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EXPLORING POTENTIALS AND CHALLENGES OF MICROLEARNING IN ESP AND ESP MATERIALS DESIGN: A SYSTEMATIC REVIEW

by

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Abstract:

The intrigue surrounding microlearning's potential in English for Specific Purposes (ESP) has motivated this research, aiming to delve into its applications and challenges in ESP and its materials design. This study explores the potential and impediments of employing microlearning in ESP, focusing on its material design and instructional methodology. Through a systematic literature review, five pertinent articles from 2016-2022 were selected and analyzed using platforms like Publish or Perish and Google Scholar. The findings reveal a limited yet impactful application of microlearning in ESP, highlighting its capacity to enhance learning through the facilitation of digital materials, bite-sized and self-paced learning, and student empowerment, among other benefits. In ESP materials design, microlearning stimulates learning and underscores the importance of integrating multimedia into the learning process. However, challenges such as the need for appropriate technology, poor learning initiative, creation of a new learning culture, students' time constraints, teachers' unfamiliarity with technology, and the need for adaptive material design based on microlearning principles, material development, and ESP materials, emerge as significant hurdles. This research implies a valuable pathway for future studies and practical applications, offering insights into navigating through these challenges and optimizing the application of microlearning in ESP and its material design, thereby contributing to the field's pedagogical development.

Keywords: Challenges, English for Specific Purposes, Materials design, Micro-learning, Potentials.

Abstrak:

Intrik seputar potensi microlearning dalam Bahasa Inggris untuk Tujuan Khusus (ESP) telah memotivasi penelitian ini, yang bertujuan menyelidiki aplikasi dan tantangannya dalam ESP dan desain materialnya. Studi ini mengeksplorasi potensi dan hambatan menggunakan microlearning di ESP, dengan fokus pada desain materi dan metodologi instruksionalnya. Melalui tinjauan literatur yang sistematis, lima artikel terkait dari 2016-2022 dipilih dan dianalisis menggunakan platform

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seperti Publish or Perish dan Google Scholar. Temuan ini mengungkapkan aplikasi microlearning yang terbatas namun berdampak pada ESP, menyoroti kapasitasnya untuk meningkatkan pembelajaran melalui fasilitasi materi digital, pembelajaran berukuran kecil dan mandiri, dan pemberdayaan siswa, di antara manfaat lainnya. Dalam desain materi ESP, microlearning merangsang pembelajaran dan menggarisbawahi pentingnya mengintegrasikan multimedia ke dalam proses pembelajaran. Namun, tantangan seperti kebutuhan akan teknologi tepat guna, inisiatif pembelajaran yang buruk, penciptaan budaya belajar baru, kendala waktu siswa, ketidaktahuan guru dengan teknologi, dan kebutuhan akan desain materi adaptif berdasarkan prinsip pembelajaran mikro, pengembangan materi, dan materi ESP, muncul sebagai rintangan yang signifikan. Penelitian ini menyiratkan jalur yang berharga untuk studi masa depan dan aplikasi praktis, menawarkan wawasan untuk menavigasi melalui tantangan ini dan mengoptimalkan penerapan microlearning di ESP dan desain materialnya, sehingga berkontribusi pada pengembangan pedagogis lapangan.

Kata kunci: Tantangan, Bahasa Inggris untuk Tujuan Khusus, Desain materi, Micro-learning, Potensi.

INTRODUCTION

Microlearning, characterized by short, focused learning activities, has gained significant attention in language learning in recent years. The popularity of microlearning can be attributed to various factors. First, with the rise of the digital era, digital natives often prefer interactive and practical approaches to learning rather than passive listening to lectures. They seek opportunities to directly apply and utilize the knowledge and skills they acquire (Buhu & Buhu, 2019). They need the option to learn anytime and anywhere (Rowlands et al., 2008).

Second, the digital era has also transformed the structure, distribution, and acquisition of knowledge. Learners can access information from various sources in small, easily digestible units. Microlearning capitalizes on this shift by delivering content in bite-sized formats, making it more accessible and manageable for learners. Advancements in information and communication technology (ICT) have led to the fragmentation of knowledge into microcontent and micro-knowledge (Hug et al., 2007).

Furthermore, microlearning has gained traction due to the demands and challenges faced by educators. Teachers often navigate a hectic world, balancing responsibilities such as teaching, administrative tasks, and social obligations. This limited time and heavy workload necessitate efficient and effective learning solutions. Microlearning, with its just-in-time learning approach, allows teachers to access relevant content and resources when needed, enabling professional development and growth within their busy schedules (Lee, 2023).

