Annals of "Dunarea de Jos" University of Galati
Fascicle I. Economics and Applied Informatics
Years XXXI – nº2/2025
ISSN-L 1584-0409 ISSN-Online 2344-441X
www.eia.feaa.ugal.ro

DOI https://doi.org/10.35219/eai15840409513

Enhancing Pre-University Education Systems Through the Strategic Application of Social Media Frameworks

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ARTICLE INFO

Article history:
Received July 4, 2025
Accepted July 15, 2025
Available online September 2025

JEL Classification
A19, A20, A21, A22, A31

Keywords:
ICT, education, social media, high school, framework

ABSTRACT

Social media networks have become integral to modern life, profoundly affecting how young people interact and learn. Although concerns about mental health impacts like anxiety and depression are prevalent, these platforms play a significant role in shaping social and cognitive experiences. This article introduces a study focused on leveraging social media in educational settings to enhance learning outcomes. Using VOSviewer for bibliometric analysis, the research aims to evaluate existing literature and explore how social media can be effectively integrated into education to improve teaching and learning practices.

1. Introduction

The COVID-19 pandemic has underscored the limitations of online education infrastructure while accelerating the use of social media for remote learning. This crisis has highlighted digital platforms' crucial role in modern education by revealing the deficiencies of traditional e-learning systems and showcasing social media's ability to offer flexible, real-time learning environments. Social media has been pivotal in bridging physical distances, facilitating communication, collaboration, and resource sharing, thus improving engagement and access to educational content (Akgül, 2022).

Social media has become deeply embedded in adolescents' lives, shaping their peer interactions, relationships, and social identity. These platforms provide opportunities for social engagement, friendship maintenance, and emotional support, allowing instant communication and fostering a sense of community (Moya, 2022). However, social media also introduces psychosocial challenges. Constant exposure to idealized images and the pressure to maintain a curated online presence can heighten anxiety and self-comparison, leading to feelings of inadequacy and stress. Adolescents face social pressures to conform and seek validation, which can impact self-esteem and emotional well-being.

Different social media platforms offer varied educational benefits. Facebook aids collaboration and resource sharing; Twitter facilitates quick information exchange; Instagram supports visual engagement through creative content; and Snapchat encourages spontaneous peer interaction (Alalwan, 2022). Blogs and forums enhance academic collaboration and remote learning through organized discussions and resource sharing.

Mobile applications and Learning Management Systems (LMS) like Moodle and Blackboard provide flexible access to educational materials and assessments, promoting personalized learning (Camilleri, 2023). Synchronous tools like Zoom and Microsoft Teams are vital for real-time interaction, simulating classroom environments and supporting skill development (Camilleri, 2023).

In academic and professional contexts, frameworks provide structured methodologies and principles for problem-solving and strategy development. They offer tools and standards for consistency and effectiveness while allowing customization based on specific needs (Walk, 2022).

The Cambridge Online Dictionary describes a framework as a supporting structure around which development occurs (FRAMEWORK | English meaning - Cambridge Dictionary, accessed 09.10.2024). In scholarly contexts, frameworks provide a systematic basis for research, theory development, or methodological implementation, ensuring that scholarly work is conducted within a well-defined structure.

This article will further explore how frameworks can be applied to integrate social media networks into educational settings effectively. It will discuss how structured frameworks can facilitate the systematic incorporation of social media into pedagogy, enhancing educational outcomes. By employing these

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frameworks, educational institutions can develop strategies that align social media use with pedagogical goals, addressing challenges and optimizing the benefits of social media in education.

2. Literature review

Akgül (2022) employs several theoretical frameworks to analyze the use of Facebook/Meta in higher education. The Technology Acceptance Model (TAM) assesses how perceptions of ease of use and usefulness affect user engagement. The Task-Technology Fit Model evaluates the alignment between technology features and user needs. Although the Theory of Planned Behavior (TPB) is briefly mentioned, it is used to understand users' behavioral intentions. Structural Equation Modeling (SEM) quantifies relationships among variables to identify predictors of Facebook/Meta usage in education. Additionally, Akgül uses Artificial Neural Networks (ANN) and deep learning techniques to predict user behaviors, offering a comprehensive view of social media's role in education (Akgül, 2022).

