

An Adaptive Learning Approaches for Postgraduate Students with Mental Health Challenges

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ABSTRACT

The use of adaptive learning technologies into higher education has attracted growing interest., particularly in addressing the unique needs of learners with mental health challenges. This bibliometric study investigates the research landscape on adaptive learning approaches for postgraduate students experiencing mental health difficulties. Using data extracted from Scopus, the study maps publication trends, influential authors, key journals, countries, and thematic clusters within this domain. The analysis employs tools such as VOS viewer and Perish software for visualization and knowledge mapping. The results highlight a growing but fragmented body of scholarship, with limited focus on postgraduate-level learners and specific mental health contexts such as depression and anxiety. This study contributes by identifying research gaps, offering insights for future investigation, and emphasizing the need for interdisciplinary collaboration in designing AI-driven adaptive learning systems that support the academic and emotional well-being of postgraduate students.

1.0 Introduction

The landscape of higher education is evolving, with increasing recognition of the diverse needs of postgraduate students, particularly those facing mental health challenges. Mental health issues, such as depression, anxiety, bipolar disorder, and others, are prevalent among postgraduate students, often worsened by the intense academic pressures, social isolation, and financial stress associated with advanced studies. These challenges can significantly affect academic performance and overall well-being, necessitating innovative educational strategies that cater to their unique needs.

Adaptive learning, an educational method that utilizes technology and data to make each student's learning experience unique, could help with these problems. It also may create a supportive and adaptable educational environment by customizing content, tempo, and teaching approaches to meet the specific requirements of students. This approach not only enhances academic outcomes but also promotes mental well-being by reducing stress and accommodating the fluctuating capabilities of students with mental health conditions.

Despite its potential, the application of adaptive learning strategies for postgraduate students with mental health challenges remains underexplored. Existing research predominantly focuses on K-12 and undergraduate populations, leaving a significant gap in our understanding of how these approaches can be effectively implemented at the postgraduate level. Furthermore, most studies do not differentiate between the types of mental health conditions, leading to a generalized approach that may not address specific needs effectively.

The purpose of this research is to systematically map and graphically analyse adaptive learning strategies. The aim of this bibliometric study is also to identify the publication patterns and intellectual framework of this field. The research questions (RQs) that are addressed are as follows:

RQ1: What are the current research trends related to adaptive learning and mental health among postgraduate students over the past two decades?

RQ2: Which authors, institutions, and countries are the most influential in research on adaptive learning approaches for mental health support in higher education?

RQ3: What are the most popular themes in adaptive learning strategies for postgraduate students with mental health challenges?

This paper reviews aims to fill this gap by synthesizing current research on adaptive learning approaches and examining their efficacy and implementation for postgraduate students with various mental health challenges. By critically evaluating the existing literature, this review seeks to identify best practices, highlight gaps in current knowledge, and provide actionable recommendations for educators, administrators, and policymakers. The goal is to enhance the educational experiences and outcomes of postgraduate students with mental health challenges, ensuring that they receive the support necessary to thrive academically and personally.

2.0 Literature Review

2.1 Postgraduate Students

Many graduate students carry multiple roles—students, workers, parents, children, etc., how to coordinate the relationship between student roles (learning, scientific research) and other roles (career, family, love) has become an unavoidable problem for graduate students (Li Tianwei, 2019). This leads to conflicts between their academic responsibilities and personal life, struggling to balance research commitments with family, social relationships, and self-care. From the principle of psychology, the higher the expectation, the worse the psychological tolerance (Li Tianwei, 2019). The pressure to excel in research activities and meet academic expectations can lead to internal conflicts related to self-doubt, imposter syndrome, and fear of failure, impacting their mental health.

2.2 Mental Health Issues

It is an integral and essential part of overall health, which can be defined in at least three ways – as the absence of disease, as a state of the organism that allows the full performance of all its functions or as a state of balance within oneself and between oneself and one’s physical and social environment (Sartorius, 2002). The state of mental health implies that the individual has the ability to form and maintain affectionate relationships with others, to perform in the social roles usually played in their culture and to manage change, recognize, acknowledge and communicate positive actions and thoughts as well as to manage emotions such as sadness (Dinesh Bhugra, 2013). Mental health gives an individual the feeling of worth, control and understanding of internal and external functioning (Sartorius, 2002).