In recent years, microlearning has burgeoned into a widely embraced approach, permeating various domains and establishing itself as a pivotal strategy in diverse fields,

owing to its inherent popularity and demonstrated efficacy. This modality of learning, characterized by its delivery of content in succinct and focused segments, has been judiciously adopted across a myriad of domains, including but not limited to training, computer science, and healthcare, each of which has witnessed a proliferation of scholarly and practical applications of microlearning methodologies. In the realm of training, microlearning has been heralded for its capacity to facilitate focused, learner-centric experiences, as evidenced by studies conducted by Hogle (2021), Javorcik & Polasek (2019), Margol (2017), and Shail (2019), each of whom underscore the utility of microlearning in enhancing the efficacy and efficiency of training paradigms. Similarly, within the field of computer science, microlearning has been leveraged to distill complex computational concepts into digestible, manageable segments, thereby facilitating enhanced comprehension and retention, as elucidated by Polasek & Javorcik (2019) and Skalka et al. (2021). Furthermore, the healthcare sector has witnessed the strategic incorporation of microlearning to navigate the complexities and nuances inherent in medical knowledge and practice, with studies by Filipe et al. (2020), Gawlik (2021), and Gross et al. (2019) illuminating the potential of microlearning in enhancing knowledge acquisition and application in a healthcare context. It is imperative to note that the widespread adoption and application of microlearning across these diverse domains underscore its versatility and applicability in catering to the specific, nuanced learning needs and preferences of varied audiences, thereby substantiating its popularity and widespread utilization in contemporary educational and training landscapes. Consequently, microlearning emerges not merely as a transient educational trend but as a robust, versatile learning strategy capable of adapting to and meeting the diverse, dynamic learning needs across various domains and disciplines.

While ESP focuses on developing language skills and knowledge that are directly applicable to learners' specialized domains, such as business, engineering, medicine, or law (Belcher, 2009), microlearning is considered to be crucial for addressing the diverse learning needs of students in specialized fields as the alternative pedagogical strategies, by seeing its successful implementation in various domains mentioned above.

Microlearning has also emerged as a promising avenue in language education and has been widely investigated in general language contexts. Numerous previous studies have highlighted the advantages of microlearning in language learning. For instance, It has been

proven beneficial for learners seeking to enhance their language proficiency (Fedorova et al., 2022). Research by Taylor and Hung (2022) demonstrated that microlearning interventions improved learners' vocabulary acquisition and reading comprehension skills. Similarly, Huo (2015) found that micro-audio can improve their English pronunciation and improve listening ability. These findings emphasize the potential of microlearning to enhance language acquisition outcomes across various contexts. Furthermore, scholars conducted a study that explored microlearning, including its uses, benefits, and limitations (Ghafar et al., 2023).

While microlearning has been substantively explored and applied across various domains, including language learning, training, computer science, and healthcare, a conspicuous gap is observed in its specific application and investigation within English for Specific Purposes (ESP) and ESP materials design. The existing literature robustly underscores the efficacy and versatility of microlearning in facilitating succinct, focused, and learner-centric experiences across diverse fields, as evidenced by its successful implementation in enhancing learning outcomes in general language contexts and improving vocabulary acquisition, reading comprehension skills, and pronunciation. However, the nuanced application of microlearning in ESP, which necessitates a specialized approach to cater to domain-specific language skills and knowledge, still needs to be explored.

The research aims to unravel the potentials and challenges inherent in implementing microlearning within this context, providing a comprehensive overview of its current state in the field. The study seeks to elucidate how microlearning can be optimally utilized in ESP and its material design through a detailed investigation. It offers recommendations for its practical application and identifies gaps that warrant further research. Ultimately, the findings from this research endeavor to contribute substantively to the academic discourse on microlearning in ESP, paving the way for enhanced language learning outcomes and informed future research and practice in ESP contexts.

Upon all, the systematic review aims to meticulously explore and analyze the existing literature on the application of microlearning in English for Specific Purposes (ESP) and ESP material design.

METHODS

Design

This study employed a systematic review to analyse studies presenting the potentials and challenges of microlearning in ESP and materials design. The systematic review seemed the most appropriate method since it aimed to collect, critically evaluate, integrate, and present findings from multiple research studies on a research question or topic of interest. Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) 2020 guidelines were utilized to ensure the systematic analysis of the selected articles.

Subject, procedure and data analysis

This study synthesized the articles published between 2016 and 2022 that were accessed from two databases: Publish or Perish and Google Scholar. The specific steps were taken based on the five phases as suggested by Khan et al., (2003), namely framing the question, identification phase, assessment phase, summarizing phase, and, lastly, the interpretation phase.

In the first phase, the researcher has to be clear with the problems being addressed by framing the research questions at the very beginning. In the identification phase, the researcher does the extensive search using two databases: Google Scholar and ERIC. In this phase, the first step was searching for pertinent articles related to the research question, and the second step was eliminating the selected articles using inclusion and exclusion criteria. To look for pertinent articles, the researcher used some keywords, such as "microlearning," "ESP," "ESP materials design," and "microlearning and ESP." In this process, the researcher found 200 papers from databases and eight from registers.