In contrast, Pakinee (2021) develops a gamified e-learning environment designed to enhance student engagement through game elements such as points and badges. This system includes a monitoring feature to track student participation and evaluates the impact of gamification by comparing groups exposed to these elements with those that are not. The platform also offers continuous feedback and adaptive learning strategies, aimed at increasing student motivation and involvement. Pakinee's research emphasizes the importance of evidence-based assessment to refine gamification methods and optimize e-learning experiences. (Pakinee 2021)

The "SimCollege" study, as discussed by Wu et al. (2022), focuses on the ethical implications of using digital games in educational metaverses. It examines how digital games can promote ethical behavior while addressing concerns related to data privacy, equity, and diversity. This research is crucial for developing responsible virtual education systems that uphold ethical standards and principles. (Wu et al. 2022)

Dong (2023) investigates the role of social media in enhancing international students' social capital through bridging and bonding connections. Bridging capital expands students' networks and access to new resources by facilitating interactions with peers in the host country. Bonding capital, conversely, reinforces existing relationships with contacts from their home country, providing essential emotional support. Dong's framework conceptualizes social media as a means for students to engage with both their home and host networks, thereby improving their social integration and academic engagement. The study underscores the importance of cultural adjustment in leveraging social media to maximize these benefits (Dong, 2023).

Shams (2022) explores how Facebook discussions can enhance speaking skills in a mixed English as a Foreign Language (EFL) class. Using the Community of Inquiry (CoI) framework, the research shows that Facebook discussions significantly improve students' speaking abilities by fostering social, pedagogical, and cognitive engagement. This approach highlights the potential of social media to support language learning through increased interaction and reflection, contributing to more effective pedagogical practices (Shams, 2022).

Rizvi et al. (2023) present the "AI Learning Levels Framework," which categorizes AI education into Social/Ethical, Application, Model, and Engine levels. This framework provides a structured approach to evaluate and enhance AI learning interventions, helping educators and researchers assess the effectiveness of AI education and address gaps in students' AI competencies. The framework supports the integration of AI into education, emphasizing its growing importance in personalizing learning and improving educational management (Rizvi, 2023).

Song et al. (2024) present a framework for inclusive AI learning in K-12 education that incorporates Universal Design for Learning (UDL) principles. This framework integrates five core AI concepts with three UDL principles—engagement, representation, and action/expression—and six pedagogical practices, exemplified by a summer AI camp for middle school students. It aims to guide curriculum design, enhance inclusivity, and support teacher development by integrating key AI concepts into the curriculum, applying UDL principles, and implementing effective pedagogical practices. (Song et al. 2024)

In contrast, Turnbull (2023) explores the integration of social media into Learning Management Systems (LMS) in higher education. This study reviews existing literature to assess the impacts of such integration, presenting a framework that highlights both the advantages and challenges. It emphasizes that, while social media can enhance course outcomes and facilitate student interaction, careful planning and monitoring are essential to manage technical and management challenges effectively. (Turnbull, 2023)

Rfeqallah (2021) investigates the impact of social media on academic performance through the lens of the Technology Acceptance Model (TAM) and communication theory. The study focuses on how self-regulation affects the relationship between social media use and academic outcomes, noting both positive aspects, such as enhanced collaboration and access to information, and potential drawbacks, including dependency and time management issues. It underscores the need for a balanced approach to maximize the benefits and address the limitations of social media in educational contexts. (Rfeqallah, 2021)

Jagatheesaperumal (2022) examines how Extended Reality (XR) and metaverses, driven by the Internet of Everything (IoE), can revolutionize education by offering interactive and personalized learning experiences. The study introduces the XR-ED framework, which aims to develop XR systems tailored to

educational needs, enhancing the quality and effectiveness of learning. However, it also addresses challenges such as technology dependence and data security.

