A systematic review of social media as a teaching and learning tool in higher education: A theoretical grounding perspective

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Abstract

The use of social media in higher education has been demonstrated in a number of studies to be an attractive and contemporary method of teaching and learning. However, further research and investigation are required in order to align social media's pedagogical benefits with the theoretical perspectives that inform educational practices. It is the objective of this study to provide a systematic literature review using bibliometric analysis techniques and content analysis to provide a map of research produced between 2009 and 2021. This study aims to identify theoretical frameworks, current research trends, and patterns in this field. A total of 772 publications were analysed using bibliometric methodology, while a subset of 55 publications were analysed using content analysis. As indicated by the results, there is still a growing interest in this area of research, with recent studies still focusing on attitudes towards the use of social media in teaching and learning. According to the content analysis, technology acceptance theories and learning theories are the most commonly used reference theories. This field has yet to elaborate on pedagogical theory, and there is a tendency to rely primarily on technology acceptance models rather than pedagogical models. A discussion of future practice and research implications is also provided.

Keywords Social media · Teaching · Learning · Systematic review · Higher education

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1 Introduction

The popularity of social media, among students, has increased dramatically in recent years because of technological advances in Web 2.0 tools (Eid & Al-Jabri, 2016; Tess, 2013). Indeed, social media has attracted over three billion active users across the globe (Statista, 2022). Such technologies have demonstrated their potential for learning and teaching due to its functions for document exchange, virtual communication and knowledge information (Hosen et al., 2021; Manca & Ranieri, 2017). Social networking sites (e.g., Facebook, Twitter, Instagram), and online games have been widely used for information gathering and dissemination, collaborative learning, and online social and professional connections (Cao et al., 2013). Most recently, Manca's (2020) review of Instagram, Pinterest, Snapchat and WhatsApp revealed that the two most common activities used for learning by students were content development and discussion for peer learning/assessment. The potential use of social media for teaching and learning activities has received an increased amount of interest and attention from the scholarly community (Barrot, 2021a). A number of studies have presented evidence regarding the use of social media by academics for personal, professional, and teaching purposes (Johnson & Veletsianos, 2021; Manca & Ranieri, 2016a, 2016b). In terms of specific social media platforms, some researchers have found that Facebook groups are an effective tool to support learning, affording benefits not offered by traditional online Learning Management Systems (LMS) (Barrot, 2018; Chugh & Ruhi, 2018; Hew, 2011; Niu, 2019). Similarly, Tang and Hew (2017) noted the potential of promoting positive learning using Twitter to access and create digital content and collaboration between learners. Recently, studies have extended towards the utility of social media platforms such as Pinterest, Instagram, and Snapchat. Manca (2020) notes that whilst these platforms have been gaining considerable attention among young people, they have been largely overlooked in the scholarly literature.

Social media, however, has also been shown to challenge traditional beliefs about education and pedagogy in schools and universities. According to some scholars (Manca & Ranieri, 2017), educators should pay particular attention to the following themes, primarily communication between students and teachers and professional conduct, as well as the integration of social networking practices into academic and teaching practices from a technological and educational perspective. Besides, other challenges included cultural and social factors that resulted in the erosion of teachers' traditional roles, the management of relationships with students, and privacy threats. Other factors included psychological resistance, traditional visions of instruction, a lack of technical support, perceived risks, institutional issues, pedagogical views, pragmatic reasons, and values.

Despite the increasing level of interest and the growing body of empirical research on specific uses of social media (Alshalawi, 2022; Manca & Ranieri, 2016c; Sobaih et al., 2016), very few studies have been conducted to systematically examine how academics are utilizing social media within their teaching engagements and have mapped the use of social media in education across the various disciplinary fields (Barrot, 2021a; Rehm et al., 2019).

Although social media use in higher education has become relatively common (Barrot, 2021a), there is still much to be researched in order to develop a better understanding of its use as a teaching and learning tool (Sutherland et al., 2020). In fact, research has demonstrated that evidence-based pedagogical approaches informed by relevant empirical research are weak (Chugh et al., 2021). Thus, there is a necessity for further empirical work, grounded in teaching, learning, and educational technology theories, that can advance this growing field of education (Valtonen et al., 2022). The challenge for the development of a pedagogy for social media integration is to encourage robust and theoretically driven research that can explore the application of established learning theories and the facilitation of social media in teaching and learning (Churcher et al., 2014). Our belief is that focusing on the need for theoretical integration can help mitigate some of the shortcomings associated with the challenges described above.

The purpose of this study was to conduct a systematic review of the use of social media for teaching and learning purposes in higher education (2009–2021) utilizing bibliometric methods and content analysis. A primary objective of the study is to assess the degree of theoretical soundness of the studies published to date and to map the current state of the art in regard to the use of social media in teaching and learning.

This study focuses on two aspects of value: on the one hand, it examines the theoretical robustness of studies regarding teaching and learning processes based on the use of social media in higher education that have been published to date; on the other hand, it employs a mixed-method approach combining bibliometric analysis with qualitative analysis to examine the teaching and learning processes. It is our understanding that this is the first study that attempts to accomplish these objectives.

2 Theoretical background

2.1 Learning benefits of social media in higher education

Various studies have demonstrated the use of social media as a supportive and interactive tool for learning in higher education (Everson et al., 2013; Greenhow & Galvin, 2020; Manca, 2020; Manca & Ranieri, 2013). Some studies have focused on social media platforms such as Facebook, Twitter, and YouTube (Everson et al., 2013) or Instagram, Pinterest, Snapchat, and WhatsApp (Manca, 2020). The benefits of using social media in higher education has been shown to promote student-centred pedagogies (Camas Garrido et al, 2021). For example, the most commonly reported positive effect of Facebook is its capacity as a learning tool for enhanced communication, collaboration, and sharing of information (Niu, 2019). Indeed, Facebook groups are the most reliable feature to conduct learning activities (Manca & Ranieri, 2016c), whereas Twitter has most commonly been used for communication and assessment purposes (Tang & Hew, 2017). In general, the use of social media has a positive impact on student learning. However, this is not necessarily attributed to the technologies per se, but to how the technologies are used, and how certain pedagogy and/or instructional

strategy is developed (Hew & Cheung, 2013). As argued by Greenhow et al. (2019), educators should show clarity in studying evidence-based pedagogical approaches to teaching.

Some researchers (e.g., Churcher et al., 2014) have reported upon how the application of learning theories can facilitate social media integration in order to create virtual communities of practice and generate positive learning outcomes. The main focus of social constructivist learning theories is on learning as a process of active discovery and the construction of knowledge in a social and cultural context (Aubrey & Riley, 2016). In this line, social media support social constructivism theory (Dron & Anderson, 2014) as it is perceived by educators to provide direction for social constructivist teaching styles (Rambe & Nel, 2015). In addition, the connectivist approach views learning as a network phenomenon influenced by technology and socialization (Siemens, 2006), as learners are encouraged to engage in peer-to-peer dialogue, sharing resources and promote communication skills (Siemens & Weller, 2011). From this perspective, social media can provide a platform for mixing learning and social activities (Manca, 2020).

In general, while students at all levels seem to harbour positive views on academic uses and applications of social media, educators appear to be somewhat more cautious than students (Piotrowski, 2015). Academics are most likely to use social media for research and career development than to support learning and teaching activities (Chugh et al., 2021; Manca & Ranieri, 2016b). This is likely due to the fact that it can be difficult for educators to maintain best practice of pedagogy while continuously learning how to incorporate emerging technologies (Churcher et al., 2014). Existing research on the use of social media in higher education has been mostly about the effectiveness of social media as a teaching and learning tool (Manca & Ranieri, 2013, 2016b; Tess, 2013), but there has been a lack of empirical data (Mnkandla & Minnaar, 2017) and support from theory (Al-Qaysi et al., 2020).

Ngai et al. (2015) argue that the development of a theoretical framework for work in this area can be supported by a combination of both technology and educational theories. Al-Qaysi et al. (2020) found that whereas the Uses and Gratification Theory (UGT: Katz, 1959) and the social constructivism theory (Wertsch, 1985) are the most widely used educational theories in social media, the Technology Acceptance Model (TAM: Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT: Venkatesh & Davis, 2000) are the most extensively used technology theories in studying social media adoption in education.

Indeed, there is a lack of theoretically based research that could lead to a coherent set of practices regarding the use of social media use in higher education. This shortcoming of theoretical development in pedagogical approaches to the use of social media in higher education has important implications also for social media literacies. Manca et al. (2021) remind us that educators who do not integrate learning theory into their teaching practices run the risk of having a superficial understanding of the construction and development of meaning in favour of centring technology.

This review of the literature purposely focuses upon research that is theoretically grounded and examines the most recurrent models and theories adopted to support pedagogical use of social media in higher education.

2.2 Systematic reviews on social media in education

The increasing number of systematic reviews related to the use of social media in education highlights the importance of these reviews in shaping educational research, identifying future research directions, and bridging the research-practice divide (Chong et al., 2022). Scholars have adopted several approaches to systematic reviews of scientific literature: (1) qualitative synthesis (e.g., Manca, 2020; Niu, 2019); (ii) meta-analysis (also known as quantitative synthesis) (e.g., Al-Qaysi et al., 2020; Mnkandla & Minnaar, 2017); (iii) qualitative and quantitative synthesis (e.g., Greenhow & Askari, 2017; Manca & Ranieri, 2013, 2016b; Manca et al., 2021; Tang & Hew, 2017); (iv) bibliometric analysis (e.g., Barrot, 2021a; Lopes et al., 2017; Rehm et al., 2019); and most recently (v) mixed methods approach using bibliometric analysis and qualitative analysis (e.g., Barrot, 2021b).

