The Impact of Digital Pedagogy on Knowledge Sharing of Learners in Higher Education: a Multi-Level Analysis

Royston Meriton[1], Blanca Viridiana Guizar Moran[2], Flor Gerardou[3], Anthony Brown[4]

University of Huddersfield, United Kingdom[1]
University of Sunderland, United Kingdom[2]
Falmouth University. United Kingdom[3]
Rotterdam School of Management, The Netherlands[4]

Abstract

The pandemic has changed the status quo of higher education pedagogy, and many institutions have rushed to face this new reality. The university sector has been slow to adopt, if not adapt, tighter budgets, and an international student market standing still provides an opportunity to take advantage of digital pedagogy's flexibility. Knowledge sharing amongst learners is an essential antecedent to engagement and academic performance. We survey the literature to capture the enablers of knowledge sharing in a virtual or online setting. We aim to propose an inclusive framework for positive knowledge sharing behaviour by embracing a complete digital pedagogy and recommending theory, practice, and future research.

Keywords: *digital pedagogy, knowledge sharing, learners, higher education, multi-level analysis*.

1. Introduction

The COVID-19 pandemic has disrupted higher education pedagogy, prompting institutions to adapt to the digital era. However, universities need to be faster to adopt digital pedagogy as a mainstream approach to teaching[1]. This reluctance may be attributed to dominant business models that commoditize higher education and view students as consumers rather than learners. In this context, knowledge sharing among learners is crucial for engagement and academic performance. To understand the dynamics of knowledge sharing in higher education, the study draws on Nonaka's theory of organizational knowledge creation and the concept of ba. Nonaka's theory emphasizes converting tacit and explicit knowledge through socialization, externalization, combination, and internalization processes [2–5]. Ba, a shared context for knowledge sharing, plays a central role in creating and retaining knowledge. The study argues that digital pedagogy facilitates knowledge sharing among learners through mediated social interactions, envisioning a "ba moment" in higher education settings. The research aims to explore key trends in the literature on digital pedagogy and knowledge sharing, identify knowledge sharing behavior mechanisms in online learning, and develop a comprehensive framework of knowledge sharing enablers. The findings will inform theory, practice, and future research in this field.

2. Literature review

Knowledge sharing is a crucial process in organizations, involving infrastructure construction and knowledge communication within a group [6–8]. Tacit knowledge is typically shared through face-to-face interaction, known as socialization, while explicit knowledge is shared through IT platforms, referred to as codification [2,9]. Digital technologies like computer networks and electronic bulletin boards create virtual spaces for socialization and knowledge pooling [10–13]. Information technology systems play a role in codifying and transferring explicit knowledge [9,14]. At the individual level, ba, conceptualized as a shared space for emerging relationships, is central to knowledge creation [15–17]. Face-to-face interaction allows immediate feedback and understanding checks [18]; social interaction, including informal and formal communication, coordination, and networks, is vital for knowledge sharing [11,16]. Face-to-face interaction is considered the richest medium for knowledge transfer, allowing immediate feedback and clarification [18]. Educational leaders should promote both informal and formal networks to enhance knowledge-sharing capabilities among students [11]. Although face-to-face interaction is no longer limited by space or time due to digital technologies, understanding the implications of mediated interactions for knowledge sharing is essential. Additionally, social interaction involves individual personalities,

beliefs, and value systems that may support or hinder knowledge sharing. Therefore, studying knowledge sharing behavior requires considering structural and individual determinants [16].

3. Methodology

The methodology section describes the approach used in this study to collect and analyze literature on digital pedagogy and knowledge sharing. A four-step methodology is employed, inspired by previous systematic reviews, to collect data and evaluate influential published works [19,20].

