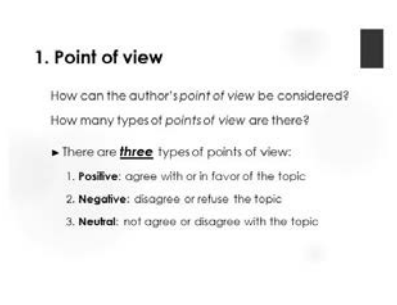

Page 8

Let's practice: Analyze the point of view

Page 9

Headaches

Recurring headaches can have initiate disruptive effects in a person's life. Initially, in many cases, these headaches make a person nauseous to the point that he or she must go to bed. Furthermore, sleep is often interrupted because of the pain. This resulted in worsens the physical and emotional state of the sufferer. For those who try to maintain a normal lifestyle, drugs are often relied on to get through the day. Such drugs, of course, can lead to other negative effects. Drugs can inhibit productivity on a job, perhaps even causing regular absences. Not only is work affected, but the seemingly unpredictable occurrence of these headaches leads to disruption in family life. The interruption to a person's family life is enormous, cancelling plans in the last minute and straining relationships with friends and family. It is no wonder that many of these people feel discourages and even depressed due to the cycle of misery reoccurring headaches cause.

[Adapted from https://www.slideserve.com/guong/cause-and-effect-paragraphs]

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Now, let's analyze – Point of view

1. What is the *point of view* of this paragraph?

Recurring headaches can have initiate disruptive effects in a person's life. Initially, in many cases, these headaches make a person nauseous to the point that he or she must go to bed. Furthermore, sleep is often interrupted because of the pain. This resulted in worsens the physical and emotional state of the sufferer. For those who try to maintain a normal lifestyle, drugs are often relied on to get through the day. Such drugs, of course, can lead to other negative effects. Drugs can inhibit productivity on a job, perhaps even causing regular absences. Not only is work affected, but the seemingly unpredictable occurrence of these headaches leads to disruption in family life. The interruption to a person's family life is enormous, cancelling plans in the last minute and straining relationships with friends and family. It is no wonder that many of these people feel discourages and even depressed due to the cycle of misery reoccurring headaches cause.

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Now, let's analyze (Answer Key)

1. What is the *point of view* of this paragraph?

Recurring headaches can have initiate disruptive effects in a person's life. Initially, in many cases, these headaches make a person nauseous to the point that he or she must go to bed. Furthermore, sleep is often interrupted because of the pain. This resulted in worsens the physical and emotional state of the sufferer. For those who try to maintain a normal lifestyle, drugs are often relied on to get through the day. Such drugs, of course, can lead to other negative effects. Drugs can inhibit productivity on a job, perhaps even causing regular absences. Not only is work affected, but the seemingly unpredictable occurrence of these headaches leads to disruption in family life. The interruption to a person's family life is enormous, cancelling plans in the last minute and straining relationships with friends and family. It is no wonder that many of these people feel discourages and even depressed due to the cycle of misery reoccurring headaches cause.

Author's point of view = Negative (disagree or refuse the topic)
Word choices = The author discusses the symptoms of headache with many negative words such as disruptive, worsen, sufferer, negative, discourages, depressed, and misery.

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Word choices: Point of view

- *Point of view* can be observed by author's choice of words.
- Following are some examples choice of words for different viewpoints:

Negative	Neutral	Positive
Arrogant	Self-assured	Confident
Strange	Different	Unique
Naïve	Inexperienced	Fresh
Fearful	Hesitant	Cautious
Old	Senior	Experienced
Lazy	Laidback	Relaxed
Skinny	Thin	Fit
Hyperactive	Active	Energetic

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Aspects of critical reading

- **Point of view:** a way of considering something

2. Tone: author's feelings or thoughts towards the topic

- **Purpose:** why you do something or why something exists

Page 14

2. Tone

How can the author's *tone* be considered?

- By considering:
  1. specific details
  2. comparisons
  3. word choices

Page 15

There are ***two types of tone***:

1. **Subjective:** provide only one side of the information
   - Provide only **pros** (support) – **positive** point of view
   - Provide only **cons** (against) – **negative** point of view
2. **Objective:** provide both sides of the information
   - Provide both **pros** and **cons** – **neutral** point of view **OR**
   - Provide only **facts** (**neither support nor against** but neutral point of view toward the main point of the text)

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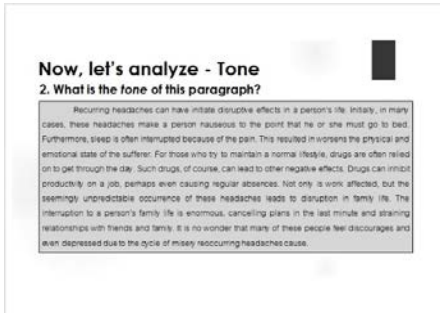