Stark et al. (2023) propose a framework for utilizing videos in higher education, integrating technical, pedagogical, and interactive strategies. This framework provides a practical guide for educators to effectively implement video-based teaching, aiming to improve student engagement and skill development across various disciplines. (Stark et al. 2023)

Bertolini et al. (2023) use a Bayesian framework to model student success in an undergraduate biology course, combining prior knowledge with current data to assess factors influencing student performance. The study finds that interactions with the learning management system and diagnostic assessments are key predictors of success, highlighting the Bayesian approach's ability to offer detailed insights into student performance. (Bertolini et al. 2023)

These studies reflect diverse approaches to enhancing education: Jagatheesaperumal focuses on XR and IoE for immersive learning, Stark et al. on video-based pedagogy, and Bertolini et al. on Bayesian methods for analyzing student performance. Each framework addresses specific educational needs and challenges, contributing to a deeper understanding of how technology can support and improve learning outcomes.

3. Methodology

This bibliometric research utilizes the Clarivate Web of Science database, a key platform for indexing and evaluating scientific literature. It helps in identifying research trends, collaboration networks, and researcher impact by providing relevant bibliometric indicators. The initial filtering involved selecting seven keywords ilustrated in Figure 1 to query the database, resulting in 13,389 documents that met the criteria, which laid the groundwork for the study's literature analysis.

The next filtering stage focused on publication years, selecting literature from 2020-2024. This reduced the number of documents to 5,775, ensuring the analysis reflects recent contributions and trends in the field.

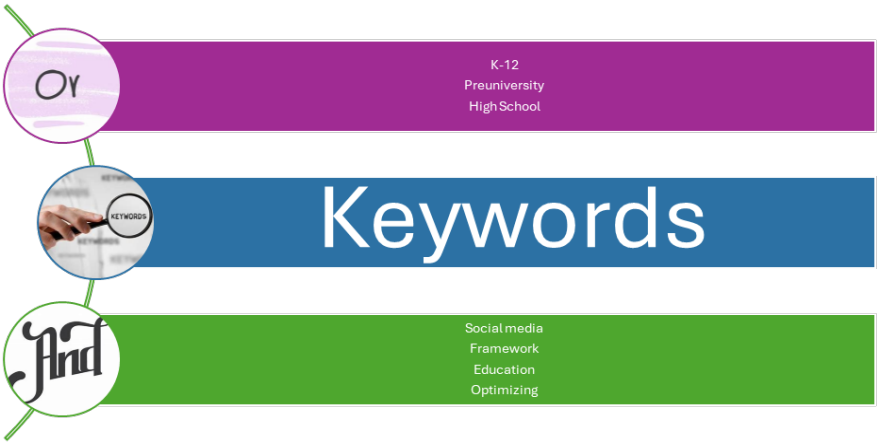

Figure1. Keyword list used for the first stage of fitration

In the next steps, documents were refined to include only peer-reviewed articles, reducing the total to 4,927. Further filtering for English-language articles brought the count to 4,420. Excluding paywalled content narrowed it to 2,229 freely accessible articles. These were then sorted into relevant fields, identifying 900 in Education and Educational Research and 117 in Economic Informatics. Finally, filtering by geographical regions reduced the number of articles to 464, ensuring a focused and regionally relevant analysis.

Figure 2 illustrates that the USA comprises 57% of the articles examined in the study. This significant proportion highlights the dominance of American research output within the dataset, indicating a substantial concentration of scholarly work from the United States relative to other regions. This distribution underscores the need to consider the predominant influence of American contributions when analyzing global trends and patterns in the literature.

