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MICROLEARNING AS A DIGITAL LEARNING STRATEGY IN HIGHER HEALTH EDUCATION: LITERATURE REVIEW

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ABSTRAK

Microlearning merupakan metode inovatif dalam pendidikan kesehatan yang efektif untuk meningkatkan kompetensi, retensi, pengetahuan, dan keterampilan profesional. Pendekatan ini menggunakan media digital seperti aplikasi seluler, video pendek, dan simulasi interaktif, sehingga memberikan pembelajaran yang fleksibel, personal, dan berorientasi pada hasil. Penelitian dilakukan dengan metode systematic literature review menggunakan pendekatan PRISMA, serta sumber data dari Scopus, PubMed, dan Google Scholar. Microlearning terbukti relevan dalam berbagai konteks sosial budaya, khususnya di bidang keperawatan, kedokteran, dan farmasi. Kebaruan penelitian ini mencakup integrasi pembelajaran hybrid antara digital dan tatap muka, peningkatan aksesibilitas teknologi, serta pemanfaatan media sosial. Tema utama meliputi pengembangan keterampilan digital, klinis, dan soft skills. Rekomendasi penelitian meliputi pengembangan produk microlearning untuk pembelajaran keperawatan dan integrasinya ke dalam model pembelajaran yang terstruktur namun fleksibel, dengan potensi merevolusi pendidikan kesehatan melalui pendekatan yang adaptif dan sesuai kebutuhan global..

Kata kunci: Microlearning, Pembelajaran Digital, Pendidikan Tinggi Kesehatan

ABSTRACT

Microlearning represents an innovative strategy in health education that enhances professional skills, competence, retention, and knowledge acquisition. This approach provides adaptable, personalised, and objective-driven education by utilising digital resources, such as mobile apps, brief videos, and engaging simulations. We conducted the study using the PRISMA approach and the systematic literature review method, utilising data sources from Scopus, PubMed, and Google Scholar. Various sociocultural contexts have highlighted the significance of microlearning, particularly within the fields of nursing, medicine, and pharmacy. This study is groundbreaking as it integrates digital and in-person hybrid learning, enhances technological accessibility, and leverages social media. The advancement of clinical, soft, and digital skills stands out as a central focus. The development of microlearning products for nursing education and their integration into a flexible yet structured learning model are highlighted as key recommendations in the study. This approach holds significant promise for revolutionising health education by tailoring it to meet the diverse needs of the global community.

Keywords : *Microlearning, Digital Learning, Higher Education in Health*

1. INTRODUCTION

The era of society 5.0 brings significant transformation with the integration of technology in almost all aspects of life. Higher education faces the demand to produce graduates who are not only academically proficient but also competent in 21st-century skills, amidst the rapid changes in the global environment and technological advancements affecting the world of work.

These skills include critical thinking, creativity, collaboration, communication, and information literacy[1]. Technology transforms computers and other ICT devices into effective and efficient learning tools, enabling education that transcends time, space, and the classroom. [2] Learning to approach problems from various perspectives and develop innovative solutions is crucial. This aligns with the needs of the modern workforce, where individuals must be able to adapt and respond to unexpected challenges in creative ways. The digital era constantly bombards individuals with information from various sources, making the ability to filter, process, and retain information critical [3]

A new teaching paradigm known as microlearning enables the delivery of knowledge and information to learners in small chunks. Microlearning can make subjects easier to understand and remember for a longer period. The teaching paradigm known as microlearning enables the delivery of knowledge and information to learners in small chunks. Microlearning can make subjects easier to understand and remember for a longer period. [4]. The development of microlearning not only reflects a shift in teaching methodologies but also responds to the changing lifestyles and preferences of modern learner. The benefits of microlearning are the enhancement of critical thinking skills, reduction of cognitive load, and more focused learning activities. [5]) [6].