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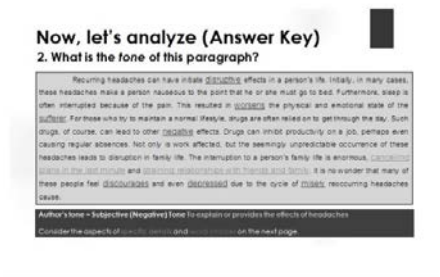

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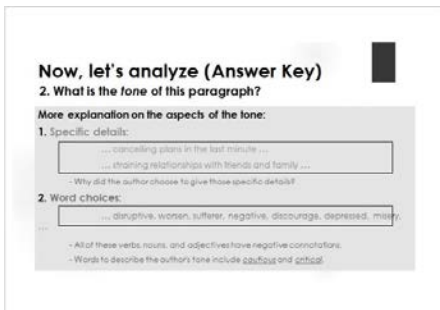

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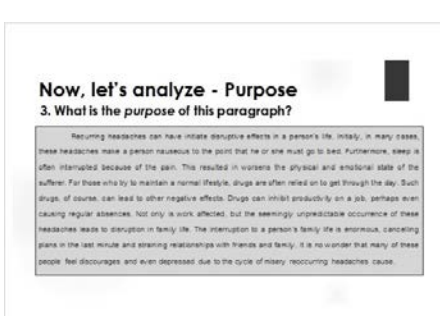

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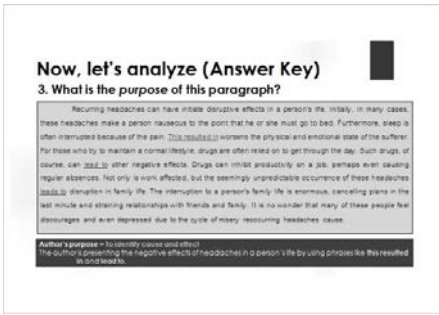

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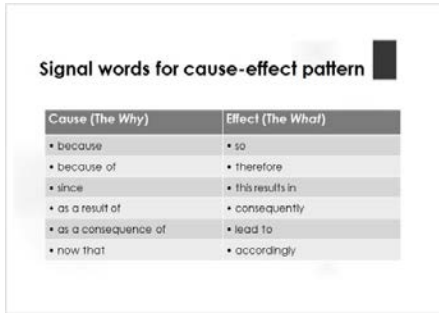

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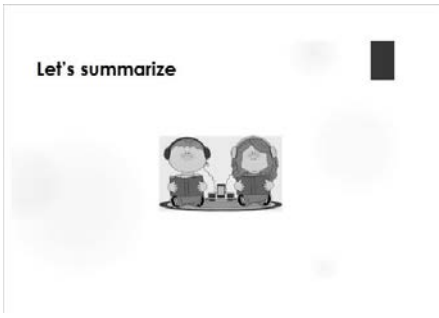

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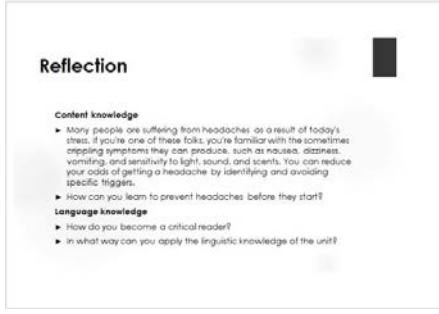

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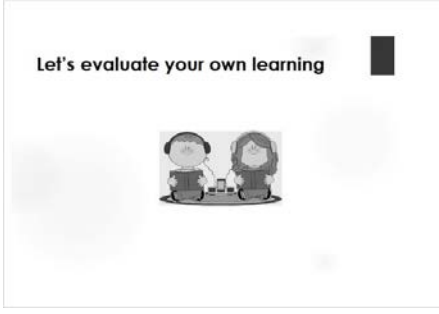

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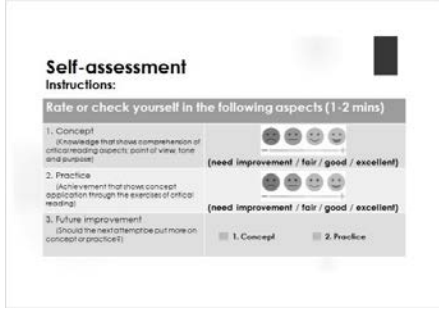

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