Most recent systematic reviews have utilised bibliometrics—a quantitative analysis of the bibliographic characteristics of a growing body of literature (Lopes et al., 2017). Although there has been an increase in the use of this approach across various academic fields, the method is relatively new to educational research (Arici et al, 2019; Chen, Zhou & Xie, 2020; Gumus et al., 2018; Song et al, 2019). In the area of our interest, there has been a paucity of research that has used the bibliographic method, even in conjunction with more traditional approaches, such as qualitative ones.

In their bibliometric analyses, Lopes et al. (2017) explored the use of Facebook in educational research, used Web of Science as the database to generate 260 articles from multiples levels of screening. The study found that most articles focused on social media, student's learning, and case study research designs. It validated the versatility of Facebook as a platform for teaching and learning across different countries and disciples, however it did not study theories or models that can best examine Facebook acceptance.

In their bibliometric analysis, Rehm and colleagues (2019) focused on multiple social media platforms. Their findings showed that five out of the top 20 cited papers across all journals on instructional design and technology scholarship between 2007 and 2017 were on social media, indicating the growing interest in this topic within educational research.

Barrot (2021a) examined the scientific literature related to the use of social media for education. They found that, out of the 15 examined social media platforms, Facebook, Twitter, and YouTube attracted the greatest attention. The data also revealed that studies on Facebook (9 out of 10) stand out in terms of citation. These findings suggest a growing interest in the use of Facebook for educational purposes. The authors suggested two possible reasons for this. Firstly, as the number of social media platforms and active users increases, so too does the number of research projects that explore their pedagogical use. Secondly, the more sophisticated the platform, the more likely it is to be used for teaching and learning.

From this review, it can be seen that only a few studies so far have mapped the scientific literature of social media in higher education using a mixed method approach – more precisely, content and bibliometric analyses. To complement and extend these earlier reviews, the current systematic review mapped the scientific

literature of social media as a teaching and learning tool, giving a wider coverage to determine which theoretical frameworks can best examine the acceptance and pedagogical use of social media in higher education. Thus, the current study was undertaken to understand the landscape of scholarly work in social media as a teaching and learning tool in higher education, particularly its growth, geographical and publication distribution, speech patterns, referring to most commonly used terms or dominant terms, regarding the evolution of the term "social media", and the analysis of theories / models that are used to examine social media acceptance and adoption in higher education.

3 Rationale and research question

In this study, social media is examined from a theoretical perspective, with a focus on studies which have used theory to help explain social media integration as a teaching and learning tool in higher education. A body of literature has developed recently that links theory with the use of social media in terms of pedagogical best practice. For example, the TAM model (Davis, 1989) was utilised to examine the educational outcomes of social media use in teaching (Cao et al., 2013), whereas social constructivism theory was used to investigate the potential of Facebook and wikis as collaborative learning tools (Churcher et al., 2014). Advancing previous traditional and single method approaches to reviewing literatures, this study advances a mixed-methods approach to explore connections among research articles published between 2009 and 2021. Specifically, this study addresses the following research questions:

(1) What are the main characteristics of the scientific literature in terms of (a) year of publication, (b) publication outlets, (c) leading countries, and (d) affiliations and core authors?
(2) What are the most frequent speech patterns and research trends within the studies?
(3) What theoretical frameworks / models were employed in the studies to guide social media integration in education? And, which study aims are most commonly aligned with such frameworks / models?

4 Methods

A mixed methods approach combining quantitative (bibliometric analysis) and qualitative (content analysis) methods was used to develop a complementary picture of the research area in terms of context for trends (Plano Clark, 2010) and to triangulate findings in order that they may be mutually corroborated (Bryman, 2006). Qualitative content analysis is useful for "… the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh & Shannon, 2005; p 1278). Bibliometric analysis is a rigorous, systematic, and innovative method for analysing publication productions

and research trends (de Oliveira et al., 2019; Erfanmanesh & Abrizah, 2018). It enables the identification of relationships among different aspects of the scientific literature through the analysis of publications and documents according to specific characteristics, such as authors, journals, institutions and countries (Esen et al., 2020).

The analysed studies were sourced from ERIC and Web of Science and those published from 2009 to June 2021 were included. 2009 was the first recorded fit for the criteria of concern to this study, which is in line with recent studies that have highlighted that social media started to gain attention in 2010 (Valtonen et al., 2022). The Web of Science (WoS) was used as a search database in this study since it is the most important bibliometric database (Pranckutė, 2021), whereas ERIC on EBSCO databases was used as a subject specific database in education research (ERIC, https://eric.ed.gov/?faq).

To increase the accuracy of the current analysis, books, book chapters, and book reviews were excluded, with a focus on peer-reviewed articles, proceedings papers, and literature reviews (Leong et al., 2021).

The two databases were searched using the following search string:

(TS=(("social media" OR "social networking site" OR facebook OR twitter OR Instagram)) AND TS=(("higher education" OR "third level" OR universit* OR college OR academic*)) AND TS=((teaching OR learning OR "educational tool*"))) AND ((LA==("ENGLISH")) NOT (DT==("BOOK" OR "BOOK REVIEW" OR "BOOK CHAPTER"))*

This study methodology is based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher et al., 2009). PRISMA supports a transparent approach for systematic reviews and ensures a replicable procedure (e.g., review protocol, search strategy, article selection criteria). When considering the criteria for inclusion and exclusion of literature the emphasis was upon studies assessing the use of social media as a teaching and learning tool and not, for instance, as a marketing / communication too. In addition, studies focused on English as a second language were excluded as these are often seen as courses that provide support to leaners, rather than leading to a defined exit award per se. Table 1 presents the screening criteria.

The first screening of sourced articles ($N = 4{,}277$) involved analyses of titles and abstracts. This process resulted in 812 records. Some reasons for exclusion included:

Table 1 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Studies assessing the use of social media as a teaching and learning tool in higher education	Studies assessing the use of social media in schools or any other non-third level institutions
Undergraduate or postgraduate courses in higher education setting	Studies assessing the use of social media in English as a second language programs
Studies assessing perceptions and attitudes of students & staff of using social media as a teaching and learning tool	Studies assessing the use of social media for communications and social interaction amongst students and staff or student to student
Any social media platform. I.e., Facebook, Instagram, Twitter, blog, etc	

studies related to studying English language; use of social media for communication purposes; studies focused on cyberbullying; social media addiction; social media marketing.

The second level of screening involved checking the full paper, classifying the study in terms of sources and to identify theoretical frameworks or models—hence selecting them for the content analysis. This resulted in 772 records, which were all eligible for bibliometric analysis. The following four characteristics were most predominant: (i) studies presenting a theoretical framework / model ($n=55$), (ii) empirical studies about teaching and learning without theory ($n=221$), (iii) studies about perceptions and attitudes without theory ($n=424$), and (iv) conceptual studies ($n=72$). For the content analysis, only the 55 studies that utilised a theoretical framework / model were included (Fig. 1).
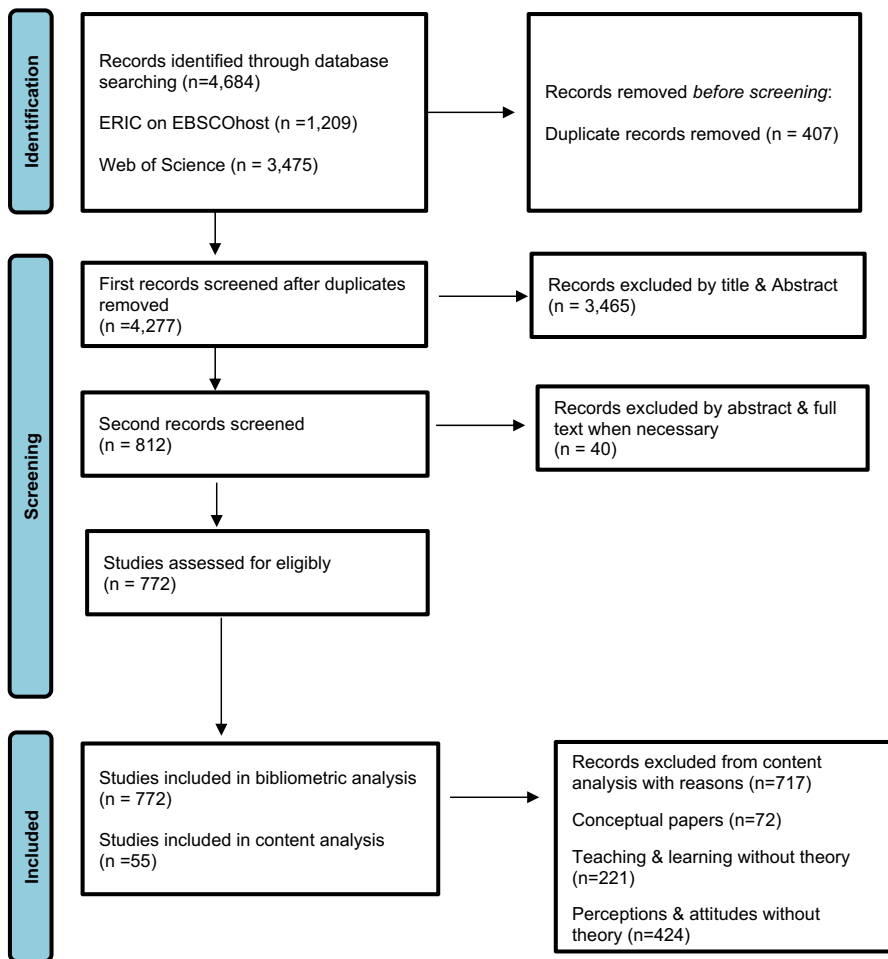

Fig. 1 The PRISMA flowchart

4.1 Procedure

Analyses commenced with bibliometric analysis of the 772 articles obtained through the second screening, identifying the main characteristics of the selected publications (year of publication, publication venues, authors, institutions, countries, and most frequent used terms).

Network visualization displaying the relationships among the main words used in abstracts were created using the VOS clustering technique (Van Eck & Waltman, 2010). VOSViewer software provides distance-based maps and identifies the clusters of co-occurring words, enabling identification of most used terms and the relationships between them (Van Raan, 2019; Waltman et al., 2010).