Recent research reveals that microlearning has emerged as an effective solution to the challenge of adapting to diverse and dynamic learning needs. This method, which involves learning through small units of information, simplifies content delivery to be more concise and focused, thereby facilitating understanding and long-term retention. Digital media-presented microlearning enables students to efficiently absorb and apply new knowledge, strengthens their critical thinking abilities, and lessens their cognitive burden. The use of modern technology such as e-learning and mobile learning, including mobile applications and short videos, has enriched and accelerated the development of this method [7] [4] Microlearning can make subjects easier to understand and remember for a longer period of time. Microlearning facilitates the easy digestion of content, often via digital media, enabling students to effectively and efficiently absorb and apply new knowledge. Additionally, microlearning offers significant flexibility, allowing students to learn according to their own schedules, anywhere and anytime [8] [9] [10]. The benefits of microlearning include enhanced critical thinking skills, reduced cognitive load, and more focused learning activities [5] [6]. Microlearning not only boosts student engagement but also enables educators to present pertinent content that seamlessly fits into a hectic study schedule. This has become an important strategy in modern learning, offering more personalized and results-oriented education, as well as supporting the development of social and professional skills[6] [5]. Microlearning not only boosts student engagement but also enables educators to present pertinent content that seamlessly fits into a hectic study schedule. This has become an important strategy in modern learning, offering more personalized and results-oriented education, as well as supporting the development of social and professional skills.

Microlearning also reflects a response to the need for more personalized and outcome-oriented learning. In addition, its ability to present material in easily digestible chunks helps improve learners' understanding and retention, as well as making it easier for instructors to update learning materials. [11]. propose microlearning as a new educational approach that can serve as a complementary or independent method to convey important educational concepts and enhance student learning satisfaction. Microlearning is known to increase student engagement and provide lessons that are enjoyable and simple to remember[12]. Microlearning is known to increase student engagement and provide lessons that are enjoyable and simple to remember. [13]. Digital media-presented microlearning enables students to efficiently absorb and apply new knowledge, strengthens their critical thinking abilities, and lessens their cognitive burden. The use of modern technology such as e-learning and mobile learning, including mobile applications and short videos, has enriched and accelerated the development of this method [7] [4]

In such a situation, it is still necessary to comprehensively understand how research trends related to microlearning in the health field have evolved over time. Systematic literature review offers a systematic approach to mapping the development of this research field, identifying key themes, and uncovering gaps and opportunities for future research. The urgency of this research lies in the need to understand the direction of development and the effectiveness of learning using microlearning in health education, particularly nursing. By understanding the existing research trends, we can better design and develop effective learning strategies using microlearning for health education, particularly nursing, in the future.

The main objective of this systematic literature review is to analyze research trends related to the use of microlearning in higher education in general, higher health education in particular, and clinical training. We are pinpointing the patterns of publication and the expansion of this field's literature, unveiling the primary research themes and their evolution over time, specifically in the context of microlearning, and observing the diverse research advancements that have taken place. The results of this literature review will be used to develop microlearning in health education, particularly in nursing education, by integrating it into a learning model that will serve as an innovation in research and development of microlearning in higher health education, especially nursing

2. METHOD

This research employs the PRISMA technique for a literature review. We collected articles using Harzing's Publish or Perish application. We conducted a literature search using article databases from Google Scholar, PubMed, Scopus, and Semantic Scholar. We utilized the keywords "development microlearning, microlearning in higher education, microlearning in health education, microlearning in nursing education..

In the selection of included articles, the criteria encompass articles written in English, all articles possessing a DOI, and articles that contain the application of microlearning specifically in higher education, health education and clinical training, with publication years limited to 2019–2024. These criteria exclude some articles that are not written in English, lack a DOI, fall outside the scope of higher education or health education, clinical training, and were published outside of the years 2019–2024. This article selection process resulted in the production of 12 final articles that satisfied all the criteria for comprehensive analysis (Figure 1.)