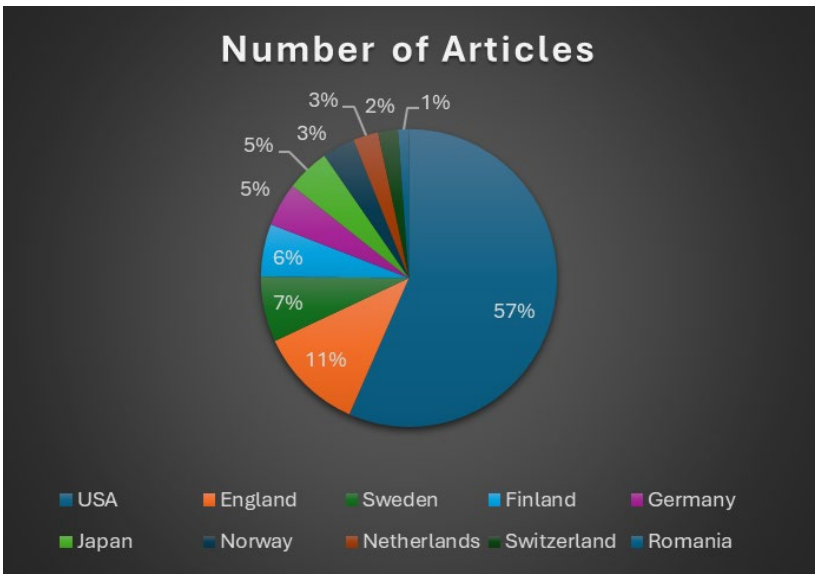

Figure 2. Distribution of Articles by Region

The dataset was narrowed to include only articles classified as "free to use," reducing the number to 41 from over 400. This step ensured that all selected articles were accessible without any fees or registration. To further refine the dataset, Zotero was employed to identify and collect articles with available PDF attachments. This process cut the number down to 29 articles, focusing exclusively on those with full-text documents readily accessible for detailed examination. This refinement ensured that the final selection consisted of high-quality, freely accessible research, facilitating a more comprehensive and equitable analysis.

4. Results and discussions based on bibliometric analysis

VosViewer was instrumental in the bibliometric analysis, using its advanced visualization and network analysis features to map significant research clusters. It processes bibliometric data to generate maps showing relationships between elements like keywords, authors, or journals. By analyzing keyword frequency and co-occurrence, VosViewer grouped related terms into three major clusters of 30 keywords. These clusters were visualized through network diagrams, illustrating the connections between keywords and highlighting key research themes and trends as shown in Figure 3. This approach provided a clear overview of the thematic landscape and facilitated a deeper understanding of the research domain.