The first step involves defining appropriate search terms and keywords. Focus groups are used to identify keywords, reducing personal bias, and creating search strings using Boolean functions. The four-tier search string used in this study includes terms related to knowledge exchange, higher education, e-learning, and students.The second step involves the initial search and screening of articles. Scopus, a large searchable citation and abstract source, retrieves relevant articles. The search string is applied to the 'title, keyword, and abstract' field in Scopus, resulting in 402 articles initially. Through the screening process, articles not focused on students are excluded, leading to a final sample of 173 articles. The third step involves initial data statistics. A publishing trend analysis from 1997 to 2023 shows steady growth in the field of digital pedagogy and knowledge sharing, with a significant increase in publications in recent years, particularly after the onset of the pandemic. The fourth step is data analysis, consisting of bibliometric analysis and network analysis. The bibliometric analysis provides data summaries, including the activities and impact of research. VOSviewer, a tool for visualizing and analyzing bibliometric networks, is used for these analyses.

4. Bibliometric Analysis

The section on bibliometric analysis provides insights into the author and country influence in the field of digital pedagogy and knowledge sharing. The analysis aims to identify the most influential authors, journals, and countries, with the goal of fostering collaboration and advancing the field.The author influence analysis involved extracting author data from the sample of 172 articles using VOSviewer. Out of 492 contributing authors, only 4% had contributed to more than one paper, with the majority appearing in a single paper. The country influence analysis reveals the top contributing countries regarding the number of publications. The United States, Australia, and Malaysia are the top performers. It is interesting to note that the study of digital pedagogy and knowledge sharing extends beyond the usual leading countries in education research. This global effort recognizes the need for context-specific approaches and solutions, reflecting the diverse cultural perspectives and contexts associated with online learning.

5. Keywords co-occurrence analysis and research thematic areas identification

The analysis aims to uncover underlying themes and determine the association between keywords within the literature. Co-occurrence analysis is employed to identify keywords that frequently appear together, indicating a semantic relationship and correlation. This analysis method has been widely used in various research fields to understand knowledge structures (Ravikumar et al., 2015; Stegmann & Grohmann, 2003). VOSviewer, a tool for network analysis, is utilized for mapping the keyword co-occurrence network. The total link strength (TLS) of a keyword in the network indicates its significance and influence [25]. In the study, a sample of 172 articles yielded 556 keywords, and a clustering algorithm was applied to identify seven literature clusters. The sizes of the clusters ranged from 17 keywords to 9 keywords. The top keywords for each cluster based on TLS. The clusters are subjectively labeled based on the dominant keywords and their connection with digital pedagogy and knowledge sharing. Cluster 1 is labeled 'intrapersonal motivation,' Cluster 2 is labeled 'social networking technologies,' and Cluster 3 is labeled 'computer-assisted collaborative learning.' Clusters 4, 5, 6, and 7, consisting of only 9 keywords each, are labeled as 'technology acceptance,' 'learning environment,' 'learner readiness,' and 'knowledge management,' respectively. The latter four clusters are briefly mentioned but have yet to be extensively discussed in the subsequent analysis due to their emerging nature and lack of discernible patterns at this stage in the literature's development.

6. Discussion

Cluster 1 of the discussion focuses on intrapersonal determinants of knowledge sharing. Self-efficacy and trust are identified as key drivers in this cluster. Self-efficacy refers to a student's belief in their abilities to use digital

educational aids in online learning, which is linked to fostering internet literacy [23]. Self-efficacy has been found to be a significant determinant of knowledge sharing in digital pedagogy, as demonstrated by Ergün and Avci's (2018) study on Turkish university students [26]. Interpersonal trust is also highlighted as an important factor in knowledge sharing at the individual and team levels. Trust, anticipated reciprocal relationship, and willingness to share have been found to indirectly impact individuals' intention to share knowledge virtually among Malaysian university students[27,28]. Social identification and interpersonal trust are positively related, leading to enhanced knowledge sharing behavior in an online problem-based learning internship program for nursing students [29]. Trust and subjective well-being have been identified as significant mediators between personality traits and knowledge sharing [30]. Cluster 2 explores factors that affect the knowledge-sharing process through social networking technologies. The main thematic areas discussed are social media characteristics, individual factors, and environmental factors. Social media characteristics, such as functions and informal settings, have been found to have a positive relationship with knowledge sharing behavior [31,32]. Students engage with social network tools both formally and informally, and individual determinants such as social interaction ties, perceived enjoyment, and trust influence their intention to share knowledge [33,34]. Collaborative learning style and extroversion also predict knowledge sharing behavior via social media [35]. Regarding environmental factors, students prefer web 2.0 tools like wikis, social media, and blogs for knowledge sharing and construction, with WhatsApp and Facebook being preferred over e-learning platforms [36]. The perception of the audience as weak ties has been found to influence information sharing on social network sites [37]. Cluster 3 focuses on the dynamics of computer-supported collaborative learning (CSCL) and knowledge sharing. CSCL represents a virtual environment in which learners collaborate in teams and supports knowledge construction and learning [38]. Positive relationships have been observed between online collaborative learning initiatives, such as wikis and social networking sites, and knowledge sharing motivation [39–41]. Transactive memory systems and communication functions in CSCL environments have been found to facilitate knowledge sharing [28,38]. These clusters highlight the significance of intrapersonal determinants, social networking technologies, and computer-supported collaborative learning in facilitating knowledge sharing in digital pedagogy. These factors contribute to a better understanding of the dynamics and drivers of knowledge sharing behavior in online learning environments.