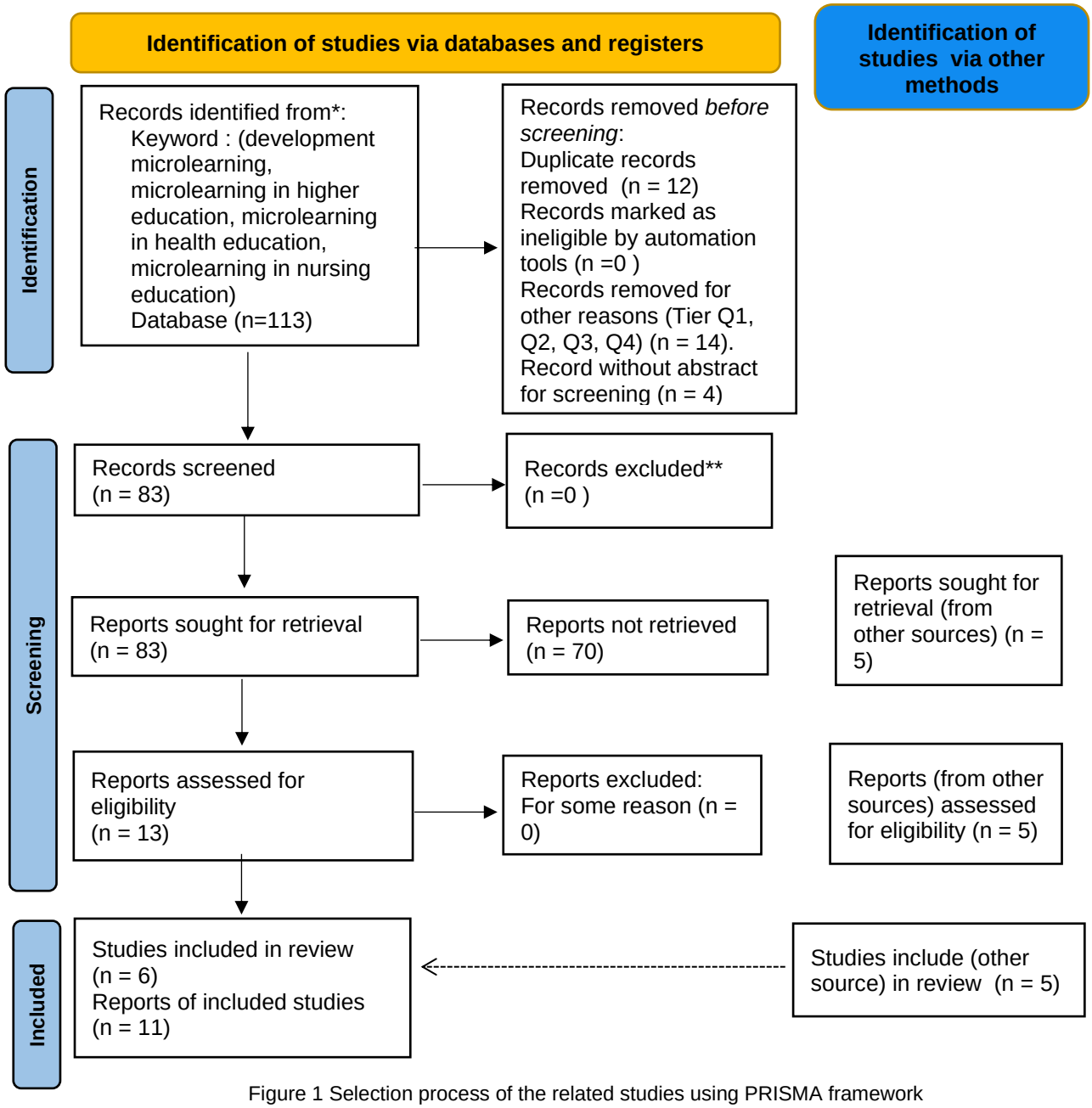

Figure 1 Selection process of the related studies using PRISMA framework

3. RESULT AND DISCUSSION

A. Trends In Microlearning Publication

The last decade has seen a significant upward trend in microlearning literature (Figure 2).. From 2019 to 2024, the year with the most publications on microlearning was 2023, with a total of 10 articles. The distribution data based on the year of publication is presented below