Mental illness is an ailment which creates disorders in thinking processes as well as behaviour which results in an inability to handle life’s ordinary demands and routines (Nathera Kandasamy, 2020). It refers to a wide range of mental health problems that change how a person feels, thinks, and acts. Just as physical illnesses affect the body, mental illnesses impact the mind, and like physical ailments, they can vary greatly in severity. Mental illness can make everyday life challenging, affecting how individuals think, feel, and interact with others. A study by Ministry of Health Malaysia in 2015 showed that about 29.2 percent of the adults above 16 years old are facing mental health issues.

The presence of mental health issues for postgraduate students can lead to feelings of stress, anxiety, and depression among postgraduates, affecting their motivation, productivity, and overall well-being, potentially leading to academic underperformance and decreased quality of life. It also can strain interpersonal relationships, both within academic settings and personal life, as symptoms such as mood swings, irritability, and social withdrawal can impact communication, collaboration, and support networks, further isolating individuals struggling with mental health challenges. Untreated mild to severe challenges can lead to worse outcomes and chronicity, preventing students from achieving their full academic potential.

2.3 Adaptive Learning

Adaptive learning is an educational approach that uses technology and data to customize learning experiences to meet the unique needs of each student. This method leverages algorithms, artificial intelligence, and various forms of analytics to track a student’s progress, identify strengths and weaknesses, and adjust the curriculum and instructional methods accordingly. The primary goal of adaptive learning is to provide a personalized education that enhances student engagement, retention, and overall academic performance.

Artificial intelligence and adaptive learning technologies are prominently featured as important developments in educational technology in the 2018 Horizon report (Educause, 2018), with a time to adoption of 2 or 3 years (Olaf et al 2019). The development of adaptive educational systems, mostly with elements of artificial intelligence, requires the processing of large amounts of knowledge obtained from students (Maiia V. Marienko et al, 2020).

3.0 Methodology

3.1 Bibliometric Assessment

To get some input and ideas regarding issues and challenges postgraduate students with mental illness, several papers were reviewed. The papers were collected from an established online database to ensure quality and accuracy of information. Most of the reviewed papers found based on keyword adaptive learning, postgraduate student or student and mental health challenge.

3.2 Procedure Analysis

Data search was conducted on November 15th, 2024, and involved the Scopus database. The search was based on articles whose titles contained words such as (adaptive OR personalized OR adjustable) AND

learning AND for AND (student* OR learner*) OR with AND mental AND (illness OR health OR challenges). The data that was retrieved, limited to article papers written in English only. The data search process is shown in Figure 1.