To display the dominant terms, full counting method has been considered (Leydesdorff & Park, 2016). Thus, each publication has the overall weight equal to Ni (Ni being the total number of terms in the "i"-publication) and each term has a weight of 1. The size of the circle and the label in the map is associated with the weight of a term. In general, the stronger the relationship between two terms, the closer they are located on the map. We have considered the "total link strength attribute", which indicates the total strength of a term's links with other terms (Gutiérrez-Salcedo et al., 2018). Whilst curved lines on the maps represent the links between terms, colours are used to indicate the cluster to which each term belongs.

Finally, the evolution of "social media" and other main terms used in abstracts were analysed and presented with the overlay visualization in Vosviewer (terms are coloured based on their year of publication). We used the *viridis* colour scheme obtained from Matplotlib, where by default, colours range from blue-green to yellow scheme.

For the second analytic component of the study, qualitative content analysis methods were applied to the 55 studies resulting from the second screening. The objectives were to gain an in-depth understanding of the theories/models employed in the studies and to identify the main research aims linked to the employed theories/models. Content analysis was based on a number of categories which were adapted from Manca and Ranieri (2013) and derived from analysis by author 1 and author 2. This process resulted in the following categories: (i) attitudes of social media as learning tool (studies which main aim was to investigate students' or instructors' attitudes towards the use of social media); (ii) social media as a supportive learning tool (studies that supported active collaborative learning, student engagement, effective communication, enhancing group task performance); (iii) efficacy of social media as learning tool (studies that focused on the impact of social media on different aspects of teaching and learning, such as: community building and informal learning). For the purpose of ensuring a level of reliability, an iterative process of analysis was carried by author 1 and author 2, and the individually derived codes were double-checked by comparing results. Once the set of codes had been recognised, dataset coding reliability was calculated (Cohen's k = 0.85). The disagreement was resolved with discussion and subsequent consensus.

5 Results

5.1 Study characteristics

Figure 2 provides the time evolution of the annual scientific production for the period analysed. The number of publications shows an upward trend until 2018, with two relatively higher values in 2015 and 2018. A slight decline is observed from 2019 onwards. The sharp drop during 2021 is due to the fact that the study covered the period between January and June of that year. We have applied a segmented linear regression (Liu et al., 1997), with two break points, in 2015 and 2018 (Liu & Qian, 2009). The segmented least squares forecast for the year 2021, provides an estimated annual value of 74 publications with a high reliability ($R^2 = 0.94$).

Table 2 shows the number of publications by journal (conferences proceedings were not included). This represents the distribution of the journals with a production of seven or more records involving 91 publications (11.7% of the corpus). It was found that *Computers & Education* and *Education and Information Technologies* have published the most articles on social media as a teaching and learning tool, with a total of 18 articles each. The *Australasian Journal of Educational Technology*, *Computers in Human Behaviour*, and *Internet and Higher Education* had 13, 12, and 9 related articles, respectively.

The scholars who published the most articles are presented in Table 3. Overall, the data set containing the 772 articles comprises a total of 2,754 authors. For the purpose of this particular set of analyses, details about professional profile and number of publications are focused on journals only. The average number of co-authors was 3.56. Therefore, authors with more than four relevant published articles were
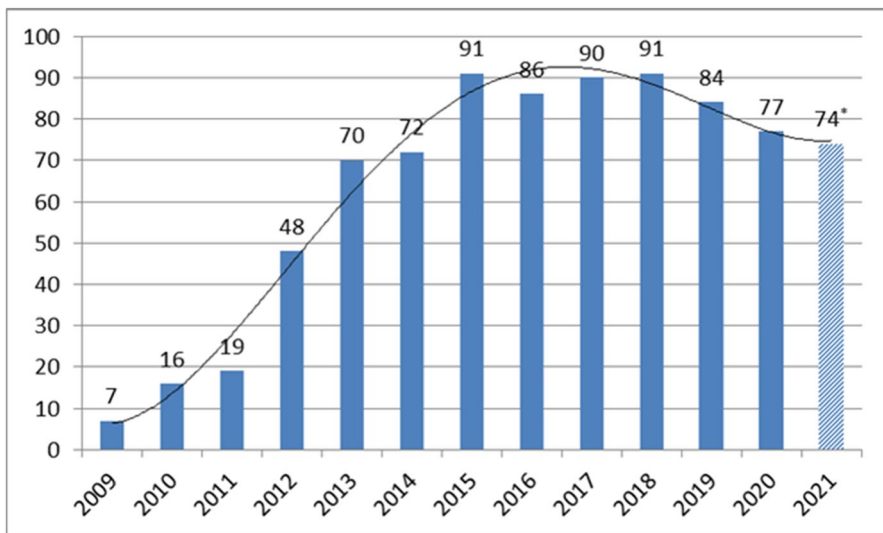

Fig. 2 Number of papers on social media as a teaching and learning tool (2009–2021). *estimated value in 2021

Table 2 Popular publication venues	Journal	No of Publications
	Computers & Education	18
	Education and Information Technologies	18
	Australasian Journal of Educational Technology	13
	Computers in Human Behaviour	12
	Internet and Higher Education	9
	British Journal of Educational Technology	7
	International Review of Research in Open and Distributed Learning	7
	Sustainability	7

considered core authors in the aforementioned field. The list is a combination of nine leading and emerging scholars from wide geographical areas. As shown, three scholars are from universities in Malaysia, three from Romania, one from Hong Kong, one from Italy, and one from South Africa. The disciplinary areas of the core authors represent a variety of disciplines, with many of these related to the education and technological fields.

5.2 Dominant terms and research trends

The final part of the bibliometric analysed the most frequently represented words in abstracts to identify most used terms and research trends (Han & Ellis, 2019; Leung et al., 2017). Firstly, the empty words (e.g., connectors, conjunctions, prepositions, articles, adjectives) were omitted. Secondly, words whose frequency was less than 20 occurrences in abstracts were considered not relevant to the research and were excluded. Synonyms and acronyms were associated. Finally, 305 terms with the largest levels of occurrence in the abstracts were included in the analysis from a total of 22,079 words. The analysis of these terms is illustrated in Fig. 3 and Fig. 4 by means of five clusters, each represented by a different colour. The distribution of the number of keywords by year of publication is presented in Fig. 4.

The word *student* was the most commonly used word in the abstracts ($n=2,156$), followed by *social media* ($n=1,077$), *use* ($n=1,043$), *Facebook* ($n=858$), and *learning* ($n=667$) (see Table 6 in Appendix A for terms with more than 120 occurrences). These results indicate that the articles mostly focused on Facebook use as a social media for learning. Furthermore, the platforms that attracted the greatest attention were Facebook ($n=858$) and Twitter ($n=274$). Figure 3 shows the most used word in abstract. As can be seen, the high impact term "student" presents strong connections with use, social media, learning, technology, tool, social network, group, Facebook, and Twitter. Five clusters of terms were discovered as part of the visualization. Each cluster was constituted from a set of terms that are clearly delimited by their location in the map. These clusters reveal the presence of five thematic strands in the literature that focus on: (i) "student-education-platform-process-communication"

Table 3 Core authors of research on the use of social media as a teaching & learning tool

| Author	Affiliation	Disciplinary area	Country	Publications
Al-Rahmi, W. M	Universiti Teknologi Malaysia	Social Sciences & Humanities	Malaysia	8
Manca, S	Italian National Research Council	Educational technology	Italy	8
Roceanu, I	"Carol I" National Defence University	Information & communication technology	Romania	6
Balakrishnan, V	University of Malaya	Computer engineering	Malaysia	5
Kwan, R	Caritas Institute of Higher Education	Computer science	Hong Kong	5
Beligan, D	"Carol I" National Defence University	Advanced distributed learning	Romania	4
Ciolan, L	University of Bucharest	Educational policy and research	Romania	4
Moghavvemi, S	University of Malaya	Operation and management information systems	Malaysia	4
Rambe P	Central University of Technology	Management science	South Africa	4
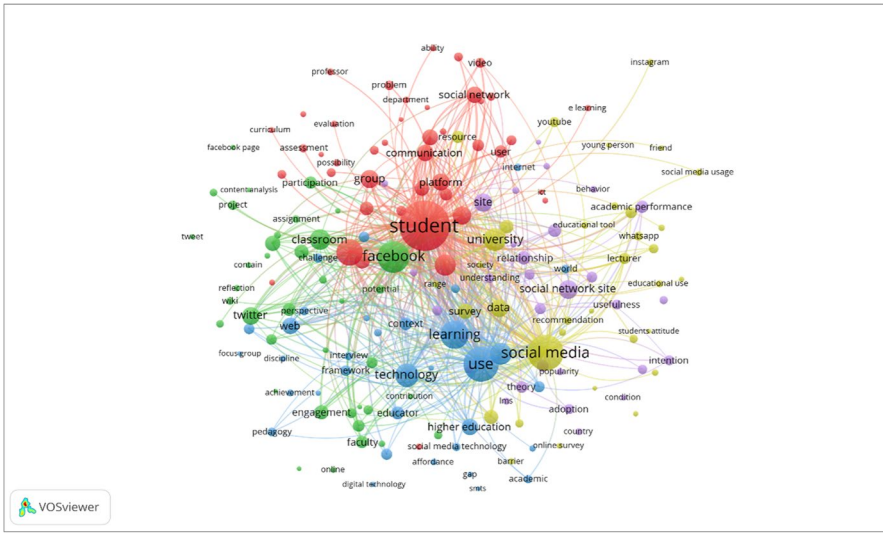
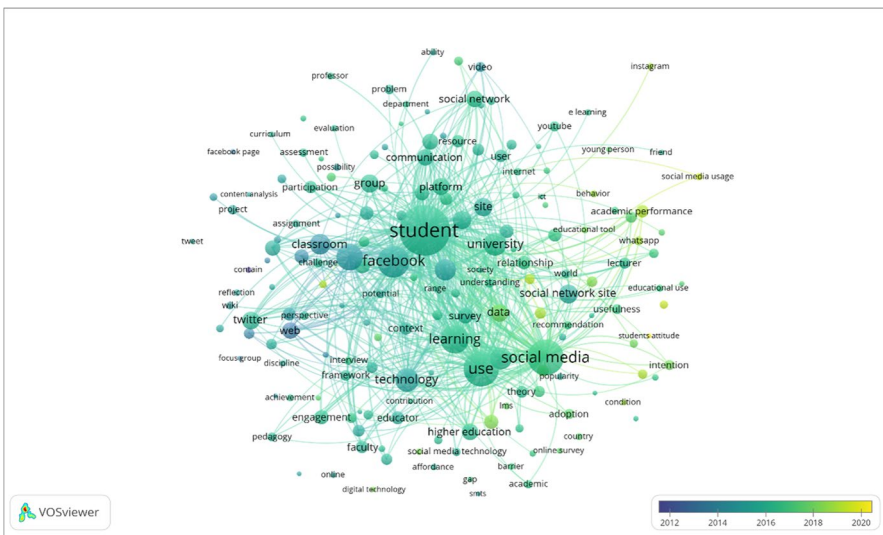**Fig. 3** Most used words found in abstracts