After identifying potential resources, the next step was to screen for relevance. Before this screening process, the researcher removed 100 duplicate records. This duplicate happened as the same paper appeared in multiple databases, and the researcher mistakenly included the same paper more than once. Moreover, the activation of automation tools in assisting in the initial screening process helped identify and flag records that were likely ineligible based on predefined criteria. This process marked 35 records as ineligible.

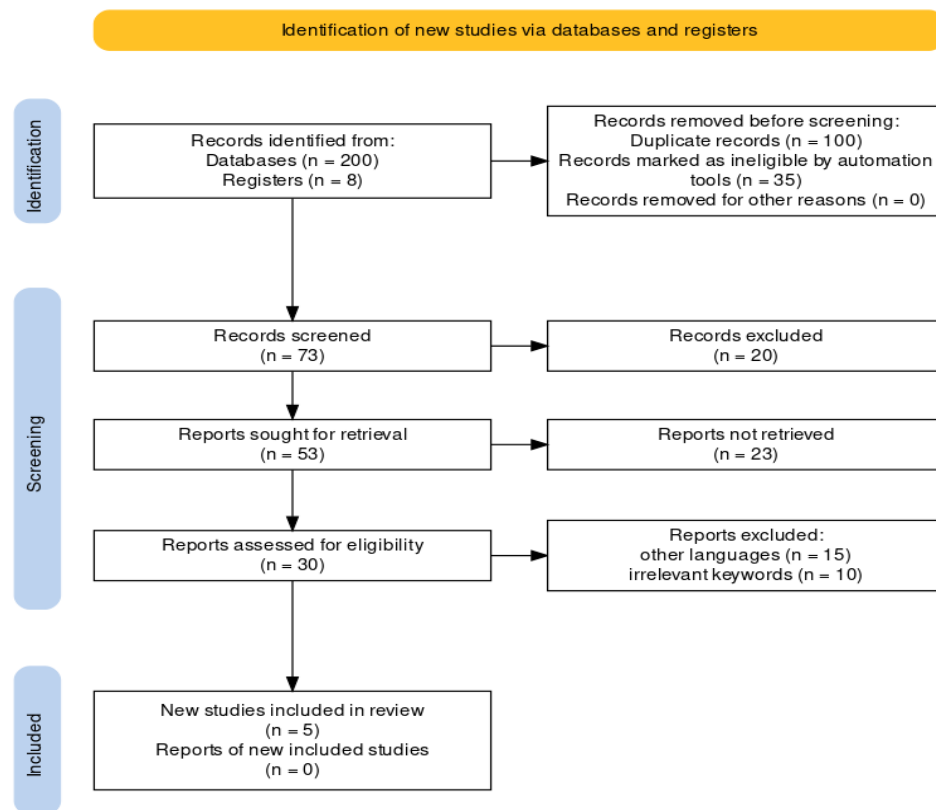
In the assessment phase, the researcher established eligibility and exclusion criteria parameters. These criteria were aimed to ensure that the selected articles followed the framework for the review. The eligibility and exclusion criteria are shown in the table below:

Table 1 The eligibility and exclusion criteria

Criterion	Eligibility	Exclusion
Literature type	• Journal (Research article)	• Book, book chapter, book series
Scope	• Microlearning • ESP • Microlearning in ESP • ESP materials design	• Not focusing on ESP.
Language	• English	• Non-English
Year	• Between 2016 and 2022	• Before 2016 and after 2022

In the screening phase, after the initial identification, the next step was to screen the records to determine which ones met the inclusion criteria and were suitable for further evaluation. In the record-screened process, 73 records were used to assess their relevance to the research questions or topic. Out of 73 records screened, there were 20 excluded records due to needing to meet the inclusion criteria based on their titles, abstracts, or initial content. After the initial screening, 53 identified reports seemed promising and relevant to this study. Unfortunately, 23 records were unable to retrieve the 53 identified reports. This happened due to restricted access, unavailable full texts, and other access limitations. Among these reports managed to retrieve, the researcher assessed 30 records for their eligibility. This involved a more in-depth examination of their content to determine if they met the specific criteria for inclusion, such as the scope of the study and language. During the eligibility assessment, the researcher found that 15 reports were in languages other than the one the researcher was working with. These reports were excluded due to language barriers. Additionally, ten records were excluded due to the irrelevant keywords or content to the research topic.

The interpretation phase will be discussed in the next session. Five peer-reviewed journal articles were collected and analyzed systematically at the end of the review. Overall, the selection process is shown in Figure 1 below.