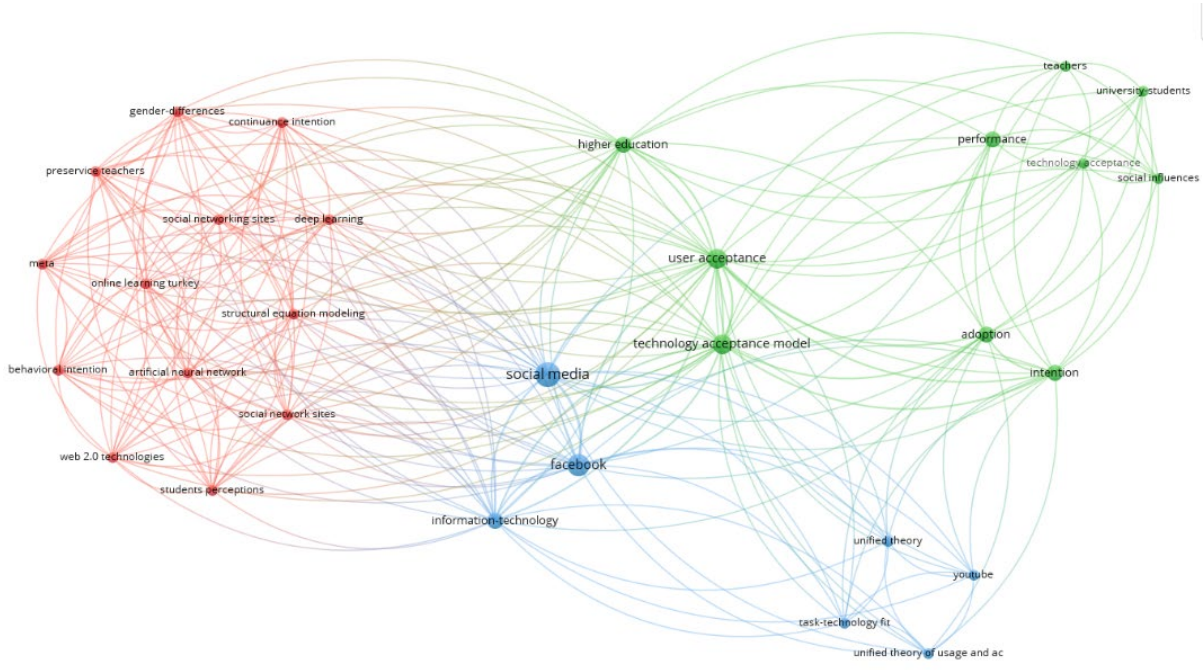

Figure 3. Keyword Map Identified by VosViewer

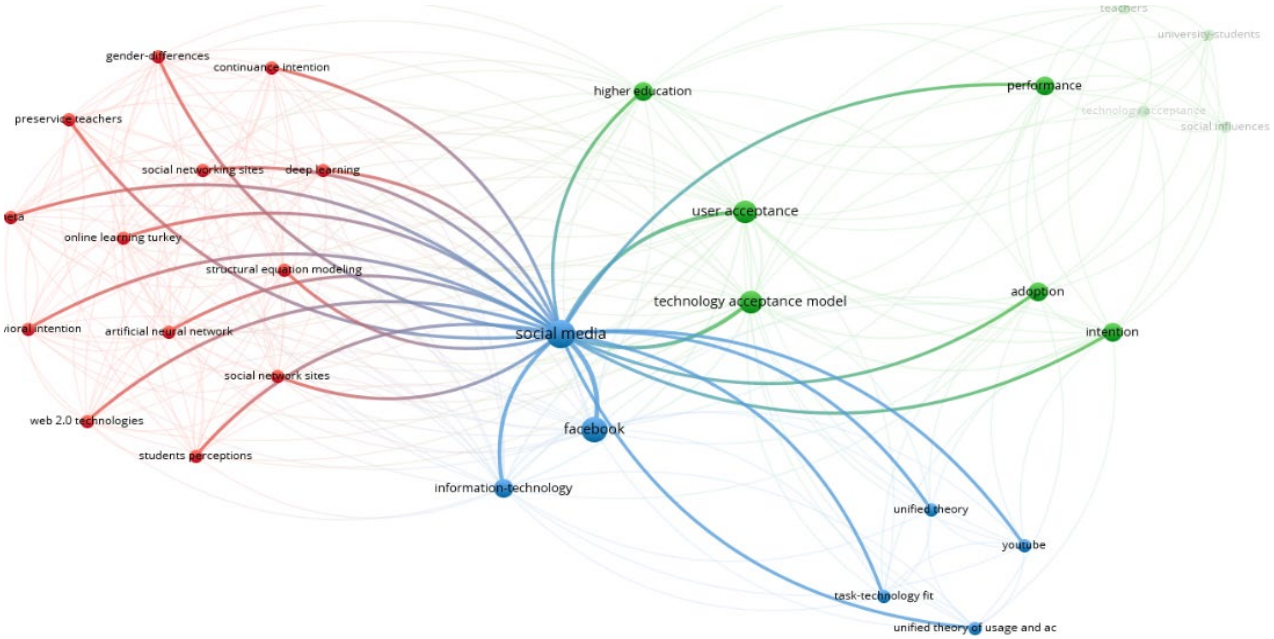

Figure 4. The connections within the social media cluster

The social media cluster ilustrated in Fig. 4 is interconnected with several key research areas. It prominently links to Facebook, emphasizing its role in studies on user interaction and engagement. The cluster also aligns with information technology, indicating its overlap with discussions on the IT infrastructure supporting social media platforms. Additionally, it connects with the Technology Acceptance Model (TAM), highlighting the focus on how social media technologies are adopted and used. The cluster shows a significant relationship with higher education, reflecting interest in the impact of social media on academic environments. It also relates to social network sites (SNS) and student perception, examining the functionality of these platforms and their effects on student learning. Lastly, its connection with Web 2.0 technology underscores the importance of interactive, user-generated content in modern social media research.