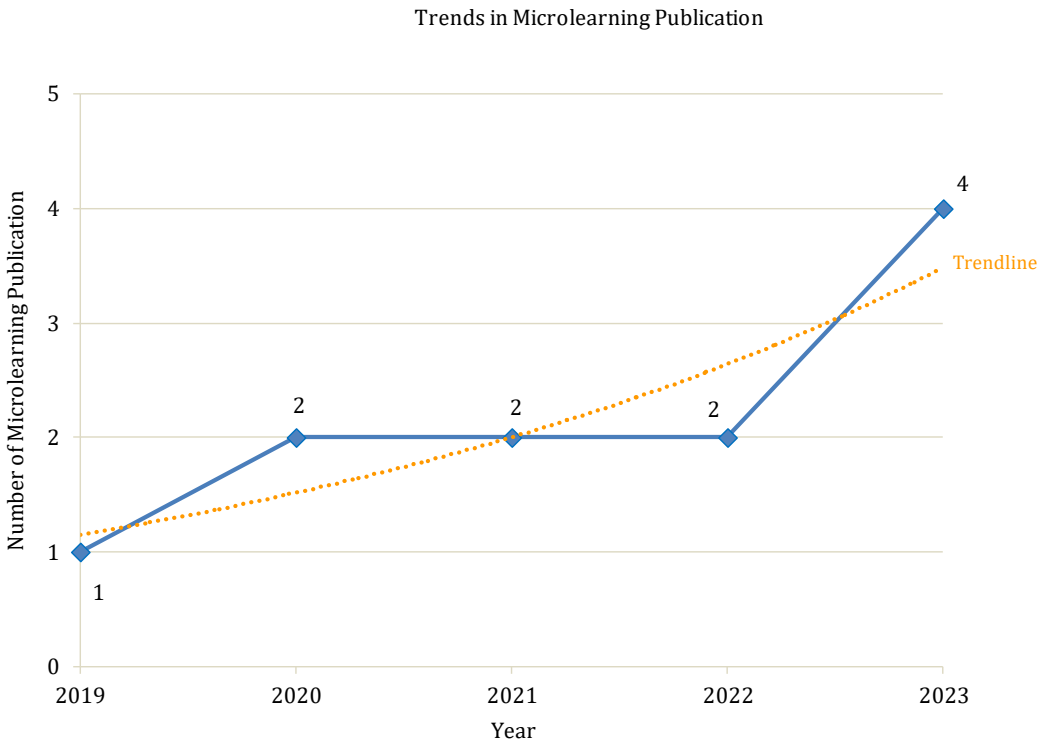

Figure 2. Trends in Microlearning Publication

B. The Main Research Themes and Their Development Over Time Are Discussed.

Microlearning research encompasses various innovative themes that support learning and training in different fields (Figure 2). Health professions adapt microlearning to create flexible and effective learning, and also use it for dementia care training to enhance staff competence in providing person-centered care [14]. In medical education, microlearning supports professional growth through continuing education. The mobile-based approach enhances learning outcomes, while in the clinical context, microlearning has proven effective in improving the self-efficacy of nursing students [15] Video-based microlearning encourages participant engagement with interactive media, while in higher education, microlearning helps develop students' soft skills and enhances learning satisfaction (Román-[16]. Professional training uses microlearning to enhance the competency of elderly staff and provide virtual consultation training for medical students [17] . We also explore platforms like TikTok as potential informal learning mediums [18]

Microlearning research shows its flexibility and effectiveness in meeting learning needs across various sectors. With a wide range of themes, microlearning supports formal education, professional training, and even innovative and adaptive technology-based learning. We describe the themes related to the research as follows