**Figure 1: The selection processes**

FINDINGS AND DISCUSSION

Finding

After selecting the 5-phase process, five eligible articles were appropriate for this study. The data was tabulated in the table below. To answer the research questions, the researcher found, from 5 articles, the potentials and challenges aligned with the benefits and challenges of microlearning (Allela, 2021) and (Katy et al., 2021). According to Allela (2021), the benefits of microlearning are abundant digital resources, reduced cognitive overload, self-paced learning, learner-led, savings on cost and time, accurate and reusable knowledge, feedback and discussion, and just-in-time. According to Katy Roby Peters (2021), microlearning has some potentials, which are learning that takes a minute, mobile friendly, self-paced learning, quick development, and redeployment, relevant content, just-in-time learning, injects knowledge over time and remembering more, and targeted content

for targeted outcomes. The findings about the availability of the microlearning potentials and challenges in ESP are presented in Table 2 below:

Table 2: The availability of potentials and challenges of microlearning in ESP from the reviewed articles

Microlearning	Authors*				
	A-1	A-2	A-3	A-4	A-5
1. Potentials					
Abundant digital resources	√	√	X	√	√
Reducing cognitive overload	√	√	X	√	√
Self-paced learning	√	√	X	X	√
Learner-led	√	√	√	√	X
Savings on cost and time	X	√	X	X	X
Accurate and reusable knowledge	X	√	X	√	X
Feedback and discussion	√	√	X	√	X
Just-in-time	X	X	X	X	X
Learning that takes a minute	√	X	X	X	√
Mobile friendly	√	X	√	X	X
Quick development and redeployment	X	X	X	X	X
Relevant content	√	X	X	X	√
Inject knowledge over time and remember more.	√	√	X	√	X
Targeted content for targeted outcomes	X	X	X	X	X
2. Challenges					
Casual learners	X	√	X	X	X
Technology barriers	X	X	√	X	X
Content fragmentation	X	X	X	√	X
Complex trainings	X	X	X	X	X
Scaling personalized content	√	X	X	X	X
Updating content	X	X	X	X	X
Accessibility for all	√	X	X	X	X
Time	X	X	√	X	X
Creating a culture of learning	√	X	X	X	X

Authors' codes:

A-1: Xianjun Tan. (2016). Application of Micro-Learning Resources in College English ESP Teaching.

A-2: Zhu, Y. (2018). *Micro-lecture Design a Practice in Marine Engineering English Teaching in Higher Vocational Colleges*.

A-3: Hronová, Š., & Knihová, L. (2020). Digital Media in ESP Instruction for Marketing Communication.

A-4: Tolstikh, O., Pankova, V., & Krasnova, E. (2021). Microlearning in

Teaching English to students of engineering specialties.

A-5: Hao, W., Song, M., Zhou, Y., & Zhang, X. (2022). A Blended Teaching Mode in ESP Classes under the Concept of Micro-learning.

Table 2 shows the numbers of the potentials and challenges of microlearning from the reviewed studies. They are abundant in digital learning (4), reducing cognitive overload (4), self-paced learning (3), learner-led (3), savings on cost and time (1), accurate and reusable knowledge (2), feedback and discussion (4), Just-in-time (0), learning that takes a minute (2), mobile friendly (2), quick development and redeployment (0), relevant content (2), inject knowledge over time and remember more (3), targeted content for targeted outcomes (0). As for the challenges, the researcher found many studies: (1) casual learners, (1) technology barriers, (1) content fragmentation, (0) complex trainings, (1) scaling personalized content, (0) updating content, (1) accessibility for all, (1) time, and (1) creating a culture of learning.

Regarding the findings above, the researcher eliminated some criteria that have the same points (self-paced learning, both Allela and Peters share the same benefit, the researcher eliminated one), and the criteria that were not found during the review; just-in-time learning, quick development, and redeployment, and targeted content and targeted outcomes.

Discussion

Concerning the first to the third research questions, what are the potentials of microlearning in ESP, what are the challenges of microlearning in ESP, and how does microlearning support material development in ESP, the researcher classified the sub-topics into three: microlearning potentials in ESP, microlearning challenges in ESP, and microlearning to support material development in ESP.

Microlearning potentials in ESP

In academic inquiry, this study meticulously embarks upon a thorough systematic literature review to scrutinize the plausible applications of microlearning within the context of English for Specific Purposes (ESP). This investigative endeavor is harmoniously aligned with the adapted findings and scholarly contributions of Allela (2021) and Katy Roby Peters (2021), who have previously underscored and brought the myriad benefits of implementing microlearning methodologies. In this section, the researcher meticulously unveils and presents pivotal findings, judiciously drawing upon a plethora of relevant and

contemporaneous studies within the field, thereby illuminating the latent potentials and viable opportunities presented by the strategic employment of microlearning within the domain of ESP. The exploration and subsequent exposition of these findings not only enhance the existing body of knowledge pertaining to microlearning and its applications but also seek to forge a robust academic and pedagogical foundation upon which future research and practical applications in ESP can be constructively built and critically evaluated.

It is imperative to note that the synthesis and analysis of the findings within this study are conducted with a rigorous adherence to academic integrity and scholarly rigor, ensuring that the resultant conclusions and insights derived therein are both valid and reliably substantiated through the meticulous examination of existing literature and empirical studies within the field. Consequently, this study endeavors to contribute meaningfully to the ongoing academic discourse surrounding the efficacies and practicalities of employing microlearning strategies, particularly within the specialized and nuanced context of English for Specific Purposes, thereby providing a well-rounded, scholarly informed perspective that is both relevant and applicable to educators, researchers, and practitioners alike.