7. Conclusions

This study presents a bibliometric analysis of digital pedagogy and knowledge sharing in higher education, aiming to assess its progress and provide insights for future development. The analysis reveals several key trends and findings. Firstly, the publication trend in this field indicates slow growth until 1997, but the pace of publication has accelerated in recent years, with 2022 being the most productive year so far. This surge can be attributed to the impact of the COVID-19 pandemic, which forced educational institutions to adopt online pedagogical approaches. Global contributions to the field have come from scholars worldwide, with the United States being the most productive and influential country. European representation is increasing, and notable contributions have also come from Asian countries such as Malaysia, China, Hong Kong, Taiwan, Saudi Arabia, India, and Bahrain. However, African countries have yet to make significant contributions. The literature on digital pedagogy and knowledge sharing can be categorized into seven distinct research streams. Established streams include "intrapersonal determinant," "social networking," and "computer-assisted collaborative learning." Emerging streams include "technology acceptance," "learning environment," "learner readiness," and "knowledge management." The study draws on Nonaka's cycle of knowledge creation and the concept of "ba" to understand knowledge sharing mechanisms in online learning. By focusing on the virtual aspect of ba and its interactions with individuals, the research contributes to understanding knowledge sharing in the virtual realm. Practically, the study's insights are valuable for higher education institutions looking to develop or enhance computer-supported collaborative learning environments. Well-designed and implemented environments have been shown to improve knowledge sharing behavior and promote positive learning outcomes. The study also identifies implications for future research. Further exploration of the dynamics of interaction within the virtual ba concerning knowledge sharing is needed, as well as understanding the forces that shape knowledge sharing behavior in the virtual space. African scholars have the potential to contribute significantly to the field, given the continent's young and tech-savvy population and the tradition of oral storytelling. However, the study acknowledges its limitations, particularly its exclusive focus on peer-reviewed material. Future research could address this limitation by incorporating non-academic publications and broader academic articles. In conclusion, this bibliometric analysis provides a comprehensive overview of the progress and trends in digital pedagogy and knowledge sharing in higher education. It highlights recent publication growth, global contributions, research streams, and theoretical and practical implications. The study emphasizes the need for further research to

explore interactions within the virtual ba and encourages African scholars to contribute to the field. Future research should also expand the scope by considering non-academic publications and a broader range of academic articles.

References

[1] Blewett C. From Traditional Pedagogy to Digital Pedagogy, 2016. https://doi.org/10.1007/978-94-6300-896-9_16.

[2] Nonaka I. A Dynamic Theory Knowledge of Organizational Creation. Organization Science 1994;5. https://doi.org/10.1287/orsc.5.1.14.

[3] Nonaka I. A dynamic theory of organizational knowledge creation. Knowledge, Groupware and the Internet, 2009. https://doi.org/10.1287/orsc.5.1.14.

[4] Nonaka I, Lewin AY. A Dynamic Theory of Organizational Knowledge Creation Dynamic Theory Knowledge of Organizational Creation. International Journal of Technology Management 1994;5.