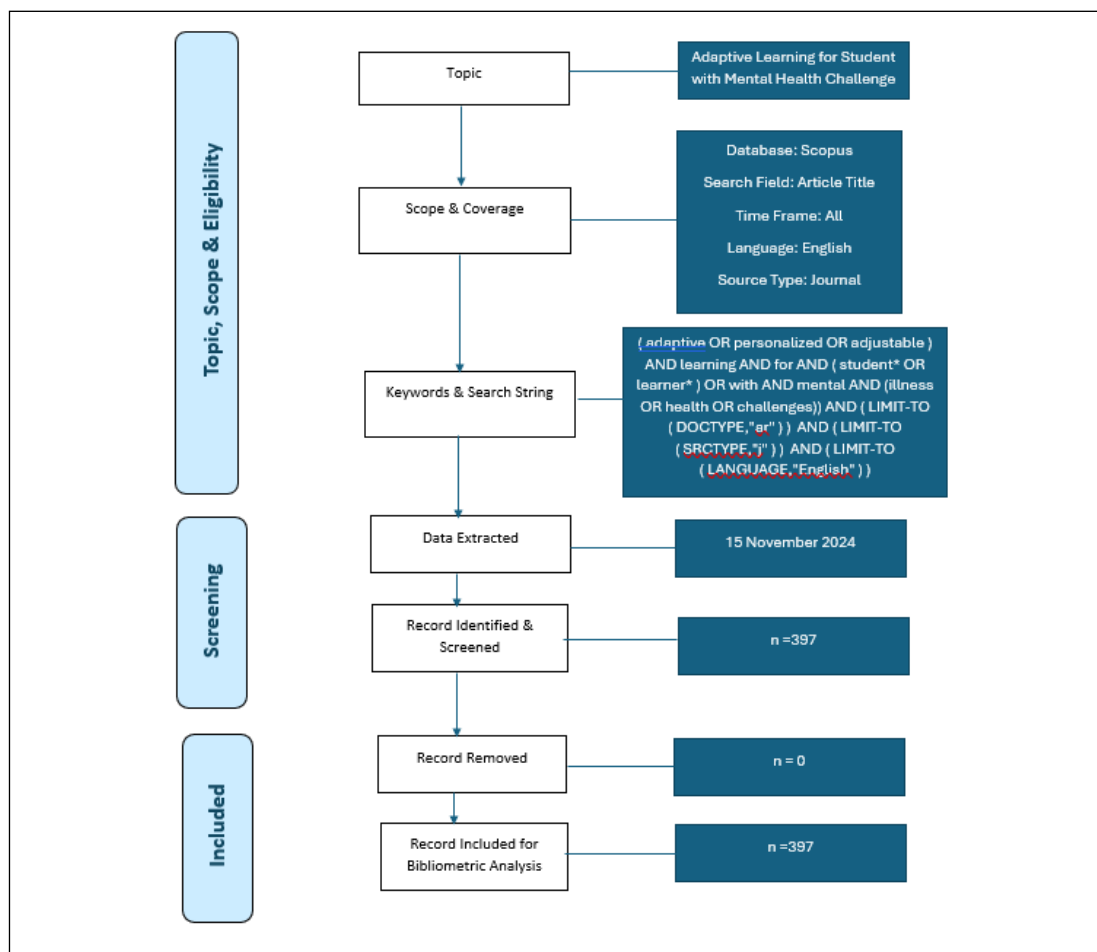


Figure 1: Diagram of the search process

3.3 Data Analysis

This research gathered 397 documents from the Scopus database, resulting in the extraction of authors' names, paper titles, abstracts, keywords, publication years, and cited references in plain text format, along with additional publishing metadata. These data were gathered through network analysis, descriptive analysis, content analysis, and bibliometric analysis. Descriptive analysis was used to compute data frequencies based on the total number of articles published, including the yearly trend, the most active journals, the most prolific countries, and the most prolific author in the research area. Data on citation metrics and the most frequently cited academic papers related to the research topic were gathered utilizing Harzing's Publish or Perish software. The VOS Viewer software was employed to conduct network and bibliometric analyses.

4.0 Results and Findings

4.1. Publication by Year

To address RQ1, the research trend based on the year of publication was monitored. Figure 2 shows the research trend regarding adaptive learning strategies for postgraduate students with mental health challenges disclosure publications and citations. Using Harzing's Publish or Perish software, it was found that Luzzati, Luigi was the first author to publish a paper on the study topic entitled "A training program for paediatric residents in child-development and guidance." In 1952. Prior to 2003, only 11 articles were

published related to mental health among students. However, beginning in 2003, the number of publications showed a steady increase year by year. A significant rise was observed in 2019 with 16 articles published, followed by 22 articles in 2020, 40 articles in 2021, and 71 articles in 2023. The highest number of publications was recorded in 2024, with a total of 77 articles.

This upward trend highlights the growing attention among researchers to student mental health issues, especially following the outbreak of the COVID-19 pandemic. Several studies in the literature have reported that the pandemic had a profound impact on students' mental health, including symptoms such as stress, anxiety, and depression (sahu, 2020)) (Wang, 2020). During this period, drastic changes in learning methods, reduced social interaction, and academic uncertainty became major contributors to the rise in mental health concerns (Son, 2020). The rise in publication numbers from 2019 to 2024 reflects the urgent need within the academic community to understand and address mental health challenges among students in the post-pandemic era.