Abundant digital resources.

According to Tolstikh (2021), the advancement of modern technology has led to the availability of a vast array of e-learning models and platforms, offering students a wide range of options enriched with additional services. The digital media environment has witnessed a proliferation of learning resources miniaturized to accommodate mobile devices, making "micro" learning resources increasingly popular, particularly among younger learners (Hao et al., 2022). Students can easily access teaching materials, benefiting from the convenience and availability of digital resources. Furthermore, microlearning facilitates interactive activities such as exercises, homework, feedback, discussions, quizzes, and question-answering, effectively enhancing learning outcomes and stimulating learners' critical thinking (Zhu, 2018).

In conclusion, the availability of modern technology has led to the emergence of various e-learning models and platforms, offering students a wide range of options with additional services. The popularity of "micro" learning resources has grown, especially among younger learners, as they can be easily accessed on mobile devices. This convenience

and availability of digital resources allow students to access teaching materials easily. Microlearning enables interactive activities such as exercises, homework, feedback, discussions, quizzes, and question-answering, enhancing learning outcomes and stimulating learners' critical thinking.

Reducing cognitive overload.

One approach involves presenting instructions or theory as short information lectures, allowing students to comprehend and memorize rules effectively (Tolstikh et al., 2021). Additionally, using mini-talks, where students are randomly selected to present on relevant topics, promotes active engagement and limits cognitive load (Hao et al., 2022). Breaking down teaching content into smaller parts, with 5 to 10 minutes of microlearning resources, helps students grasp knowledge and skills systematically while minimizing cognitive strain. Xianjun Tan (2016) also found that focusing on critical and challenging points in each micro-lecture maximizes the preview effect, and class time spent on introducing content is effectively reduced. Moreover, designing micro-lectures with rich content divided into units of varying difficulty levels caters to the needs of diverse student abilities while ensuring the concise and refined nature of microlearning (Zhu, 2018).

Adopting microlearning strategies demonstrates promising potential in mitigating cognitive overload by providing bite-sized learning experiences that optimize comprehension and alleviate cognitive strain.

Self-paced learning

Hao (2022) found that microlearning approaches amplify students' active role, fostering their conscious, active, and autonomous learning behavior. By transforming learned content into microlearning resources, students are given opportunities for adequate review and systematic relearning, mainly focusing on essential and challenging topics. Additionally, the study added that microlearning empowers learners to engage in individualized learning experiences, enabling them to select and utilize microlearning resources autonomously, shifting from passive recipients to active participants in knowledge acquisition. Emphasizing a self-directed learning model, microlearning accommodates students' preferences and learning styles, allowing them to choose and progress through lessons at their own pace, fostering autonomy and self-regulation (Zhu, 2018).

These findings demonstrate that microlearning has substantial potential to facilitate self-paced learning by engaging students actively, supporting review and relearning, enabling individualization, promoting self-directed learning, and facilitating efficient knowledge acquisition.

Learner-led

One key benefit is improving understanding and developing communication skills through peer question-answering, as students willingly engage in discussions and enhance their comprehension of the material (Tolstikh et al., 2021). Furthermore, implementing microlearning resources in College English ESP teaching transforms the traditionally passive role of students into active learners, significantly altering the dynamics between teachers and students. Finally, microlearning facilitates establishing a learning community, promoting collaboration and interaction among learners, further enhancing the learner-led approach (Zhu, 2018). (Hronová & Knihová, 2020) also adds that peer-to-peer can engage students more in the learning process.

To sum up, these findings underscore the potential of microlearning in empowering students to take an active role in their academic language learning journey, fostering engagement, autonomy, and collaborative learning within a supportive learning community.

Savings a cost and time

Zhu (2018) found that one advantage is that practical micro-lectures are easier and more cost-effective to produce, making them accessible for front-line teachers. Compared to traditional lecture formats, microlearning offers a more efficient use of time, allowing learners to access concise and targeted content that can be consumed at their own pace. By leveraging microlearning resources, institutions can potentially reduce the costs associated with elaborate and time-consuming lecture preparations while maintaining effectiveness and popularity among learners.

Microlearning can yield substantial cost and time savings, making it a viable and efficient approach to delivering educational content.

Accurate and reusable knowledge

Using platforms such as MS Teams enables the creation of specialized channels for different aspects of language learning, such as grammar, listening, reading, and vocabulary. These channels provide forums for students to ask questions and engage in English discussions, fostering a deeper understanding of the language (Tolstikh et al., 2021).

Zhu (2018) found that ensuring the mastery of academic language skills is crucial to incorporating assessments and tests into the microlearning process. Developing an electronic exercise bank and an online testing system can be supportive resources, allowing after-class quizzes and unit tests to assess learning outcomes and motivate students. Moreover, online teaching platforms can document and preserve students' learning progress, evaluate their performance, and provide feedback. Both teachers and students can use this data to gain insights into individual learning situations, facilitate personalized learning plans, and analyze teaching effectiveness.