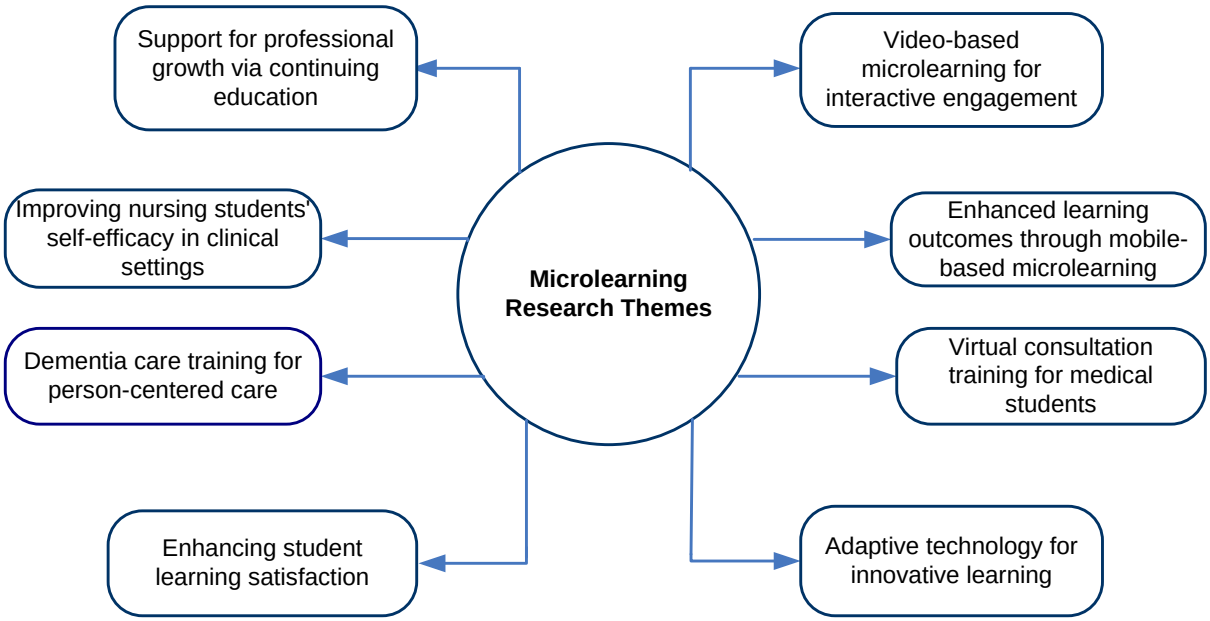

Figure 3. Microlearning Research Themes

C. Geographic Distribution and Research Collaboration

The geographic distribution of microlearning research is quite even, with significant contributions from both developed and developing countries (Table 1.). Several countries actively implement and publish microlearning-related research, including Spain, the Netherlands, Malaysia, Sweden, Austria, the United States, the United Kingdom, China, India, Russia, Colombia, and Indonesia.

Table 1. Geographic Distribution and Research Collaboration

Authors	Geographic Distribution	Review Result	Reseach Collaboration
[19]	Global	Microlearning supports more flexible and effective learning for health professions.	Global cross-institutional collaboration includes institutions such as Duke University, West Virginia University, Chung-Ang University, among others.
[14]	Virginia, USA	Providing microlearning-based training for person-centered care.	Local collaboration: Virginia Commonwealth University, Riverside Center for Excellence in Aging and Lifelong Health
[20]	England, USA	We facilitate the professional growth of medical staff by providing them with advanced training in microlearning formats.	Academic-industry collaboration: Medscape Education Global (UK & USA)
[21]	USA	Mobile-based microlearning significantly enhances the learning experience and outcomes.	University collaboration: University of Missouri–Columbia
[22]	Shiraz, Iran	Microlearning enhances self-efficacy and learning outcomes for nursing students in a clinical context.	University collaboration: Shiraz University of Medical Sciences

Authors	Geographic Distribution	Review Result	Reseach Collaboration
[23]	England, China	Interactive video-based microlearning captures learners' attention and enhances learning efficacy.	Cross-border collaboration: Chester Business School (UK), Hong Kong Polytechnic University
[24]	Rusia	Microlearning supports the acquisition of soft skills for students in a higher education environment.	Single institution collaboration: ITMO University
[25]	Sweden	Microlearning provides efficient training for elderly care staff through a digital-based approach.	University-industry collaboration: Mälardalen University, Minnity AB
[17]	Malaysia	Microlearning-based training supports the development of virtual consultation skills for medical students.	University collaboration: University of Malaya, BMC Medical Education
[16]	Spain	Microlearning-based videos enhance student learning satisfaction in higher education.	University collaboration: Salus Infirmorum University Nursing Center, University of Cádiz.
[26]	Global, TikTok	TikTok has the potential as a microlearning medium for informal learning among students.	Cross-border collaboration: University of Cádiz, Jakarta State University

This geographical diversity not only shows that microlearning, as a technology-based learning topic, has international relevance but also reflects the openness of educational systems worldwide to adopt more efficient and flexible learning methods. These countries' implementation of microlearning demonstrates that, despite their diverse social, cultural, and economic contexts, various educational systems can widely apply this approach. For instance, high-tech countries like the United States and the United Kingdom prioritize the application of microlearning in professional education, whereas countries like Indonesia and India may prioritize the development of mobile-accessible basic competencies [17] [27].