Fig. 4 Evolution over time of terms in abstracts

(colour red); (ii) "Facebook-Twitter-participation-interaction" (green); (iii) "Learning-Use-Technology" (blue); (iv) "social media-university-social media use-social media platform-educational use" (yellow); and (v) "academic attitude-performance-intention-usefulness-satisfaction" (purple).

When the distribution of these words is shown on a year-by-year basis (Fig. 4), it is revealed that studies focused on the study of Facebook page, Facebook use,

informal learning, and peripheral terms such as blog, community, video, or web, is located in the initial years under study. High impact terms such as Facebook, student, learning, use, education, or social network are published on average in studies between 2014 and 2016. The term "social media" is introduced from 2016, in papers between 2017–2018, linking it to terms such as "data", "educational use", and "educational tool". From 2018 onwards, the focus of the studies is towards "attitudes", "influence", "intention", "performance", or "satisfaction".

Four research trends are identifiable throughout the period of study (Table 4). From 2010–2014, studies were mainly focused on Facebook as a community of practice, blog, and for informal learning. From 2014–2016, Facebook was still relevant, but studies had more emphasis on the educational learning process of the use of Facebook by students. During the period of 2016–2018, the term "social media" peaked and studies were focused on social media for education and as an educational tool. From 2018 onwards, the focus of the studies was towards "attitudes", "influence", "intention", "performance", or "satisfaction".

5.3 Theoretical frameworks/models

The findings show that only 55 studies out of 772 cited a theoretical framework or model, this is only 7% of total number of studies. Content analysis was used to analyse more in-depth information about the 55 selected papers. A total of 16 frameworks/models were identified. They were grouped into six categories of similarity. These are shown in Table 5 in relation to the number of citing studies per category. The number of citing studies is higher than the sample size ($n=55$) because there are some studies that uses more than one framework/model. The most cited theoretical framework/model was technology acceptance models which were cited in 41 studies. This is followed by learning theories cited in 11 studies. Social capital theory/innovation diffusion theory is cited in 5 studies; uses and gratification theory/social gratification theory cited in 3 studies; lastly, Information systems success model/communication theory and theory of reasoned action/theory of planned behaviour are only cited in 2 studies, respectively.

Figure 5 shows the use of the main framework(s)/model(s) categories from 2013 to 2021. Figure 5 highlights that studies began citing theory in 2013, with further significant increases identifiable in 2017 and 2020. It also indicates that technology acceptance theories are predominantly the most employed theories in all years, 2020 having the highest publications.

The 55 studies were further analysed by study aims which were categorised using the following classification: (1) attitudes of social media as learning tool ($n=32$); (2) social media as a supportive learning tool ($n=16$); (3) efficacy of social media as learning tool ($n=7$). The study aims over time are revealed in Fig. 6. The results indicate that publications with the aim of investigating attitudes of social media as a learning tool are the most common with 2017 being the most popular year of publication.

Finally, to represent the empirical relationships among the aims and the theoretical frameworks/models, a word co-occurrence analysis providing a similarity matrix

Table 4 Research trends

2010–2014	2014–2016	2016–2018	2018–2021
Dominance of Facebook	Educational learning processes	Social media in education	Attitudes & satisfaction
Facebook page, Facebook use, informal learning, blog, community, video, web	Facebook, student, learning, use, education, social network	Social media, data, educational use and educational tool	Attitudes, influence, intention, performance satisfaction

Table 5 Top cited theoretical frameworks/models

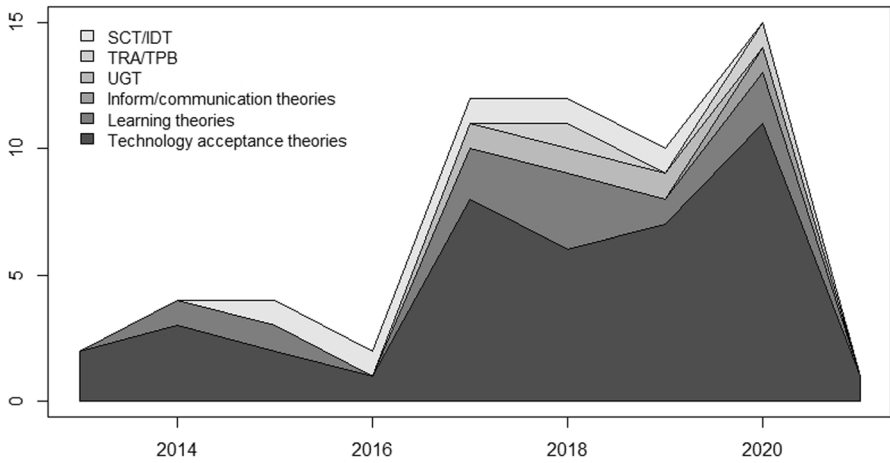| Categories	Theoretical frameworks/model	# of citing studies	Citing publications
Technology acceptance theories	TAM, UAUT, E-learning acceptance, Social media acceptance	41	Adetimirin and Ayoola (2020), Akbari et al. (2016), Akman & Turhan, (2017), Alamri et al. (2020a), Alamri et al. (2020b), Alenazy et al. (2019), Ali and Ali (2018), Al-Maatouk et al.(2020), Al-Rahmi et al. (2018), Al-Sharafi et al. (2019), Alyoussef (2020), Amadu et al. (2018), Arquero et al. (2013), Awotunde et al. (2019), Balakrishnan (2014), Balakrishnan (2017), Bamansoor et al. (2018), Bozanta and Mardikyan (2017), Cao et al. (2013), Chaka and Govender (2020), Chintalapati and Daruri (2017), Durak (2019), Escobar-Rodriguez et al. (2014), Esteve Del Valle et al. (2017), Habes et al. (2019), Khechine et al. (2020), Labib and Mostafa (2015), Lee and Lee (2019), Leong et al. (2018), Mady and Baadel (2020), Manesis and Papavenetiou (2019), McCarthy and McCarthy (2014), Moorthy et al. (2019), Murire and Cilliers (2017), Ng et al. (2017), Odewumi et al. (2018), Rahman et al. (2021), Raza et al. (2015), Salarzadeh Jena-tabadi et al. (2017), Salloum et al. (2019), Seedat et al. (2019)
Learning theories	Constructivism theory/Vygotsky's social development and learning/collaborative learning/social learning theory/connectivism	11	Akbari et al. (2016), Alamri et al. (2020a), Alamri et al. (2020b), Al-Rahmi et al. (2018), Al-Rahmi et al. (2015), Balakrishnan (2014), Basitere & Mapatagane, (2018), Bozanta and Mardikyan (2017), Churcher et al. (2014), Huang (2018), Qi (2017), Yu et al. (2010)
SCT/IDT	Social capital theory/innovation diffusion theory	5	Durak (2017),Fauzi et al. (2018), Huda et al. (2016), Koranteng et al. (2019), Raza et al. (2015)
UGT	Uses and gratification theory/social gratification theory	3	Abbas et al. (2019), Durak (2017), Gruzd et al. (2018)
Information/communication theories	Information systems success model/communication theory	2	Alalwan et al. (2019), Chaka and Govender (2020)
TRA/TPB	Theory of reasoned action/theory of planned behaviour	2	Fauzi et al. (2018), Jones (2020)

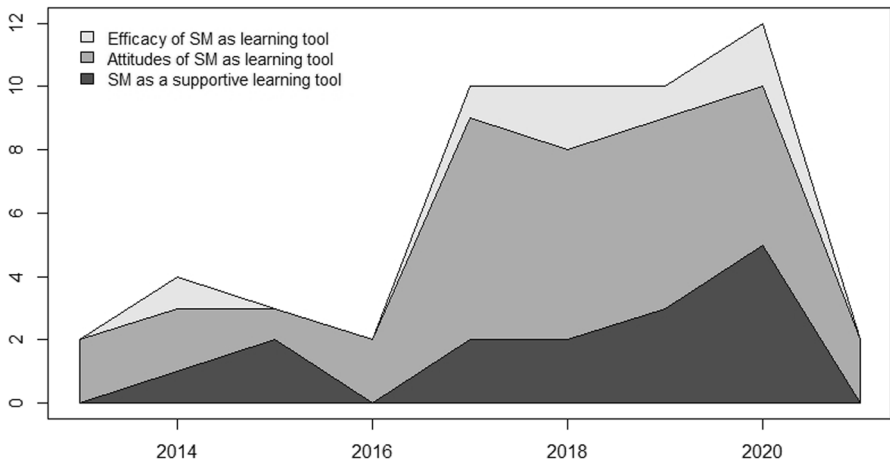**Fig. 5** Theoretical frameworks/models over time