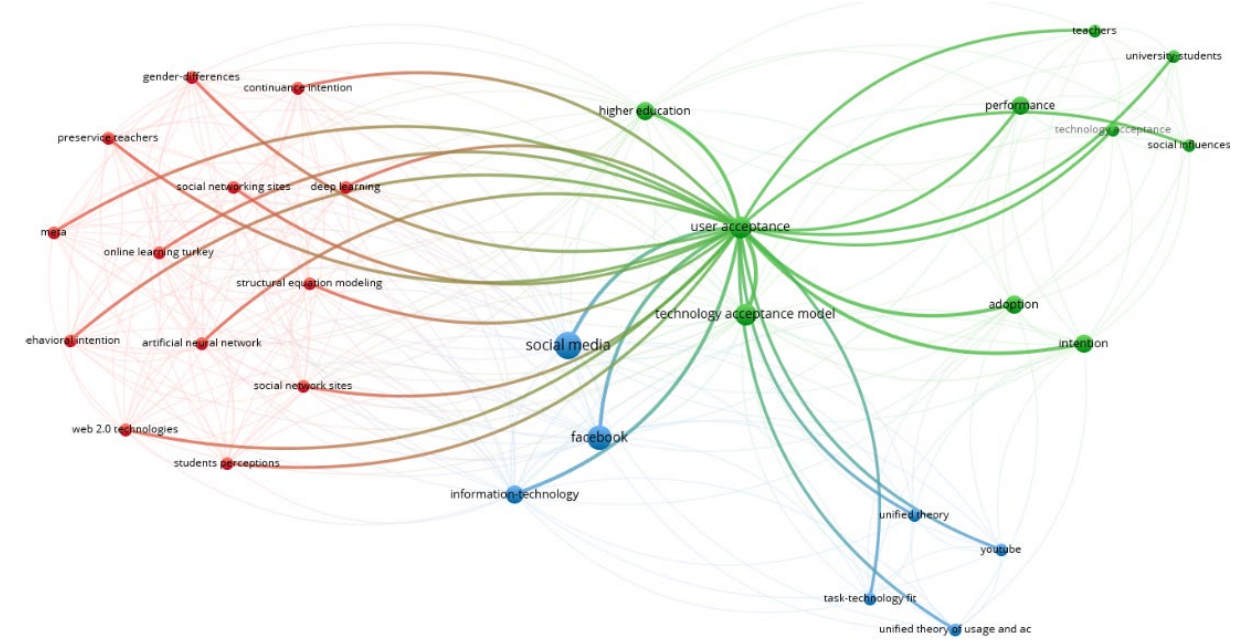

Figure 5. The connections within the user acceptance cluster

The second cluster that is illustrated in Figure 5 focuses on user acceptance of technology, heavily linked with the Technology Acceptance Model (TAM), which explores factors like perceived ease of use and usefulness. This cluster also connects with social media research, examining how users interact with and accept social media platforms. Artificial neural networks and deep learning are used to analyze and predict user

behavior, providing insights into technology adoption. The cluster includes social network sites (SNS) and adoption intention, reflecting studies on user behavior and willingness to embrace new technologies. Additionally, the Unified Theory of Acceptance and Use of Technology (UTAUT) is associated with this cluster, integrating various aspects of technology acceptance into a comprehensive model.

The final cluster that can be seen in Fig. 6 focuses on deep learning and its wide-ranging applications. It is closely linked with social media and SNS, where deep learning helps analyze user behavior and data patterns. This cluster also connects with Meta and Web 2.0 technologies, showing how deep learning enhances platform functionality and user experience, including personalized content and engagement analysis.

Facebook, as a key social media platform, benefits from deep learning for improving features like content recommendations and targeted ads. The cluster also ties in with the Technology Acceptance Model (TAM), using deep learning to study how users adopt and engage with new technologies.