Research collaborations related to microlearning show significant benefits in creating adaptive, innovative, and relevant learning methods. This cross-institutional and cross-sector cooperation expands the prospects of microlearning usage, supporting formal education, professional training, and technology-based skill development worldwide. Here are some examples of the research collaboration forms that were conducted. Please refer to (Table 2) for further details. Microlearning has become the focus of global research involving cross-country, university, and industry collaboration to address educational and training challenges. This research has produced various relevant innovations in different contexts [28]. Multi-university collaboration in the Netherlands and Austria developed application-based microlearning (mApp) to improve employee health through hybrid service design [19]. Global research involves institutions such as Duke University and Chung-Ang University, which demonstrate the flexibility and effectiveness of microlearning for healthcare professionals [14]. In the United States, local collaborations use microlearning to train dementia care staff, enhancing competence in individualized care [20]. Collaboration with the industry, such as Medscape Education Global, shows that microlearning supports the professional growth of medical staff through continuing education [5]. The mobile-based approach by the University of Missouri-Columbia significantly improved learning outcomes [22]. Iran has demonstrated that microlearning boosts the self-efficacy of nursing students in clinical settings. Cross-country research, such as that from Chester Business School and Hong Kong Polytechnic University, highlights the effectiveness of interactive microlearning videos in enhancing participant attention [23]. Russia uses microlearning to support the development of soft skills, Sweden enhances the digital competence of elderly care staff, and Malaysia trains medical students in virtual consultation skills [25]. Research in Spain shows that microlearning videos enhance student

learning satisfaction. Global collaboration evaluates TikTok as an informal microlearning medium with promising results [16] [29].

D. Overview of The Implementation of Microlearning In Global Higher Education

Based on the findings from the related article, microlearning an innovative learning method, aims to enhance competence, motivation, and health awareness. Digital applications like health quizzes often implement this approach, providing short-time-based learning with immediate feedback. This format is very suitable for busy work environments, where flexibility is a primary need. [28]. Remote training also utilizes microlearning-based programs, which consist of short video modules lasting 3–5 minutes. The topics taught cover various fields, such as pharmacovigilance, signal detection, and causality assessment. With a just-in-time learning approach, microlearning enables learning when needed, providing efficiency for students and healthcare professionals. According to [25] and [17], microlearning enables learning when needed, providing efficiency for students and healthcare professionals. Microlearning has found its application in the fields of medicine, nursing, pharmacy, and public health. The technologies used include podcasts, SMS, internet applications, as well as short videos and infographics. This makes learning more flexible, engaging, and accessible anytime and anywhere. According to [28] [30], this approach enhances the flexibility, engagement, and accessibility of learning. The microlearning format also supports the professional development of healthcare workers through short articles, podcasts, interactive case studies, and modular videos [30]. The goal is to ensure that learning remains effective and relevant to field needs. Each learning unit typically lasts 5-15 minutes, facilitating learners' integration of the material into their daily routines.

Microlearning utilizes digital platforms such as mobile applications, interactive videos, TikTok, and virtual simulations to create personalized and adaptive learning experiences. Its use is widespread in various fields of education, including soft skills development, case-based training for medical students, and enhancing elderly care competencies. For example, microlearning-based training in elderly care successfully encouraged behavior change among healthcare workers in direct nutrition management through interactive quizzes or real-time feedback. This approach not only enhances material understanding but also accelerates the mastery of practical skills in the health field. With its flexibility and efficiency, microlearning becomes an effective solution for the challenges of modern learning in various health professions. According to [22] [19]

Microlearning, with its flexibility and accessibility, is suitable for various fields, such as soft skills development, training in the medical field for case resolution, and improving elderly care competencies. Microlearning, with its efficient and technology-based format, serves as an effective solution for modern learning, facilitating the adaptive development of competencies and professional needs, and enhancing the retention of learned material by students.