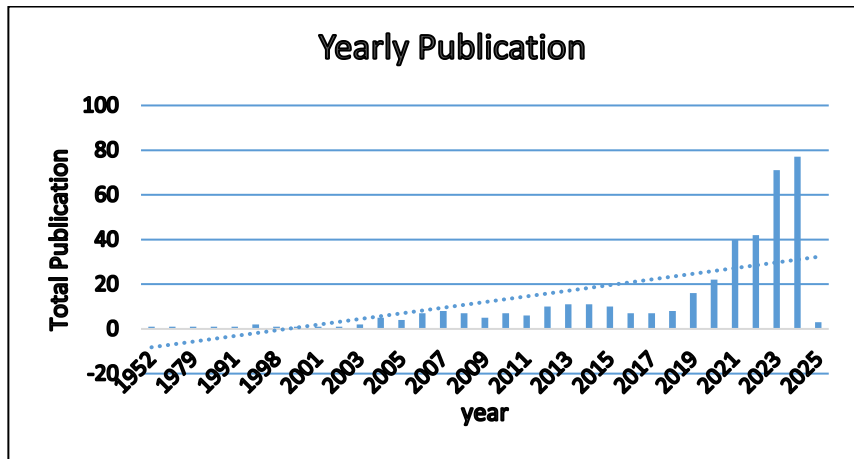


Figure 2: Total Yearly Publication

4.2. Publishing Activity by Country

This study also looked at countries that were actively engaged in publications related to the research topic. Seventy-three (73) countries support the research on regarding adaptive learning strategies for students with mental health challenges. The frequency data regarding nations engaged in the publication were analysed using MS Excel, and the findings are shown in Table 1. Ten countries ranked with the highest contributions to the research topic were collated. United States supplied the most articles concerning research on this issue (96:24.18%), followed by the China (48:12.09%) publications, and United Kingdom (28:7.05%). Total publications by country were mapped using the globe map, as illustrated in Figure 4, based on frequency data from MS Excel.

Table 1: Top ten countries that contributed to the publications

Country	Total publications	% (n=397)
United States	96	24.18%
China	48	12.09%
United Kingdom	28	7.05%
Canada	27	6.80%
India	24	6.05%
Spain	17	4.28%
Australia	14	3.53%
Russian Federation	13	3.27%
Taiwan	11	2.77%
Italy	9	2.27%