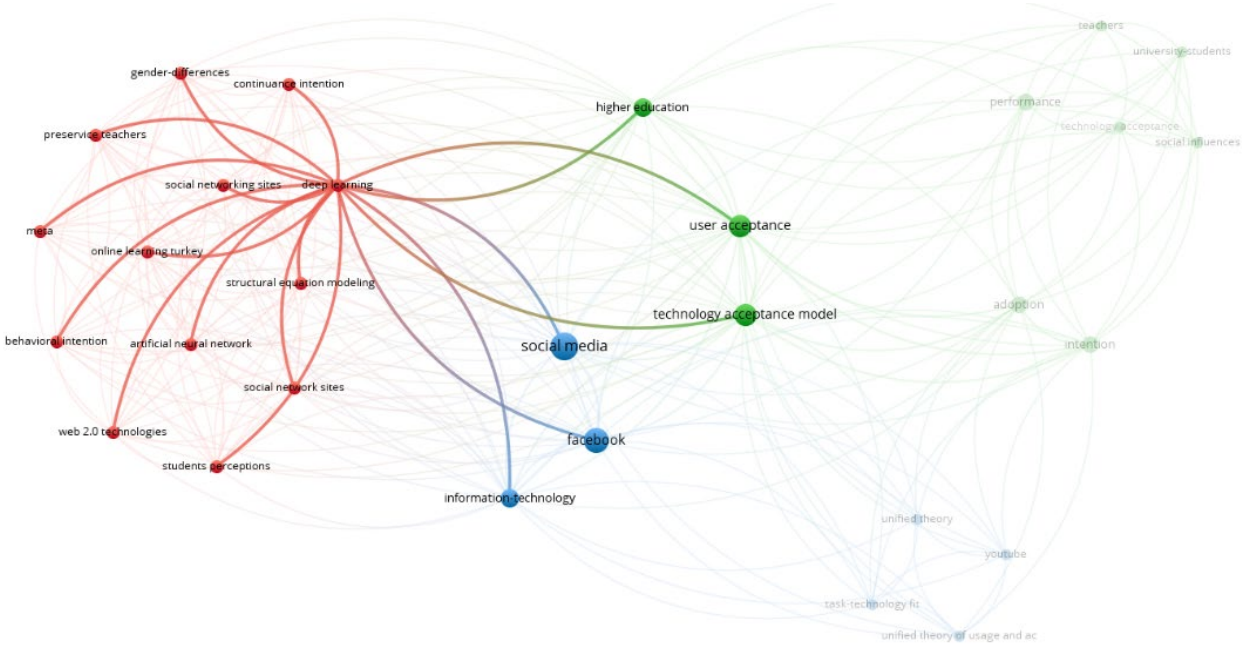

Figure 6. The connections within the deep learning cluster

In education, deep learning aids in analyzing student performance and optimizing learning tools. Structural Equation Modeling (SEM) is another important method in this cluster, used alongside deep learning to develop and validate complex models of technology acceptance and user behavior.

Overall, this cluster highlights deep learning's significant role in advancing research across social media, technology acceptance, and education, enhancing the understanding of data patterns and user interactions.

5. Conclusions

Social networking sites (SNS) have become integral to modern life, especially for younger generations, due to their ability to offer highly interactive and engaging content. These platforms, which include features like multimedia posts, real-time updates, and personalized user experiences, play a crucial role in shaping communication patterns, social interactions, and information consumption. Their dynamic nature attracts users, leading to increased time spent online and deeper engagement with digital content.

Despite the criticisms often associated with social networks, such as concerns about privacy and mental health, they also present significant opportunities for enhancing educational practices. The study underscores that when integrated strategically, social networks can positively impact education. By applying theoretical frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), educators can gain insights into how these platforms are adopted and used in educational contexts.

The Technology Acceptance Model (TAM) helps explain how perceived ease of use and perceived usefulness influence technology adoption, while UTAUT provides a comprehensive view of factors like performance expectancy, effort expectancy, social influence, and facilitating conditions. These frameworks guide the design of interventions aimed at improving user engagement and satisfaction with social media tools in education.

The research leverages advanced tools like Zotero for managing and organizing references and VosViewer for visualizing bibliometric data. Zotero helps in retrieving and organizing relevant literature, while VosViewer provides insights into research trends and thematic clusters. This detailed bibliometric analysis

reveals how social networks intersect with various research themes and helps identify best practices for their application in educational settings.

Social networks can transform education by offering interactive learning experiences, enhancing student engagement, and facilitating academic collaboration. For instance, social networks can support personalized learning through targeted content and foster collaborative learning environments by connecting students and educators.

However, to fully realize these benefits, it is essential to address the challenges associated with social networks, such as ensuring digital literacy and promoting responsible online behavior. By strategically integrating social networks into educational practices and applying theoretical models to guide their use, educators can maximize their potential benefits while mitigating potential risks.

In conclusion, this study demonstrates that social networking sites, when used thoughtfully and within a structured theoretical framework, can significantly enhance educational outcomes. The research highlights the potential of these platforms to improve learning experiences and educational practices globally, emphasizing the need for a balanced approach that leverages their strengths and addresses their limitations.