Fig. 6 Research aims over time

was carried out (Hu et al., 2013). A measure of similarity is obtained by counting the co-occurrences (Yang et al., 2012), which makes it possible to represent the relationships (conceptual clustering) that exist among the aims and frameworks/models (Chen et al., 2019). Direct lines represent connections between the theoretical frameworks/models. Figure 7 indicates that the strongest relationship is presented by studies with the aim to explore attitudes of social media as learning tool by integrating a technology acceptance model. This is followed by information and communication theories being used to explain the efficacy of social media as learning tool. Learning theories are mostly related to studies that are aimed at exploring social media as a supportive learning tool.
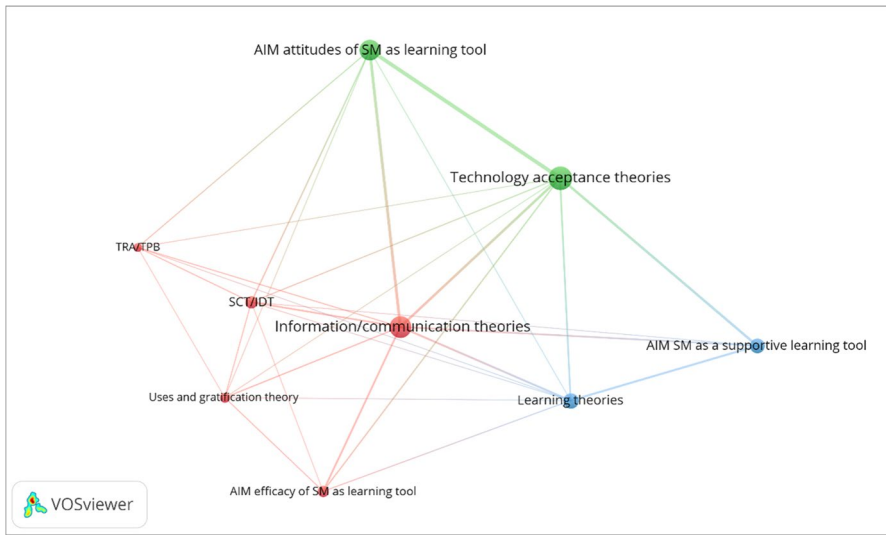
Fig. 7 Research aims & theoretical frameworks/models network

6 Discussion

The current study has mapped the scientific literature regarding the use of social media in higher education teaching and learning (2009 to 2021). The central aim was to document research trends, dominant terms, and the main characteristics of studies, with a focus on providing a new perspective on the theoretical groundings that may explain the pedagogical integration of social media within higher education teaching and learning.

These results extend the findings of other systematic literature reviews regarding social media use in education-conducted on single or multiple platforms (Lopes et al., 2017; Manca, 2020; Tang & Hew, 2017)-and across various disciplinary fields (Barrot, 2021a; Rehm et al., 2019). The main finding indicates a shift from studies focused on Facebook, as the most researched social media platform and its use by students for informal learning, to a more recent trend from 2018 onwards showing studies still focused on attitudes, intentions, and satisfaction of social media as a teaching and learning tool. This is aligned with results from the content analysis which showed that only a minority of studies report the use of theory, and those that do report research aims based on the investigation of attitudes towards social media as a learning tool by integrating a technology acceptance model.

The following sections discuss the three research questions of this study in relation to results concerning both the use of social media as a teaching and learning tool and its pedagogical integration.

6.1 Characteristics of the scientific literature

Overall, the data show a constant growing trend in the number of publications concerned with social media use in teaching and learning, with an increase in two different years (2015 and 2018). This trend confirms a growing interest in the research community regarding the use of social media as a teaching and learning tool (Bodily et al., 2019; Valtonen et al., 2022). One of the reasons for the rapid growth of research in this field may be related to the relevance of social media platforms in students' daily lives. We anticipate that further studies will be conducted as new social media uses and applications increases. For example, since its launch in 2017, TikTok has become the fastest growing social media platform worldwide, reaching nearly 83 million monthly active users as of February 2021 (Statista, 2021). From an educational perspective, TikTok has proven to be an effective pedagogical tool in corporal expression courses (Escamilla-Fajardo et al., 2021) and for political participation and civic engagement (Literat & Kligler-Vilenchik, 2021).

In terms of publication venues, *Computers & Education*, which is an international peer reviewed journal and one of the most prominent journals on the use of technology in education (Arici et al., 2019), has published the highest number of papers. The majority of the publications are also international, implying that educational research in social media is pedagogically used in local, regional, or international learning contexts (Barrot, 2021a).

Geographically, results showed widespread interest across different countries, with more than half of the studies conducted outside of Europe. Whilst Barrot (2021a) has reported that the US was by far the leading country in this field, Manca (2020) found that most of the research was from the Middle East.

6.2 Dominant terms and research trends

Based on the clusters of terms identified from the analysis of the most used words in abstracts, the platforms that attracted the greatest attention were Facebook and Twitter. In her review, Barrot (2021a) also found that these platforms were the most popular, and suggested that Facebook and Twitter are more likely to be used for teaching and learning as they offer multiple affordances when compared to other less developed/newer platforms.

While the phenomenon of social media remains relatively new to academia research, it has grown in popularity throughout the analysed period. In the initial years, the literature showed evidence of research on the use of social media for informal learning (e.g., Forkosh-Baruch & Hershkovitz, 2012) through Facebook (e.g., Hew, 2011), and blogs (e.g., Zinger & Sinclair, 2013).

In our corpus of literature, the term "social media" starts to flourish from 2016. Many studies with a focus on the use of social media as an educational tool started to be published in that timeframe (e.g., Balakrishnan, 2017; Manca & Ranieri, 2016a, 2016b; Sobaih et al., 2016). From 2018 to 2021, research trends were more focused on studies about attitudes and satisfaction, confirming trends from earlier studies on attitudes regarding Facebook (e.g., Manca & Ranieri, 2013, 2016a, 2016b). Manca

and Ranieri (2016c) argued that whilst there was a favourable attitude towards social media use for education, many academics would express a preference for using social media for personal and professional use, rather than for teaching and learning purposes.

6.3 Theoretical frameworks/models and study aims

The third research question examined the studies which had included a theoretical framework/model to explain the integration of social media in learning and teaching. The findings show that only 55 studies out of 772 cited a theoretical framework or model. This result demonstrates a general lack of theoretically based research. This concurs with the findings of Manca et al. (2021) who concluded that studies that do not integrate learning theory run the risk of superficial understanding of the pedagogical advantages of social media for learning and teaching.

Our findings show that 16 theoretical frameworks/models guided the 55 studies, with the technology acceptance models being the most frequently used. These theoretical frameworks/models were present in 41 studies. Thus, with the overwhelming presence of technology acceptance models, future research should endeavour to adopt other theoretical frameworks/models to verify the results obtained from TAM and its variants. For example, Al-Qaysi et al. (2020) argued that the development of a theoretical framework that can best examine the integration of social media for learning and teaching can be justified by the use of the uses and gratification theory (Katz, 1959) and the social constructivism theory (Wertsch, 1985). Furthermore, the use of social media for teaching and learning should be a pedagogical decision and not a technology one (Everson et al., 2013). Considering that educational technology research to date has aimed to understand the integration of, and factors affecting, technology use, mainly by employing theories from psychology and information systems, it was found in a recent study by Valtonen et al. (2022) that the largest amount of educational research targeted how technology can support learning processes based on different learning theories. This is in contrast with our findings which have shown that technology acceptance theories are the most studied frameworks/models in social media for teaching and learning. The reason for this contradiction is that Valtonen et al.'s (2022) review identified studies with an educational technology focus and not on social media specifically. Indeed, technology research's history is long, rich and broad (Weller, 2020). However, this indicates that the use of socially oriented theories of learning and constructionist tradition within various technology-enhanced contexts and environments is the most common fit to understand technology integration.

Aligned with our findings is the work of Ngai et al. (2015) and of Chintalapati and Daruri (2017) who declared that the Technology Acceptance Model (TAM) is widely used in social media research to explain the acceptance of social media and to measure the factors that influence its adoption.

Our findings also show that the second most employed theoretical framework/models were those related to learning theories. In particular, social constructivism theory was the second most cited approach. These publications peaked from

2017, indicating that the use of learning theories is still in its infancy. Greenhow and Askari (2017), who assessed the state of social media research in education, found that the major gap in studies was concerned with the link to concrete measures of learning. This finding aligns with an earlier review study that noted increasing interest for social media use, but insufficient empirical support for claims that such technology can be an effective learning tool (Tess, 2013). Reflecting on these findings, Greenhow et al. (2019) suggested that research should focus on practices, outcomes, and learning across different contexts.

As social media is an emerging technology, it is important to continually understand attitudes towards it. Hence, it is not surprising that most of the studies in our analysis were designed to investigate the perceptions and attitudes of students and academics towards the use of social media as a learning and teaching tool. In theory, this is best explained by using an information systems theory such as the TAM (Ngai et al., 2015). However, this does not explain best practice when introducing social media as a learning and teaching tool. Many studies in the analysis which cited learning theories used TAM with social constructivism theory to examine collaborative learning and engagement through social media use (Alalwan et al., 2019; Alamri et al., 2020b; Al-Rahmi, et al., 2018).

Since Technology acceptance theories are designed to examine teachers' and students' readiness to incorporate social media into teaching and learning practices, it is not surprising that they are aligned with attitudes towards social media as a teaching and learning tool. However, it appears that academic research has not much progressed in terms of providing better theoretical strength to pedagogical models and teaching practices.

The second most commonly found research aim in the studies was related to active collaborative learning, student engagement, effective communication and enhancing group performance. This research aim was supported by learning theories. For example, Yu et al. (2010) investigated student engagement on Facebook from a pedagogical standpoint based on social learning theory. Al-Rahmi et al. (2015) explored the factors that contribute to the enhancement of collaborative learning and engagement through social media based on the theory of social constructivist learning. This is in line with Churcher et al. (2014) study who argued that using social constructivist theory has the ability to develop a community of practice, and maximize learning potential.