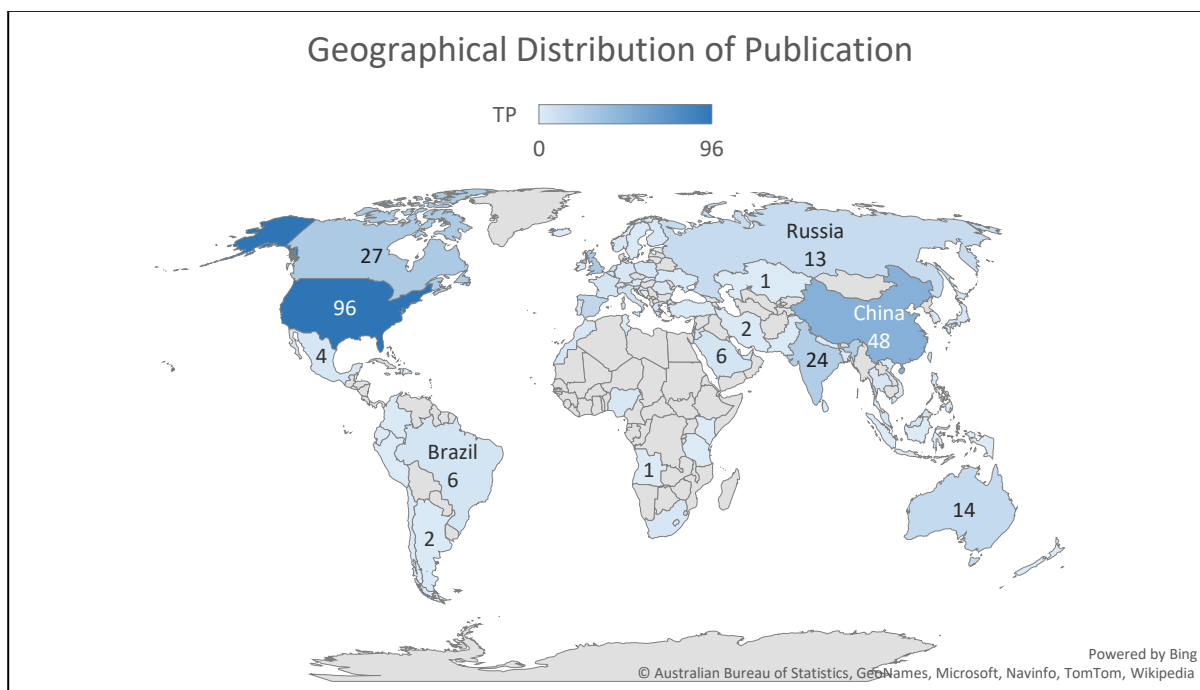


Figure 3: Total Publication by Country

4.3. Publishing Activity by Journal

The 349 articles gathered from the Scopus database were published in 32 different publications. Table 2 shows the most active publications for the highlighted issues. Cite Score displays the number of citations earned for each document published in the journal. According to the frequency statistics, the International Journal of Environmental Research and Public Health the most active in publishing on adaptive learning for students with mental health challenges with 8 articles (2.02%) published from 2020 to 2023. The journal has a Cite Score of 7.3. Following that is BMC Medical Education which has published 6 (1.51%) articles with 4.9 cite score, and the Nurse Education Today which has published 5 (1.26%) articles with 8.6 cite score.

Table 2: Most Active Source Title

Journal	Total Publications	% (n=349)	Publisher	Cite Score
International Journal of Environmental Research and Public Health	8	2.02%	MDPI	7.3.
BMC Medical Education	6	1.51%	Springer Nature	4.9
19th Americas Conference on Information Systems Amcis 2013 Hyperconnected World Anything Anywhere Anytime	5	1.26%	-	-
Nurse Education Today	5	1.26%	Science Direct	8.6
ACM International Conference Proceeding Series	4	1.01%	-	-
BMJ Open	4	1.01%	BMJ	4.4
Medical Teacher	4	1.01%	Informa Healthcare	7.8
Frontiers In Psychology	4	1.01%	Frontiers Media	4.5

Chinese Journal of Clinical Rehabilitation	4	1.01%	Zhongguo Lin Chuang Kang Fu National	0.3
Bulletin Of Educational Psychology	4	1.01%	Taiwan Normal University	0.3

4.4. Publishing Activity by Author and Organisation

This study also observed authors actively involved in the research topic and institutions participating in the publications. Data from the Scopus database indicates that 32 authors from various organisations contributed to the publications addressing students with mental health challenges. Table 3 lists the top ten authors in terms of output. According to the data, the most productive author is Mansouri, K of Harvard Medical School in United States and Qbadou, M. of University of Toronto in China, who authored three publications and had contributed (0.76%) papers to the research topic.

Table 3: Most Productive Authors

Author Nama	Total Publication	%	Affiliation	Country
Mansouri, K.	3	0.76%	Harvard Medical School	United States
Qbadou, M.	3	0.76%	University of Toronto	China
Azimi, I.	2	0.50%	University of Pittsburgh	United Kingdom
Babenko, O.	2	0.50%	University of Alberta	Canada
Dey, A.K.	2	0.50%	Universitat Oberta de Catalunya	Spain
Dutt, N.	2	0.50%	University of Washington	Spain
Karagiannopoulou, E.	2	0.50%	Universidad de Zaragoza	Australia
Lucke, U.	2	0.50%	McMaster University	Russian Federation
Luedtke, A.	2	0.50%	University of California, Irvine	Taiwan
Mandell, D.S.	2	0.50%	King's College London	Italy

Data show that 32 organizations were involved in publications related to the study topic. MS Excel was utilized to compute the frequencies and identify the most influential institutions, as presented in Table 4. The Harvard Medical School is the most significant contributor to the research field, with 8 (2.02%) publications over 69 years, followed by the University of Toronto with 6 papers (1.51%) and the University of Pittsburgh and University of Alberta with 5 papers each (1.26%).

Table 4: Most Influential Institutions

Institutions	Total Publication	% (n=349)	Country
Harvard Medical School	8	2.02%	United States
University of Toronto	6	1.51%	China
University of Pittsburgh	5	1.26%	United Kingdom
University of Alberta	5	1.26%	Canada
Universitat Oberta de Catalunya	4	1.01%	Spain
University of Washington	4	1.01%	Spain
Universidad de Zaragoza	4	1.01%	Australia
McMaster University	4	1.01%	Russian Federation
University of California, Irvine	3	0.76%	Taiwan
King's College London	3	0.76%	Italy

4.5. Citation Network Analysis

This study aims to identify the most significant publication in relation to RQ2. In response to RQ3, citation networks of 349 publications were analysed.

4.5.1. A centrality analysis of citation networks

To conduct the centrality analysis of citations and create a network visualisation map of the article's citations, the Harzing the citation metrics data for the publications. From total 349 articles, there were 258 papers on adaptive learning for postgraduate students with mental health challenges with 5285 citations. The typical number of citations per year is 73.