Feedback and discussion

Asynchronous discussions are practical as they eliminate geographical constraints and give participants ample time to engage in discussions (Tolstikh et al., 2021). It allows for meaningful interactions and feedback exchange among learners.

Microlearning also enables teachers to receive timely student feedback, allowing them to adjust their teaching methods and tailor subsequent lessons to address specific learning needs. The feedback from students helps teachers gain insights into students' learning weaknesses and difficulties, which in turn allows for more focused and targeted teaching activities in the classroom (Zhu, 2018).

Moreover, the interaction between teachers and students outside the traditional classroom fosters a closer emotional connection. Feedback from students plays a vital role in guiding teachers to adapt their teaching approaches, ensuring that subsequent lessons are better aligned with student needs (Zhu, 2018).

Based on the three studies above, asynchronous discussions in e-learning offer flexibility and remove geographical constraints, allowing for meaningful interactions and feedback exchange. Microlearning enables timely feedback, helping teachers adapt their teaching methods to address specific learning needs and establish a closer emotional connection with students.

Inject knowledge over time and remember more.

Microlearning adopts a short information lecture format, concisely presenting instructions or theory, allowing students to grasp and memorize rules effectively (Tolstikh et al., 2021). This approach enables learners to receive knowledge in manageable doses, preventing cognitive overload and promoting better retention.

Furthermore, microlearning resources can captivate students' interests, improving memory efficiency (Hao et al., 2022). By leveraging engaging and focused content, microlearning enhances students' motivation to learn and increases their ability to retain information over time.

In the context of academic language learning, pre-class micro-lectures can specifically target activating students' prior knowledge and construct their linguistic schemata, including technical terms and sentence structures (Zhu, 2018).

By revisiting and reinforcing previously learned content, microlearning helps students refresh their knowledge and reinforce their understanding, improving long-term memory retention.

Learning that takes a minute.

Microlearning activities, characterized by short-term and small-task teaching and practice activities, allow students to engage in learning tasks that can be completed efficiently and quickly (Hao et al., 2022). This promotes active and continuous learning, as students can participate in these activities quickly. For instance, mini-talks can be assigned to students randomly, with teachers dedicating only 2-3 minutes for each student to deliver a mini-talk on topics relevant to their English level or the current teaching units (Hao et al., 2022). This time-efficient approach facilitates effective learning and knowledge acquisition. Microlearning resources are designed to deliver content comprehensively and quickly, resulting in impactful teaching outcomes.

By condensing relevant information and focusing on key concepts, microlearning ensures that students receive a comprehensive understanding of specific content within a brief timeframe. This efficient and targeted delivery approach contributes to effective learning outcomes.

Mobile friendly

Modern communication systems, such as MS Teams, offer a highly developed and mobile-friendly platform for quick and efficient student contact (Tolstikt et al., 2020). Students receive notifications regarding assignments and deadlines on their smartphones, tablets, or laptops, enabling seamless communication and task management. The accessibility of mobile devices ensures that students can engage with microlearning materials anytime and anywhere, enhancing their learning flexibility.

Microlearning allows students to utilize fragmented pockets of time for learning, regardless of their location (Xianjun Tan, 2016). This mobile-friendly aspect of microlearning enables students to access and engage with microlearning resources during their free moments, whether on the go or in different learning environments. Mobile devices provide a convenient and portable means for students to engage in academic language learning, making microlearning a flexible and adaptable approach.

The two studies conclude that modern communication systems like MS Teams provide a mobile-friendly platform for efficient contact with students, allowing seamless communication and task management. The accessibility of mobile devices ensures students can engage with microlearning materials anywhere, anytime, enhancing learning flexibility. Microlearning enables students to utilize fragmented pockets of time for learning, regardless of location, making it a flexible and adaptable approach supported by convenient and portable mobile devices.

Relevant content

Microlearning allows students to collect and summarize specific and relevant information on a particular topic (Hao et al., 2022). By engaging in microlearning activities, students can gather and consolidate relevant information, enabling them to develop a deeper understanding of the subject matter. This targeted approach to content delivery ensures that students receive information directly related to their learning objectives, enhancing the relevance and applicability of the knowledge acquired.

Moreover, microlearning resources provide students access to content specifically tailored to the new lessons they are undertaking. Students can quickly obtain and engage with content that is directly related to the current topic being taught. This ensures the

materials are contextually relevant, allowing students to focus on the specific knowledge and skills required for academic language development.

Integrating microlearning with the new level of automatization and customization has dramatically facilitated the identification of relevant content on the web (Hronová & Knihová, 2020). These features utilize advanced algorithms and intelligent systems to analyze user preferences and contextual information, providing personalized and tailored learning materials. As a result, learners can easily access and engage with the most relevant and targeted microlearning resources available online, enhancing the effectiveness and efficiency of their learning experience.