E. Overview Of Microlearning Implementation In Health Education

Health professionals have implemented microlearning in various forms to enhance competence and understanding [31] Microlearning-based applications, for instance, aim to improve comprehension of nutrition, physical activity, and mental health. This application allows for flexible, structured, and anytime-accessible learning, providing an efficient learning experience for its users [24]. Pharmacy applies microlearning to enhance understanding of signal detection, statistical analysis, and risk management. [32]. This training module provides integrated assessments and learning materials designed to enhance professional competence in the field of pharmacovigilance [32]. A similar approach is applied in nursing homes, where microlearning enables flexible training for healthcare professionals. Short formats present lessons that support patient-centered care and are accessible anytime needed. In continuing professional development (CPD/CME) [20], microlearning supports interactive case-based learning. This format helps medical professionals make evidence-based decisions by integrating real case studies into training materials. [27] Interactive approaches, such as quizzes and short video simulations, have proven to enhance self-efficacy and procedural understanding in a clinical context through microlearning videos. According to studies conducted by [5] [33], microlearning videos have demonstrated the ability to improve self-efficacy and procedural understanding in a clinical setting. Through interactive e-learning modules designed to sharpen critical thinking skills in a short amount of time, microlearning also enhances preceptor competencies [34] In the context of digital competency training for educators, microlearning provides quick, relevant, and effective training to enhance the ability to give feedback to students, making it a flexible tool for various educational needs [22]

In nursing education, microlearning makes a significant contribution to it. Microlearning videos help students understand mental nursing concepts, increase motivation, and contribute to improved exam scores. TikTok serves as a microlearning platform that delivers relevant content like nutrition information and elderly care, offering an engaging learning experience that caters to the needs of the digital generation. According to [35] [25], Medical education uses case-based modules to train students in clinical communication skills through virtual patient consultation simulations. This format not only enhances students' competencies but also enriches their learning experience by presenting relevant clinical scenarios.

F. Research Novelty

When viewed through the lens of microlearning research innovations, one of the prominent innovations is the hybrid integration of digital learning and face-to-face interaction. This combination enhances user motivation and retention while also positively impacting the effectiveness of workplace health training. This approach differs from traditional e-learning because it emphasizes personalized learning and user engagement [36]. Additionally, the design of microlearning modules now addresses the challenges of low internet bandwidth, enabling inclusive global-scale training [37]. Additional features such as subtitles and transcripts in various languages enhance accessibility for learners from diverse backgrounds. This innovation expands the reach of microlearning in environments with limited technological infrastructure. Another article highlights how microlearning becomes a solution to the problem of information overload often faced by health students [24]. With a technology-based approach, microlearning accelerates learning and enables quick access to information, thereby increasing the efficiency of the learning process.

The impact of the COVID-19 pandemic also accelerated the adoption of microlearning as the primary format in continuing professional education, including its integration into the global credit system for learning recognition [11]. Other innovations include the use of TikTok as a microlearning platform, which brings a new approach to delivering nursing education materials. [26]. By integrating social media into the learning process, students can become more actively engaged through an attractive and interactive format. Additionally, telemedicine training has implemented virtual simulations based on microlearning [17], offering students direct experiences through interactions with simulation-based patients. Elderly nurses have also observed the development of nutritional competencies through multi-method simulations. The design of these microlearning interventions prioritizes behavioral changes among healthcare workers, thereby improving the quality of care for elderly patients [25]. Microlearning videos have demonstrated a positive impact on nursing students' satisfaction and academic performance in the learning context, thereby serving as an effective tool to support learning [13] [16]

Microlearning has shown its potential as a flexible, effective, and relevant learning method to meet modern needs. By leveraging current innovations, further research can ensure that microlearning continues to evolve as an effective, adaptive, relevant, and useful learning method to meet future educational needs.

4. CONCLUSION

Microlearning has evolved into an innovative approach in health education, providing effective strategy to enhance competence, retention, knowledge, and professional skills. By utilizing digital media such as mobile applications, short videos, and interactive simulations, microlearning offers a more flexible, personalized, and outcome-oriented learning method. Research shows that microlearning not only increases student engagement but also has a positive impact on learning outcomes, self-efficacy, and mastery of practical skills. Furthermore, the fields of nursing, medicine, and elderly care have widely adopted this approach, making microlearning an important strategy to support contemporary education that is adaptive and relevant to global needs.

This literature review restricts the articles to those published between 2019 and 2024. However, it has offered a comprehensive overview of the application of microlearning in higher education, specifically in health education or clinical training, and has also offered insights into the trends, innovations, and themes that have received equal research across different countries. Further research recommendations include: (1) conducting a more in-depth analysis of the media used to deliver microlearning, which can enhance learner satisfaction and improve knowledge retention; (2) developing microlearning products specifically for nursing education; and (3) integrating microlearning materials into a learning model. The integration of microlearning into a learning model has the potential to revolutionize

nursing education by providing a structured yet flexible method for the dissemination of knowledge and the mastery of skills

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