Lastly, only 7 studies focused on the efficacy of social media as a learning tool which are supported by information and communication theories. For example, Chaka and Govender (2020) tested the implementation of mobile learning using Facebook as a medium of communication using a combination of the unified theory of acceptance and use of technology (UTAUT) model, Information Systems (IS) success model and the educational use of Facebook theory. Al-Rahmi et al. (2018) investigated the use of social media to encourage sharing knowledge, information, and discussion based on constructivism theory, technology acceptance model, and communication theory.

7 Conclusion and implications

The purpose of this study was twofold. First, we aimed to reveal research trends and most commonly used terms of social media for teaching and learning in higher education. The journals that published the most related papers, core scholars working on this field, and the countries in which the related research was based by employing a bibliometric analysis of the research. This analysis suggested that this research field is growing rapidly and evolving. This may be explained by the fact that social media have revolutionized the life of many people and thus attracting much attention.

Second, we employed content analysis to provide a new perspective on the theoretical groundings of the articles in the field. The results showed a lack of theoretical based research in this field, with some evidence of technology acceptance models and learning models as key theories that best explains the integration of social media as a teaching and learning tool.

Although the current study has provided useful insights regarding social media use in teaching and learning, some limitations need to be acknowledged. First, this study was not intended to report, discuss and analyse the findings of each study included in this review. Instead, it aimed to provide some numerical evidence that show the evolving research trends of social media for teaching and learning, as well as the frameworks/models studied and purpose of those focal studies. Second, this study analyses only the articles indexed in the WoS and ERIC database. Therefore, future studies could include articles from Scopus database, book chapters, book reviews, or other publications outside the chosen database. Thirdly, social media research is in its early stages, therefore new studies will continue to surface and continued proliferation of new social media technologies (Ngai et al., 2015). More recent social media in education research should be considered in future studies. Finally, future research could explore other research perspectives like research methods and contexts/disciplines.

This paper provides a new perspective on the theoretical groundings in the field of social media as a teaching and learning tool. Several implications can be drawn from this. Firstly, most studies are focused on investigating students and/or instructors' attitudes towards the use of social media by integrating technology acceptance models. Future studies should focus on "best practice" for integrating social media into pedagogy, tied to student learning outcomes by integrating learning theories. Such studies may also help shape future research on social media integration in formal education, resulting potentially in solutions to educational problems rather than technological ones. Secondly, it was noted that studies employing technology acceptance models may be overwhelming the greater body of literate at present, and therefore any future research should look at post-acceptance studies, such as the impact of usage on learning and/or issues relating to it (such as privacy, security, and trust) (Manca & Ranieri, 2016b). Finally, this study provided a review of the research landscape on the use of social media as a teaching and learning tool which can be used as a baseline in further advancing the field towards its full maturity.

As interest among scholars increases in using social media for teaching and learning, questions to consider for further research include the following: Can

social media that are designed commercial purposes support learners in an educational environment? What does the adoption of social media mean from a theoretical perspective? In this regard, future work should address the pedagogical practices which are suitable for use with social media based on sound theoretical groundings.

Appendix A

Table 6 Terms with the highest frequency in abstracts

Terms with the highest frequency	N	Terms with the highest frequency	N
student	2156	process	223
social media	1077	interaction	201
use	1043	approach	198
Facebook	858	survey	195
learning	667	knowledge	189
tool	606	community	172
technology	476	perception	170
university	444	engagement	169
teaching	396	relationship	165
education	379	environment	159
classroom	359	application	155
SNS	312	context	151
teacher	284	questionnaire	150
group	280	educator	146
site	278	instructor	145
twitter	274	faculty	136
data	269	skill	132
platform	245	user	132
web	238	participation	130
social network	237	academic performance	128
communication	235	resource	128
higher education	226	learner	121
social network	226	*Total*	14,834/22079

Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of Interest The authors declare that there is no conflict of interest.

References

*References masked with an asterisk indicate studies included in the content analysis of this review

*Abbas, J., Aman, J., Nurunnabi, M., & Bano, S. (2019). The impact of social media on learning behavior for sustainable education: Evidence of students from selected universities in Pakistan. *Sustainability, 11*(6), 1683.

*Adetimirin, A. E., & Ayoola, J. (2020). Perception of social media use by distance learners in Nigeria. *International Journal of Online Pedagogy and Course Design, 10*(2), 37–47.

*Akbari, E., Naderi, A., Simons, M. H. Y. R. J., & Pilot, A. (2016). Accepting social networks in learning and teaching. In *11th International Conference on e-Learning* (p. 167).

*Akman, I., & Turhan, C. (2017). User acceptance of social learning systems in higher education: An application of the extended Technology Acceptance Model. *Innovations in Education and Teaching International, 54*(3), 229–237.

*Alalwan, N., Al-Rahmi, W. M., Alfarraj, O., Alzahrani, A., Yahaya, N., & Al-Rahmi, A. M. (2019). Integrated three theories to develop a model of factors affecting students' academic performance in higher education. *IEEE Access, 7*, 98725–98742.

*Alamri, M. M., Almaiah, M. A., & Al-Rahmi, W. M. (2020a). Social media applications affecting students' academic performance: A model developed for sustainability in higher education. *Sustainability, 12*(16), 6471.

*Alamri, M. M., Almaiah, M. A., & Al-Rahmi, W. M. (2020b). The role of compatibility and task-technology fit (TTF): On social networking applications (SNAs) usage as sustainability in higher education. *IEEE Access, 8*, 161668–161681.

*Alenazy, W. M., Al-Rahmi, W. M., & Khan, M. S. (2019). Validation of TAM model on social media use for collaborative learning to enhance collaborative authoring. *IEEE Access, 7*, 71550–71562.

*Ali, S. M., & Ali, A. Z. M. (2018). Student's acceptance towards video sharing site for education purpose. *Advanced Science Letters, 24*(7), 5101–5104.

*Al-Maatouk, Q., Othman, M. S., Aldraiweesh, A., Alturki, U., Al-Rahmi, W. M., & Aljeraiwi, A. A. (2020). Task-technology fit and technology acceptance model application to structure and evaluate the adoption of social media in academia. *IEEE Access, 8*, 78427–78440.

Al-Qaysi, N., Mohamad-Nordin, N., & Al-Emran, M. (2020). A systematic review of social media acceptance from the perspective of educational and information systems theories and models. *Journal of Educational Computing Research, 57*(8), 2085–2109.

*Al-Rahmi, W. M., Alias, N., Othman, M. S., Marin, V. I., & Tur, G. (2018). A model of factors affecting learning performance through the use of social media in Malaysian higher education. *Computers & Education, 121*, 59–72.

*Al-Rahmi, W. M., Othman, M. S., & Yusuf, L. M. (2015). The effect of social media on researchers' academic performance through collaborative learning in Malaysian higher education. *Mediterranean Journal of Social Sciences, 6*(4), 193–193.

Alshalawi, A. S. (2022). The adoption of social media applications for teaching purposes in higher education. *Teachers and Teaching*, 1–20. https://doi.org/10.1080/13540602.2022.2062712

*Al-Sharafi, M. A., Mufadhal, M. E., Arshah, R. A., & Sahabudin, N. A. (2019). Acceptance of online social networks as technology-based education tools among higher institution students: Structural equation modeling approach. *Scientia Iranica*, 26 (Special Issue on: Socio-Cognitive Engineering), 136–144.

*AlYoussef, I. (2020). An empirical investigation on students' acceptance of (SM) use for teaching and learning. *International Journal of Emerging Technologies in Learning, 15*(4), 158–178.

*Amadu, L., Muhammad, S. S., Mohammed, A. S., Owusu, G., & Lukman, S. (2018). Using technology acceptance model to measure the ese of social media for collaborative learning in Ghana. *Journal of Technology and Science Education, 8*(4), 321–336.

Arici, F., Yildirim, P., Caliklar, S., & Yilmaz, R. M. (2019). Research trends in the use of augmented reality in science education: Content and bibliometric mapping analysis. *Computers & Education, 142*, 103647.

*Arquero, J. L., Del Barrio, S., & Romero-Frías, E. (2013). Need for cognition as moderating variable in the technology acceptance of web 2.0 tools for educational purposes. In *ICERI2013 Proceedings* (pp. 301–311). IATED.

Aubrey, K., & Riley, A. (2016). *Understanding and using educational theories* (2nd ed.). Sage Publications Ltd.

*Awotunde, J. B., Ogundokun, R. O., Ayo, F. E., Ajamu, G. J., Adeniyi, E. A., & Ogundokun, E. O. (2019). Social media acceptance and use among university students for learning purpose using UTAUT model. In *International conference on information systems architecture and technology* (pp. 91–102). Springer, Cham.

*Balakrishnan, V. (2014). Learning can be fun–exploring the intention to use social media among university students. In *Proceedings of INTCESS14-International Conference on Education and Social Sciences* (pp. 157–164).

*Balakrishnan, V. (2017). Key determinants for intention to use social media for learning in higher education institutions. *Universal Access in the Information Society, 16*(2), 289–301.

*Bamansoor, S., Alhazmi, A. K., & Saany, S. I. A. (2018). The adoption of social learning systems in higher education: extended TAM. In *2018 International Conference on Smart Computing and Electronic Enterprise (ICSCEE)* (pp. 1–7). IEEE.

Barrot, J. S. (2018). Facebook as a learning environment for language teaching and learning: A critical analysis of the literature from 2010 to 2017. *Journal of Computer Assisted Learning, 34*(6), 863–875.

Barrot, J. S. (2021a). Scientific mapping of social media in education: A decade of exponential growth. *Journal of Educational Computing Research, 59*(4), 645–668.