To sum up, microlearning enables students to collect and summarize specific and relevant information, deepening their understanding of the subject. It provides tailored content that aligns with learning objectives, enhancing relevance and applicability. Integration with automatization and customization simplifies identifying relevant web content, ensuring personalized and efficient learning experiences.

Microlearning challenges in ESP

Based on a comprehensive systematic literature review, the study aims to examine the challenges of microlearning in the context of English for Specific Purposes (ESP). This investigation aligns with the findings of Allela (2021) and Peters (2021), who highlighted the challenges associated with microlearning. In this section, the researcher presents findings, drawing upon relevant studies to shed light on the challenges of employing microlearning in ESP.

Casual learners

In higher vocational colleges, the challenge of microlearning in terms of casual learners becomes apparent. (Zhu, 2018) these students often need more support in their learning experiences, leading to a comparatively poor learning initiative. This poses a significant obstacle when implementing microlearning strategies in English for Specific Purposes (ESP) programs.

Technology barriers

When examining the challenge of microlearning in terms of technology barriers, it becomes evident that the implementation of audio-visual resources faces significant obstacles. According to the study (Hronová & Knihová, 2020), the main hurdles were inadequate equipment and insufficient computer literacy among teachers. These barriers hindered the effective integration of technology in microlearning approaches within an academic setting.

Content fragmentation

Two key aspects come to light when discussing the challenge of microlearning in terms of content fragmentation. According to (Tolstikh et al., 2021), firstly, understanding the appropriate amount of daily assignments to avoid overwhelming students while ensuring their active participation, and secondly, determining the optimal amount of information delivered within a single microlearning session. These challenges in content fragmentation necessitate careful consideration and adaptability in microlearning design and implementation.

Scaling personalized content

(Zhang, 2016) microlearning resources are characterized by their concise and focused nature, allowing for efficient content delivery within a short timeframe (reviewed articles). However, this condensed format requires teachers to invest more time and effort in designing and preparing the instructional materials before the class. Teachers must ensure that the microlearning resources cover various topics and adequately address students' questions and needs.

Accessibility for all

The challenge of implementing microlearning in ESP is the difficulty of adoption by older teachers (Xianjun Tan, 2016). These teachers may need help to adapt to the teaching tools and methods associated with the microlearning era, making it challenging to utilize microlearning resources effectively. The preference for traditional teaching methods hinders the widespread adoption of microlearning in universities in China.

Time

The limited amount of time students can allocate to developing their English skills, according to (Tolstikt et al., 2020), became a challenge too. In tally, students showed motivation and invested approximately an hour in English skill development. However, their motivation waned over time as they faced competing demands in their professional sphere, resulting in decreased engagement with microlearning exercises.

Creating a culture of learning

One challenge identified is the need for more attention given to certain aspects of learning, such as listening practice (Tolstikh et al., 2021). Participants in the study showed a tendency to neglect listening practice in the morning. Although it was organized for the evening introduction, it still needed to be addressed by many participants, highlighting the need for strategies to encourage comprehensive engagement with all learning tasks.

Additionally, experienced teachers proficient in traditional teaching methods may need help adapting to the rhythm and dynamics of microlearning (Hao et al., 2022). The transition to a micro-learning approach requires a shift in pedagogical practices and teaching techniques, which can pose challenges for educators accustomed to traditional methods.

Moreover, implementing microlearning and integrating new technological advancements into the learning environment has potential pitfalls (Hronová & Knihová, 2020). These pitfalls may include technical issues, learner resistance, and the need for adequate training and support for both teachers and students.

Microlearning to support material development in ESP

This study provides the readers with potentials and challenges in ESP and shows that microlearning supports the design of materials in ESP. According to (Sufiyandi, 2020), the criteria of effective learning materials in ESP are: Materials utilized in the educational realm, particularly in English for Specific Purposes (ESP), should inherently serve as a potent stimulus, catalyzing and facilitating the learning journey. It is imperative that ESP learning materials not only serve as a source of stimulation but also act as a motivational catalyst for learners. Du ley-Evans et al. (1998) articulate that efficacious materials should meticulously strike a delicate equilibrium, being sufficiently challenging to engage and stimulate learners while remaining attainable and relatable. The materials should introduce innovative ideas and information yet remain firmly anchored in learners' extant experiences and knowledge,

fostering a conducive environment for flourishing enjoyment and creativity. Hu chinson & Waters (1987) further advocate for creating materials that inspire and empower learners to autonomously navigate their learning journey instead of merely serving as passive recipients of instruction. Th crafting of effective materials necessitates the incorporation of captivating texts and engaging activities, which not only stimulate critical thinking but also provide ample opportunities for learners to apply their existing knowledge and skills.