This research identified papers that had received the most references by using information from the Scopus database. The list of highly referenced publications on the research topic is shown in Table 5. Duchscher J.B wrote the most cited article entitled "A process of becoming: The stages of new nursing graduate professional role transition," which was published in 2008 and had 354 citations. Next was the paper entitled "Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal," by Sreeramareddy, Chandrashekhar T. et al, with 298 citations.

The minimum number of document citations was set to 1. The network visualisation map was generated and viewed using the VOS Viewer software. From 349 papers, only 24 were related and grouped into 8 clusters. Figure 4 depicts a network visualization map co-authorship by countries. It shows that the largest circle come from United States with 30 total link strength and total 112 documents related to the topic. And second largest circle is from China with 9 total link strength and total 70 documents.

Table 7: Highly cited publications

No	Authors	Title	Year	Journal	Citation	Citation per paper	Citation per author
1	Duchscher J.B.	A process of becoming: The stages of new nursing graduate professional role transition	2008	Slack Incorporated	354	354	354
2	Sreeramareddy, Chandrashekhar T. et al	Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal	2007	-	298	298	49.67
3	Araújo F.J.D.O. + 4 authors	Impact Of Sars-Cov-2 And Its Reverberation In Global Higher Education And Mental Health	2020	Elsvier Ireland Ltd.	260	260	52
4	Kline M.A.	How to learn about teaching: An evolutionary framework for the study of teaching behavior in humans and other animals	2014	Cambridge University Press	237	237	237
5	Montes-Berges B.	Exploring the relationship between	2007	-	176	176	88

	+ 1 authors	perceived emotional intelligence, coping, social support and mental health in nursing students					
6	Britton W.B. + 5 authors	A randomized controlled pilot trial of classroom-based mindfulness meditation compared to an active control condition in sixth-grade children	2014	Elsevier Ltd	162	162	27
7	Gibbons C. + 2 authors	Stress, coping and satisfaction in nursing students	2011	-	144	144	48
8	Alqahtani T. + 10 authors	The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research	2023	Elsevier Inc.	89	89	8.90
9	Tempski P. + 5 authors	What do medical students think about their quality of life? A qualitative study	2012	-	85	85	14.17
10	Coccoz V. + 2 authors	The enhancement of reconsolidation with a naturalistic mild stressor improves the expression of a declarative memory in humans	2011	-	83	83	27.67

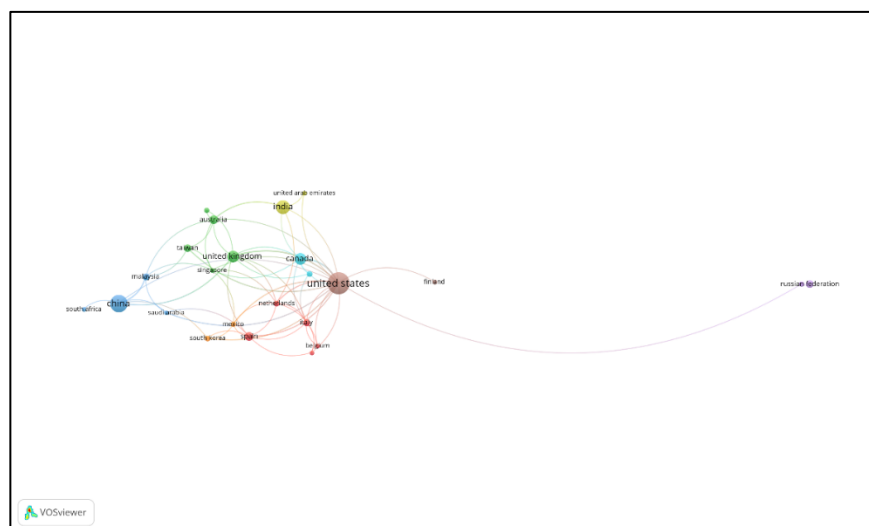


Figure 4: Network Visualization Map Co-Autorship by Countries

5.0 Finding & Discussion

The findings suggest growing academic interest in integrating adaptive learning technologies to support mental health among postgraduate students. The surge in publications post-2020 highlights a shifting priority in educational research — addressing mental well-being alongside academic performance.