[5] Nonaka I, Toyama R. The theory of the knowledge-creating firm: Subjectivity, objectivity and synthesis. Industrial and Corporate Change 2005;14. https://doi.org/10.1093/icc/dth058.

[6] Seonghee K, Boryung J. An analysis of faculty perceptions: Attitudes toward knowledge sharing and collaboration in an academic institution. Libr Inf Sci Res 2008;30. https://doi.org/10.1016/j.lisr.2008.04.003.

[7] Cheng M, Ho JS, Lau PM. Knowledge sharing in academic institutions : a study of multimedia university malaysia. Electronic Journal of Knowledge Management 2009;7.

[8] Ipe M. Knowledge Sharing in Organizations: A Conceptual Framework. Human Resource Development Review 2003;2. https://doi.org/10.1177/1534484303257985.

[9] Hansen MT, Nohria N, Tierney T. What's your strategy for managing knowledge? Harv Bus Rev 1999;77.

[10] Selamat MH, Abdullah R, Paul CJ. Knowledge management framework in a technology support environment. International Journal of Computer Science and Network Security 2006;6.

[11] Kim S, Lee H. The impact of organizational context and information technology on employee knowledge-sharing capabilities. Public Adm Rev 2006;66. https://doi.org/10.1111/j.1540-6210.2006.00595.x.

[12] Earl M. Knowledge management strategies: Toward a taxonomy. Journal of Management Information Systems 2001;18. https://doi.org/10.1080/07421222.2001.11045670.

[13] Gupta AK. Knowledge Management's Social Dimension : Lessons From Nucor Steel. MIT Sloan Manag Rev 2000;42.

[14] Hislop D. Mission impossible? Communicating and sharing knowledge via information technology. Journal of Information Technology, vol. 17, 2002. https://doi.org/10.1080/02683960210161230.

[15] Nonaka I, Toyama R, Konno N. SECI, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation. Long Range Plann 2000;33. https://doi.org/10.1016/S0024-6301(99)00115-6.

[16] Chen CJ, Huang JW. How organizational climate and structure affect knowledge management-The social interaction perspective. Int J Inf Manage 2007;27. https://doi.org/10.1016/j.ijinfomgt.2006.11.001.

[17] Salis S, Williams AM. Knowledge sharing through face-to-face communication and labour productivity: Evidence from british workplaces. Br J Ind Relat 2010;48. https://doi.org/10.1111/j.1467-8543.2009.00762.x.

[18] Koskinen KU, Pihlanto P, Vanharanta H. Tacit knowledge acquisition and sharing in a project work context. International Journal of Project Management 2003;21. https://doi.org/10.1016/S0263-7863(02)00030-3.

[19] Davarzani H, Fahimnia B, Bell M, Sarkis J. Greening ports and maritime logistics: A review. Transp Res D Transp Environ 2016;48. https://doi.org/10.1016/j.trd.2015.07.007.

[20] Fahimnia B, Tang CS, Davarzani H, Sarkis J. Quantitative models for managing supply chain risks: A review. Eur J Oper Res 2015;247. https://doi.org/10.1016/j.ejor.2015.04.034.

[21] Al-Emran M, Mezhuyev V, Kamaludin A. Towards a conceptual model for examining the impact of knowledge management factors on mobile learning acceptance. Technol Soc 2020;61. https://doi.org/10.1016/j.techsoc.2020.101247.

[22] Salloum SA, Al-Emran M, Shaalan K, Tarhini A. Factors affecting the E-learning acceptance: A case study from UAE. Educ Inf Technol (Dordr) 2019;24. https://doi.org/10.1007/s10639-018-9786-3.

[23] Razzaq A, Samiha YT, Anshari M. Smartphone habits and behaviors in supporting students self-efficacy. International Journal of Emerging Technologies in Learning 2018;13. https://doi.org/10.3991/ijet.v13i02.7685.

[24] Razzaque A, Al-Hashimi M, Hamdan AM, Musleh A, Hassan A, Aldahean ES, et al. Learning readiness when sharing knowledge while e-learning. Opcion 2019;35. https://doi.org/10.33965/el2019_201909F007.