Moreover, the meticulous sequencing of materials is paramount to facilitating a structured and coherent learning experience. Du ley-Evans (1998) underscores the importance of maintaining consistency and establishing identifiable patterns within educational materials, providing a structured framework that guides the learning trajectory. Hu Chinson and Waters (1987) elucidate that material is pivotal in orchestrating the teaching and learning process, providing a clear and structured pathway through the expansive corpus of language that learners acquire.

Furthermore, the authenticity of materials is a cornerstone in ESP teaching, necessitating the integration of genuine teaching materials, underscored by Basturkmen (2015) as a quintessential characteristic of ESP. The term "authentic" in this context pertains to texts originally crafted for purposes other than language teaching and learning, thereby providing learners with a genuine and practical context in which to apply their learning. Bl gojević (2013) further delineates that using authentic materials in ESP instruction enables learners to engage in reading comprehension and interpretation of texts crafted by native speakers for non-educational purposes, thereby enhancing their practical application and understanding of the language.

Lastly, supplementary materials are necessary, particularly considering the traditional reliance on paper-based materials as the primary resource in ESP teaching. Du ley-Evans et al. (1998) acknowledge that ESP teachers occasionally integrate additional resources such as audio and video cassettes, computers, and tangible objects into their instructional repertoire. Crawford (1995) similarly recognizes the intrinsic value of employing multimedia as classroom materials. In the rapid advancements in technology and the pervasive nature of multimedia in contemporary society, there exists a plethora of opportunities for the flexible and expanded delivery of content in ESP instruction, thereby enriching the learning experience and facilitating a more engaging and interactive educational journey.

Based on the characteristics mentioned above, microlearning in ESP had the potential to design the materials. Tolstikh (2021) designed the learning materials for Engineering students by combining microlearning concepts and the four types of information perception. The materials were in podcasts, screencasts, photos, screenshots, infographics or graphs, tables, or drawings wrapped in concise modular teaching addressed to auditory, visual, and digital learners. It was proved that they were effective in capturing students' attention and strengthening their interest. Hao et al. (2022) added that books are no longer the only learning resource; the advancement of technology has led to a shift in learning resources, with digital media resources becoming increasingly prevalent. This shift has resulted in the miniaturization of learning materials as mobile devices have become smaller and more accessible. As a result, "micro" learning resources, which are compact and easily consumed, have gained popularity among younger learners. In addition, using video formats in students' presentations and as hands-on experiences in creating promotional marketing videos is considered valuable in ESP instruction. These video formats create an immersive learning environment and even allow less technologically proficient students to acquire new digital skills from their peers during group work, which can be less daunting (Hronová & Knihová, 2020).

The three studies concluded that the employment of microlearning principles, objects, and activities in designing the materials in ESP has brought some potentials that are aligned with the criteria of effective learning materials in ESP; that they provide a stimulus for learning and value the utilizing multimedia in the process of learning.

CONCLUSION AND IMPLICATION

Conclusion

The employment of microlearning in ESP and ESP materials design has its potential and challenges. It can be concluded that the significant potential of applying microlearning is its availability of digital resources that make it accessible easily. Microlearning enhances communication skills and fosters active learning by transforming students from passive recipients to engaged participants. It promotes collaboration, interaction, and the

establishment of a learner-led community. Integrating automatization and customization further amplifies its benefits by facilitating the identification of relevant and personalized content.

Additionally, Microlearning in ESP materials design catalyzes learning and emphasizes the effective use of multimedia in the learning process. However, implementing microlearning in ESP and ESP materials design also presents challenges, such as addressing the frustrations and need for more learning initiatives among casual learners. Despite these challenges, the potential of microlearning in terms of accessibility, engagement, and personalized learning makes it a valuable approach to ESP education. Efforts should be made to overcome the challenges and leverage the full potential of microlearning to enhance language acquisition and skills development in ESP contexts.

Limitation

This study provides a general overview of the potentials and challenges of microlearning in English for Specific Purposes (ESP) without offering specific empirical evidence or case studies. Future research could benefit from conducting detailed empirical studies or surveys that gather concrete data on implementing microlearning in ESP and its impact on learners' language acquisition and skills development To strengthen the findings. Additionally, the study did not delve into the nuances of different ESP domains; the challenges and potentials may vary within these specific contexts, which could be explored in future research.

Implications

The implications of the study are valuable for educators and researchers in the field of ESP. For educators the study suggests that educators in ESP should consider integrating microlearning strategies into their teaching methods to enhance accessibility, engagement, and personalized learning for their students. This could lead to more effective language acquisition and skill development. They should also be aware of the challenges mentioned, particularly in addressing the needs of casual learners and motivating them to engage with microlearning materials. For researchers, this study underscores the need for further empirical investigations into the application of microlearning in ESP across different domains. Conducting case studies or surveys within specific ESP contexts can provide

Caroline et al (2023)

deeper insights into the actual impact of microlearning. Additionally, researchers can explore strategies to mitigate the challenges identified, which may involve creating tailored microlearning solutions for different learner profiles.

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