Despite increased interest, research remains fragmented. There's a need for more cross-disciplinary, cross-institutional collaboration, especially in underrepresented regions such as Southeast Asia and Africa. Moreover, the focus has largely been on anxiety and stress, with less attention on broader mental health spectrums (e.g. bipolar disorder, OCD). This highlights a gap for future exploration.

The prominence of keywords such as “support systems” and “personalization” reflects a move toward learner-centered education, showing how adaptive learning could serve as both an academic and emotional scaffold for students in need.

There is various adaptive learning applied for students/postgraduate students to facilitate them in increasing study satisfaction and better mental health condition.

Li Tianwei discussed the impact of WeChat on postgraduate mental health education, pointing out the lack of a systematic approach, limited research, and single research tools and methods in this field. The paper calls for the adaptation of WeChat as a new educational tool, emphasizing the importance of utilizing its functions for effective mental health education. The research paper sheds light on the gaps in empirical studies related to graduate mental health education, highlighting the need for longitudinal and intervention research to better understand and address the mental health challenges faced by graduate students

Maiia V. Marienko emphasizes the importance of combining adaptive technologies with Virtual Reality and Augmented Reality (VRAR) in education to enhance the personalization of the learning process. The paper explores the latest educational technologies that focus on personalizing learning and adapting content to meet individual student needs. This integration is seen as a promising trend in educational research.

Alexia Barrable describes the development and benefits of MePlusMe, a web-based support system for students, addressing subclinical problems, general wellbeing, and study skills. MePlusMe offers personalized interventions tailored to students' needs, filling the gap in traditional Student Support Services (SSS) that mainly focus on acute and chronic mental health issues. It provides easy, stigma-free access to psychoeducation and support, complementing face-to-face services and catering to students with subclinical difficulties who often do not receive adequate support. MePlusMe is designed to meet the

needs of students experiencing mild to moderate difficulties, aiming to improve their personal effectiveness and mental health.

A. Edgardo Reis evaluates the impact of innovative curriculum designs that embed mental health literacy in non-health disciplines, specifically emphasizing on an Event Management course. The paper emphasizes the opportunities for creative approaches to enhancing mental health education in universities, showcasing the importance of integrating mental health literacy across various academic disciplines. Embedding mental health learning opportunities in curriculum design, even in non-health disciplines, can improve students' mental health literacy and wellbeing.

Larian M Nkomo emphasizes that the availability of lecture recordings caters to diverse learning needs, which may not significantly impact lecture attendance. The study underscores that lecture recordings can enhance student learning experience by providing flexible learning opportunities, aiding content engagement, and facilitating interactions with lecturers and peers. The research indicates that lecture recordings foster self-directed learning, offering equitable access to learning materials for students with various commitments, medical conditions, or learning disabilities.

6.0. Conclusion and Future Recommendation

Adaptive learning represents a transformative approach in the realm of higher education, particularly for postgraduate students grappling with mental health challenges. This personalized educational methodology tailors learning experiences to meet the unique needs of each student, offering a flexible, supportive, and responsive environment that is crucial for those facing mental health issues. By leveraging advanced technologies and data-driven insights, adaptive learning platforms create individualized learning paths that accommodate the fluctuating nature of mental health symptoms. This flexibility reduces stress and allows students to engage in their studies at their own pace, fostering a more inclusive and accessible educational experience. Real-time feedback and tailored content delivery ensure that students receive the appropriate level of challenge and support, enhancing their academic performance and overall well-being.

As we continue to explore and implement adaptive learning strategies, it is essential to recognize the profound impact they can have on postgraduate students with mental health challenges. These approaches not only promote academic success but also contribute significantly to the mental and emotional resilience of students. By prioritizing both educational and mental health needs, adaptive learning paves the way for a more empathetic and effective educational system, ultimately empowering students to achieve their full potential in both their academic and personal lives.

For future recommendations, more research should explore the integration of diverse learning methods, such as online modules, peer-to-peer support programs, or community engagement projects, to enhance mental health literacy among postgraduate students. There is a gap between the intellectual and emotional development of graduate students, with increasing societal pressures impacting their personal growth, employment, relationships, and communication skills. The research tools and methods for postgraduate mental health education are often singular, lacking diversity and innovation, particularly in utilizing platforms like WeChat for education enhancement. More research needed to be explored on opportunity and diversity of adaptive learning to support postgraduate student mentally

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