[25] Waltman L, Boyack KW, Colavizza G, van Eck NJ. A principled methodology for comparing relatedness measures for clustering publications. Quantitative Science Studies 2020;1. https://doi.org/10.1162/qss_a_00035.

[26] Ergün E, Avci Ü. Knowledge sharing self-efficacy, motivation and sense of community as predictors of knowledge receiving and giving behaviors. Educational Technology and Society 2018;21.

[27] Hassandoust F, Logeswaran R, Farzaneh Kazerouni M. Behavioral factors influencing virtual knowledge sharing: theory of reasoned action. Journal of Applied Research in Higher Education 2011;3. https://doi.org/10.1108/17581181111198665.

[28] Wang X, Zhang R, Wang X, Xu D, Tian F. How Do Mobile Social Apps Matter for College Students' Satisfaction in Group-Based Learning? The Mediation of Collaborative Learning. Front Psychol 2022;13. https://doi.org/10.3389/fpsyg.2022.795660.

[29] Wang WT, Lin YL. Evaluating Factors Influencing Knowledge-Sharing Behavior of Students in Online Problem-Based Learning. Front Psychol 2021;12. https://doi.org/10.3389/fpsyg.2021.691755.

[30] Jami Pour M, Taheri F. Personality traits and knowledge sharing behavior in social media: mediating role of trust and subjective well-being. On the Horizon 2019;27. https://doi.org/10.1108/OTH-03-2019-0012.

[31] Koranteng FN, Wiafe I, Kuada E. An Empirical Study of the Relationship Between Social Networking Sites and Students' Engagement in Higher Education. Journal of Educational Computing Research 2019;57. https://doi.org/10.1177/0735633118787528.

[32] Hosen M, Ogbeibu S, Giridharan B, Cham TH, Lim WM, Paul J. Individual motivation and social media influence on student knowledge sharing and learning performance: Evidence from an emerging economy. Comput Educ 2021;172. https://doi.org/10.1016/j.compedu.2021.104262.

[33] Selvarajah U, Ali N. The intention of using Facebook by postgraduate students for knowledge sharing: An empirical study. International Journal of Management in Education 2021;15. https://doi.org/10.1504/IJMIE.2021.111812.

[34] Moghavvemi S, Sharabati M, Paramanathan T, Rahin NM. The impact of perceived enjoyment, perceived reciprocal benefits and knowledge power on students' knowledge sharing through Facebook. International Journal of Management Education 2017;15. https://doi.org/10.1016/j.ijme.2016.11.002.

[35] Kae NS, Chong Y, Hassan H. Millennials' knowledge sharing behaviour via social media: The effects of reciprocity, extroversion and collaborative learning style. Int J Econ Res 2017;14.

[36] Chutia R, Devi RM. Strategies of Knowledge Sharing Among the Postgraduate Students of University of Science and Technology, Meghalaya: A Study. Library Philosophy and Practice 2020;2020.

[37] Kim J, Lee C, Elias T. Factors affecting information sharing in social networking sites amongst university students: Application of the knowledge-sharing model to social networking sites. Online Information Review 2015;39. https://doi.org/10.1108/OIR-01-2015-0022.

[38] Noroozi O, Weinberger A, Biemans HJA, Mulder M, Chizari M. Facilitating argumentative knowledge construction through a transactive discussion script in CSCL. Comput Educ 2013;61. https://doi.org/10.1016/j.compedu.2012.08.013.

[39] Mivehchi L, Rajabion L. A framework for evaluating the impact of mobile games, technological innovation and collaborative learning on students' motivation. Human Systems Management 2020;39. https://doi.org/10.3233/HSM-190543.

[40] Díez-Pascual AM, García-Díaz P, Peña-Capilla R. Experience in the use of social software to support student learning in university courses of science and engineering degrees. Educ Sci (Basel) 2019;9. https://doi.org/10.3390/educsci9010005.

[41] Eid MIM, Al-Jabri IM. Social networking, knowledge sharing, and student learning: The case of university students. Comput Educ 2016;99. https://doi.org/10.1016/j.compedu.2016.04.007.