Barrot, J. S. (2021b). Social media as a language learning environment: A systematic review of the literature (2008–2019). *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2021.1883673

Basitere, M., & Mapatagane, N. (2018). Effects of a Social Media Network Site on Student's Engagement and Collaboration: A case study of WhatsApp at a University of Technology. In ECSM 2018 5th European conference on social media.

Bodily, R., Leary, H., & West, R. E. (2019). Research trends in instructional design and technology journals. *British Journal of Educational Technology, 50*(1), 64–79.

*Bozanta, A., & Mardikyan, S. (2017). The effects of social media use on collaborative learning: A case of Turkey. *Turkish Online Journal of Distance Education, 18*(1), 96–110.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research, 6*(1), 97–113.

Camas Garrido, L., Valero Moya, A., & VendrellMorancho, M. (2021). The teacher-student relationship in the use of social network sites for educational purposes: A systematic review. *Journal of New Approaches in Educational Research, 10*(1), 137–156.

*Cao, Y., Ajjan, H., & Hong, P. (2013). Using social media applications for educational outcomes in college teaching: A structural equation analysis. *British Journal of Educational Technology, 44*(4), 581–593.

*Chaka, J. G., & Govender, I. (2020). Implementation of mobile learning using a social network platform: Facebook. *Problems of Education in the 21st Century, 78*(1), 24.

Chen, X., Li, J., Sun, X., & Wu, D. (2019). Early identification of intellectual structure based on co-word analysis from research grants. *Scientometrics, 121*(1), 349–369.

Chen, X., Zhou, D., & Xie, H. (2020). Fifty years of British Journal of Educational Technology: A topic modeling based bibliometric perspective. *British Journal of Educational Technology, 51*(3), 692–708.

*Chintalapati, N., & Daruri, V. S. K. (2017). Examining the use of YouTube as a Learning Resource in higher education: Scale development and validation of TAM model. *Telematics and Informatics, 34*(6), 853–860.

Chong, S. W., Lin, T. J., & Chen, Y. (2022). A methodological review of systematic literature reviews in higher education: Heterogeneity and homogeneity. *Educational Research Review, 35*, 100426.

Chugh, R., & Ruhi, S. (2018). Social media in higher education: A literature review of Facebook. *Education and Information Technologies, 23*, 605–616.

Chugh, R., Grose, R., & Macht, S. (2021). Social media usage by higher education academics: A scoping review of the literature. *Education and Information Technologies, 26*(1), 983–999.

*Churcher, K., Downs, E., & Tewksbury, D. (2014). "Friending" Vygotsky: A social constructivist pedagogy of knowledge building through classroom social media use. *Journal of Effective Teaching, 14*(1), 33–50.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.

de Oliveira, O. J., da Silva, F. F., Juliani, F., Barbosa, LCFM., & Nunhes, T. V. (2019). Bibliometric method for mapping the state-of-the-art and identifying research gaps and trends in literature: An essential instrument to support the development of scientific projects. In S. Kunosic & E. Zerem (Eds.), *Scientometrics recent advances*. IntechOpen. https://doi.org/10.5772/intechopen.8585

Dron, J., & Anderson, T. (2014). *Teaching crowds: Learning and social media*. Athabasca University Press.

*Durak, G. (2017). Using social learning networks (SLNs) in higher education: Edmodo through the lenses of academics. *International Review of Research in Open and Distributed Learning, 18*(1), 84–109.

*Durak, H. Y. (2019). Examining the acceptance and use of online social networks by preservice teachers within the context of unified theory of acceptance and use of technology model. *Journal of Computing in Higher Education, 31*(1), 173–209.

Eid, M. I., & Al-Jabri, I. M. (2016). Social networking, knowledge sharing, and student learning: The case of university students. *Computers & Education, 99*, 14–27.

Erfanmanesh, M., & Abrizah, A. (2018). Mapping worldwide research on the Internet of Things during 2011–2016. *The Electronic Library, 36*(6), 979–992.

Education Resources Information Center. (n.d.). ERIC FAQ - General . Eric FAQ - general. Retrieved January 14, 2022, from https://eric.ed.gov/?faq

Escamilla-Fajardo, P., Alguacil, M., & López-Carril, S. (2021). Incorporating TikTok in higher education: Pedagogical perspectives from a corporal expression sport sciences course. *Journal of Hospitality, Leisure, Sport & Tourism Education, 28*, 100302.

*Escobar-Rodríguez, T., Carvajal-Trujillo, E., & Monge-Lozano, P. (2014). Factors that influence the perceived advantages and relevance of Facebook as a learning tool: An extension of the UTAUT. *Australasian Journal of Educational Technology*, 30(2)

Esen, M., Bellibas, M. S., & Gumus, S. (2020). The evolution of leadership research in higher education for two decades (1995–2014): A bibliometric and content analysis. *International Journal of Leadership in Education, 23*(3), 259–273.

*Esteve Del Valle, M., Gruzd, A., Haythornthwaite, C., Paulin, D., & Gilbert, S. (2017). Social media in educational practice: Faculty present and future use of social media in teaching. In *Proceedings of the 50th Hawaii International Conference on System Sciences*.

Everson, M., Gundlach, E., & Miller, J. (2013). Social media and the introductory statistics course. *Computers in Human Behavior, 29*(5), A69–A81.

*Fauzi, M. A., Tan, C. N. L., & Ramayah, T. (2018). Knowledge sharing intention at Malaysian higher learning institutions: The academics' viewpoint. *Knowledge Management & E-Learning: An International Journal, 10*(2), 163–176.

Forkosh-Baruch, A., & Hershkovitz, A. (2012). A case study of Israeli higher-education institutes sharing scholarly information with the community via social networks. *The Internet and Higher Education, 15*(1), 58–68.

Greenhow, C., & Askari, E. (2017). Learning and teaching with social network sites: A decade of research in K-12 related education. *Education and Information Technologies, 22*(2), 623–645.

Greenhow, C., & Galvin, S. (2020). Teaching with social media: Evidence-based strategies for making remote higher education less remote. *Information and Learning Sciences, 121*(7/8), 513–524.

Greenhow, C., Gleason, B., & Staudt Willet, K. B. (2019). Social scholarship revisited: Changing scholarly practices in the age of social media. *British Journal of Educational Technology, 50*(3), 987–1004.

*Gruzd, A., Haythornthwaite, C., Paulin, D., Gilbert, S., & Del Valle, M. E. (2018). Uses and gratifications factors for social media use in teaching: Instructors' perspectives. *New Media & Society, 20*(2), 475–494.

Gumus, S., Bellibas, M. S., Esen, M., & Gumus, E. (2018). A systematic review of studies on leadership models in educational research from 1980 to 2014. *Educational Management Administration & Leadership, 46*(1), 25–48.

Gutiérrez-Salcedo, M., Martínez, M. Á., Moral-Muñoz, J. A., Herrera-Viedma, E., & Cobo, M. J. (2018). Some bibliometric procedures for analyzing and evaluating research fields. *Applied Intelligence, 48*(5), 1275–1287.

*Habes, M., Salloum, S. A., Alghizzawi, M., & Mhamdi, C. (2019). The relation between social media and students' academic performance in Jordan: YouTube perspective. In *International Conference on Advanced Intelligent Systems and Informatics* (pp. 382–392). Springer.

Han, F., & Ellis, R. A. (2019). Identifying consistent patterns of quality learning discussions in blended learning. *The Internet and Higher Education, 40*, 12–19.

Hew, K. F., & Cheung, W. S. (2013). Use of Web 2.0 technologies in K-12 and higher education: The search for evidence-based practice. *Educational Research Review, 9*, 47–64.

Hew, K. (2011). Students' and teachers' use of Facebook. *Computers in Human Behavior, 27*(2), 662–676.

Hosen, M., Ogbeibu, S., Giridharan, B., Cham, T. H., Lim, W. M., & Paul, J. (2021). Individual motivation and social media influence on student knowledge sharing and learning performance: Evidence from an emerging economy. *Computers & Education, 172*, 104262.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277–1288.

Hu, C. P., Hu, J. M., Deng, S. L., & Liu, Y. (2013). A co-word analysis of library and information science in China. *Scientometrics, 97*(2), 369–382.

*Huang, X. (2018). *Social media use by college students and teachers: An application of UTAUT2* (Doctoral dissertation, Walden University).

*Huda, M. Q., Hidayah, N. A., & Putra, S. J. (2016). A study of social technology use in State Islamic University (UIN) Syarif Hidayatullah Jakarta. In *2016 4th International Conference on Cyber and IT Service Management* (pp. 1–6). IEEE.

Johnson, N., & Veletsianos, G. (2021). *Digital Faculty: Faculty social media use and communications*. Bay View Analytics.

*Jones, A. H. G. (2020). *Using the theory of reasoned action to examine faculty intentions to use social networking in distance learning courses* (Doctoral dissertation, University of Alabama Libraries).

Katz, E. (1959). Mass communications research and the Study of popular culture: An editorial note on a possible future for this journal. *Studies in Public Communication, 2*, 1–6.

*Khechine, H., Raymond, B., & Augier, M. (2020). The adoption of a social learning system: Intrinsic value in the UTAUT model. *British Journal of Educational Technology, 51*(6), 2306–2325.

*Koranteng, F. N., Wiafe, I., & Kuada, E. (2019). An empirical study of the relationship between social networking sites and students' engagement in higher education. *Journal of Educational Computing Research, 57*(5), 1131–1159.

*Labib, N. M., & Mostafa, R. H. (2015). Determinants of social networks usage in collaborative learning: Evidence from Egypt. *Procedia Computer Science, 65*, 432–441.

*Lee, J. H., & Lee, C. F. (2019). Extension of TAM by perceived interactivity to understand usage behaviors on ACG social media sites. *Sustainability, 11*(20), 5723.

*Leong, L. W., Ibrahim, O., Dalvi-Esfahani, M., Shahbazi, H., & Nilashi, M. (2018). The moderating effect of experience on the intention to adopt mobile social network sites for pedagogical purposes: An extension of the technology acceptance model. *Education and Information Technologies, 23*(6), 2477–2498.