References

1. *Akgül, A., & Uymaz, M. (2022). Facebook/Meta usage in higher education: A deep learning-based two-phased hybrid SEM-ANN analysis. Education and Information Technologies, 27(9821–9855). https://doi.org/10.1007/s10639-022-10845-5*
2. *Alalwan, N. (2022). Actual use of social media for engagement to enhance students' learning in higher education. Education and Information Technologies, 27(4), 9767–9789. https://doi.org/10.1007/s10639-022-10856-3*
3. *Al-Rahmi, A., Shamsuddin, A., Wahab, E., Al-Rahmi, W., Alismaiel, O., & Crawford, J. (2022). Social media usage and acceptance in higher education: A structural equation model. Frontiers in Education, 7. https://doi.org/10.3389/feduc.2022.964456*
4. *Bertolini, R., Finch, S. J., & Nehm, R. H. (2023). An application of Bayesian inference to examine student retention and attrition in the classroom. Frontiers in Education, 8, 1073829. https://doi.org/10.3389/feduc.2023.1073829*
5. *Camilleri, M. A., & Camilleri, A. C. (2023). Learning from anywhere, anytime: Utilitarian motivations and facilitating technologies in various contexts.*
6. *Dong, J., Lee, S., Wang, C.-H., & Shannon, D. M. (2023). Impact on social capital and learning engagement of international students: The role of social media. Education and Information Technologies, 28, 8027–8050. https://doi.org/10.1007/s10639-023-11111-1*
7. *FRAMEWORK | English meaning - Cambridge Dictionary. (n.d.). Retrieved September 10, 2024, from https://dictionary.cambridge.org*
8. *Jagatheesaperumal, S. K., Ahmad, K., Al-Fuqaha, A., & Qadir, J. (2022). Advancing education through extended reality and Internet of Everything enabled metaverses: Applications, challenges, and open issues. arXiv. http://arxiv.org/abs/2207.01512*
9. *Moya, A., Caldarella, P., Larsen, R. A. A., Warren, J. S., Bitton, J. R., & Feyereisen, P. M. (2022). Addressing adolescent stress in school: Perceptions of a high school wellness center. Journal of School Psychology. https://doi.org/10.1007/s43494-022-00079-1*
10. *Pakinee, P., & Puritat, W. (2021). Designing a gamified e-learning environment for teaching ERP systems. Smart Learning Environments, 7(1), 1–11. https://doi.org/10.1186/s40561-021-00120-7*
11. *Rizvi, S., Waite, J., & Sentance, S. (2023). Artificial Intelligence teaching and learning in K-12 from 2019 to 2022: A systematic literature review. Computers and Education: Artificial Intelligence, 4, 100145. https://doi.org/10.1016/j.caeai.2023.100145*
12. *Song, Y., Weisberg, L. R., Zhang, S., Tian, X., Boyer, K. E., & Israel, M. (2024). A framework for inclusive AI learning design for diverse learners. Computers and Education: Artificial Intelligence, 6, 100212. https://doi.org/10.1016/j.caeai.2024.100212*
13. *Stark, K. S., Wekerle, C., Bischoff, A., Schweiger, M., Peuschel, K., Proske, K., Weckerle, B., Vettermann, L., & Schindler, A.-K. (2023). A heuristic framework for video-based teaching and learning scenarios in higher education. Journal of Research on Technology in Education. https://doi.org/10.1080/15391523.2023.2242980*
14. *Turnbull, D., Chugh, R., & Luck, J. (2023). Learning management systems and social media: A case for their integration in higher education institutions. Research in Learning Technology, 31. https://doi.org/10.25304/rlt.v31.2814*
15. *Wu, Y., Hao, F., & Wu, T. (2022). SimCollege: A digital game for promoting the ethical framework of the Edu-Metaverse. In 2022 IEEE Smartworld, Ubiquitous Intelligence & Computing, Scalable Computing & Communications, Digital Twin, Privacy Computing, Metaverse, Autonomous & Trusted Vehicles (SmartWorld/UIC/ScalCom/DigitalTwin/PriComp/Meta) (pp. 2491–2497). https://doi.org/10.1109/SmartWorld-UIC-ATC-ScalCom-DigitalTwin-PriComp-Metaverse56740.2022.00348*