Leong, Y. R., Tajudeen, F. P., & Yeong, W. C. (2021). Bibliometric and content analysis of the internet of things research: A social science perspective. *Online Information Review, 45*(6), 1148–1166.

Leung, X. Y., Sun, J., & Bai, B. (2017). Bibliometrics of social media research: A co-citation and co-word analysis. *International Journal of Hospitality Management, 66*, 35–45.

Leydesdorff, L., & Park, H. W. (2016). Full and fractional counting in bibliometric networks. *Journal of Informetrics, 11*(1), 117–120.

Literat, I., & Kligler-Vilenchik, N. (2021). How popular culture prompts youth collective political expression and cross-cutting political talk on social media: A cross-platform analysis. *Social Media + Society*. https://doi.org/10.1177/20563051211008821

Liu, J., Wu, S., & Zidek, J. V. (1997). On segmented multivariate regression. *Statistica Sinica, 7*, 497–525.

Liu, Z., & Qian, L. (2009). Changepoint estimation in a segmented linear regression via empirical likelihood. *Communications in Statistics-Simulation and Computation, 39*(1), 85–100.

Lopes, R. M., Faria, D. J. G. D. S. D., Fidalgo-Neto, A. A., & Mota, F. B. (2017). Facebook in educational research: A bibliometric analysis. *Scientometrics, 111*(3), 1591–1621.

*Mady, M. A., & Baadel, S. (2020). Technology-Enabled Learning (TEL): YouTube as a ubiquitous learning aid. *Journal of Information & Knowledge Management, 19*(01), 2040007.

Manca, S. (2020). Snapping, pinning, liking or texting: Investigating social media in higher education beyond Facebook. *The Internet and Higher Education, 44*(100707), 1–13.

Manca, S., & Ranieri, M. (2013). Is it a tool suitable for learning? A critical review of the literature on Facebook as a technology-enhanced learning environment. *Journal of Computer Assisted Learning, 29*(6), 487–504.

Manca, S., & Ranieri, M. (2016a). Facebook and the others. Potentials and obstacles of Social Media for teaching in higher education. *Computers & Education, 95*, 216–230.

Manca, S., & Ranieri, M. (2016b). "Yes for sharing, no for teaching!" Social Media in academic practices. *The Internet and Higher Education, 29*, 63–74.

Manca, S., & Ranieri, M. (2016c). Is Facebook still a suitable technology-enhanced learning environment? An updated critical review of the literature from 2012 to 2015. *Journal of Computer Assisted Learning, 32*(6), 503–528.

Manca, S., & Ranieri, M. (2017). Implications of social network sites for teaching and learning. Where we are and where we want to go. *Education and Information Technologies, 22*(2), 605–622.

Manca, S., Bocconi, S., & Gleason, B. (2021). "Think globally, act locally": A glocal approach to the development of social media literacy. *Computers & Education, 160*, 104025.

*Manesis, D., & Papavenetiou, P. (2019). Acceptance of Facebook as an Educational Tool by University Students. In *ECSM 2019 6th European Conference on Social Media* (p. 199). Academic Conferences and publishing limited.

*McCarthy, R., & McCarthy, M. (2014). Student perception of social media as a course tool. *Information Systems Education Journal, 12*(2), 38.

Mnkandla, E., & Minnaar, A. (2017). The use of social media in e-learning: A metasynthesis. *International Review of Research in Open and Distributed Learning, 18*(5), 227–248.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group*. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine*, 151(4), 264–269.

*Moorthy, K., T'ing, L. C., Wei, K. M., Mei, P. T. Z., Yee, C. Y., Wern, K. L. J., & Xin, Y. M. (2019). Is facebook useful for learning? A study in private universities in Malaysia. *Computers & Education*, 130, 94–104.

*Murire, O. T., & Cilliers, L. (2017). Social media adoption among lecturers at a traditional university in Eastern Cape Province of South Africa. *South African Journal of Information Management, 19*(1), 1–6.

*Ng, K. K., Luk, C. H., & Lam, W. M. (2017). The acceptance of using social mobile application for learning in Hong Kong's higher education. In *New Ecology for Education—Communication X Learning* (pp. 33–46). Springer.

Ngai, E. W., Tao, S. S., & Moon, K. K. (2015). Social media research: Theories, constructs, and conceptual frameworks. *International Journal of Information Management, 35*(1), 33–44.

Niu, L. (2019). Using Facebook for academic purposes: Current literature and directions for future research. *Journal of Educational Computing Research, 56*(8), 1384–1406.

*Odewumi, M. O., Yusuf, M. O., & Oputa, G. O. (2018). UTAUT Model: Intention to use social media for learning interactive effect of postgraduate gender in South-West Nigeria. *International Journal of Education and Development Using Information and Communication Technology, 14*(3), 239–251.

Piotrowski, C. (2015). Emerging research on social media use in education: A study of dissertations. *Research in Higher Education Journal, 27*, 1–12.

Plano Clark, V. L. (2010). The adoption and practice of mixed methods: US trends in federally funded health-related research. *Qualitative Inquiry, 16*(6), 428–440.

Pranckutė, R. (2021). Web of Science (WoS) and Scopus: The titans of bibliographic information in today's academic world. *Publications, 9*(1), 12. https://doi.org/10.3390/publications9010012

*Qi, C. (2017). Social media facilitated group performance: An investigation of tie strength in grouping. In *25th International Conference on Computers in Education, ICCE 2017* (pp. 176–185). Asia-Pacific Society for Computers in Education.

*Rahman, T., Kim, Y. S., Noh, M., & Lee, C. K. (2021). A study on the determinants of social media based learning in higher education. *Educational Technology Research and Development, 69*(2), 1325–1351.

Rambe, P., & Nel, L. (2015). Technological utopia, dystopia and ambivalence: Teaching with social media at a South African university. *British Journal of Educational Technology, 46*(3), 629–648.

*Raza, A., Chandio, F. H., Koondhar, M. Y., Rind, M. M., & Shah, A. (2015). A framework for the analysis of determinants of social media acceptance in higher educational institute of Pakistan. In *Proceedings of the 5th International Conference on Computing and Informatics 2015*

Rehm, M., Manca, S., Brandon, D., & Greenhow, C. (2019). Beyond disciplinary boundaries: Mapping educational science in the discourse on social media. *Teachers College Record, 121*(14), 140303.

*Salarzadeh Jenatabadi, H., Moghavvemi, S., Wan Mohamed Radzi, C. W. J. B., Babashamsi, P., & Arashi, M. (2017). Testing students' e-learning via Facebook through Bayesian structural equation modeling. *PLoS One*, 12(9), e0182311.

*Salloum, S. A., Al-Emran, M., Habes, M., Alghizzawi, M., Ghani, M. A., & Shaalan, K. (2019). Understanding the impact of social media practices on e-learning systems acceptance. In *International Conference on Advanced Intelligent Systems and Informatics* (pp. 360–369).

*Seedat, Y., Roodt, S., & Mwapwele, S. D. (2019, May). How South African University information systems students are using social media. In *International Conference on Social Implications of Computers in Developing Countries* (pp. 378–389). Springer.

Siemens, G. (2006). Connectivism: Learning theory or pastime of the self-amused? http://altamirano.biz/conectivismo.pdf

Siemens, G., & Weller, M. (2011). Higher education and the promises and perils of social network. *Revista De Universidad y Sociedad Del Conocimiento, 8*(1), 164–170.

Sobaih, A. E. E., Moustafa, M. A., Ghandforoush, P., & Khan, M. (2016). To use or not to use? Social media in higher education in developing countries. *Computers in Human Behavior, 58*, 296–305.

Song, Y., Chen, X., Hao, T., Liu, Z., & Lan, Z. (2019). Exploring two decades of research on classroom dialogue by using bibliometric analysis. *Computers & Education, 137*, 12–31.

Statista (2022). *Number of global social network users 2017–2025*. Retrieved 28 April 2022, from https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/

Statista (2021). *TikTok- Statistics & Facts*. Retrieved 31 January 2022, from https://www.statista.com/topics/6077/tiktok/#dossierKeyfigures

Sutherland, K., Terton, U., Davis, C., Driver, C., & Visser, I. (2020). Academic perspectives and approaches to social media use in higher education: A pilot study. *International Journal of Teaching and Learning in Higher Education, 32*(1), 1–12.

Tang, Y., & Hew, K. F. (2017). Using twitter for education: Beneficial or simply a waste of time? *Computers & Education, 106*, 97–118.

Tess, P. A. (2013). The role of social media in higher education classes (real and virtual): A literature review. *Computers in Human Behavior, 29*(5), A60–A68.

Valtonen, T., López-Pernas, S., Saqr, M., Vartiainen, H., Sointu, E. T., & Tedre, M. (2022). The nature and building blocks of educational technology research. *Computers in Human Behavior, 128*, 107123.

Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523–538.

Van Raan, A. (2019). Measuring science: basic principles and application of advanced bibliometrics. In *Springer handbook of science and technology indicators* (pp. 237–280). Springer.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*, 186–204.

Waltman, L., Van Eck, N. J., & Noyons, E. C. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of Informetrics, 4*(4), 629–635.

Wertsch, J. V. (1985). *Vygotsky and the social formation of mind*. Harvard University Press.

Weller, M. (2020). *25 years of ed tech*. Athabasca University Press.

Yang, Y., Wu, M., & Cui, L. (2012). Integration of three visualization methods based on co-word analysis. *Scientometrics, 90*(2), 659–673.

*Yu, A. Y., Tian, S. W., Vogel, D., & Kwok, R. C. W. (2010). Can learning be virtually boosted? An investigation of online social networking impacts. *Computers & Education, 55*(4), 1494–1503.

Zinger, L., & Sinclair, A. (2013). Using blogs to enhance student engagement and learning in the health sciences. *Contemporary Issues in Education Research, 6*(3), 349–352.