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Online learning in management education amid the pandemic: A bibliometric and content analysis

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ABSTRACT

The COVID-19 pandemic (2020–2022) had triggered a global crisis which led to the suspension of colleges and universities. Management educators had digitally transformed their teaching to new modalities with digital technologies and adapted to technological solutions. The management students had experienced different online modes of learning and adjusted their methods to the new reality of content delivery. This study aims to discuss opportunities and challenges for management education and facilitate further investigation into the emerging trends on online learning by analyzing the characteristics of management education research and examining the most frequent research themes from 2020 to 2022. A bibliometric analysis is used to review 920 papers retrieved from the Scopus database for exploring key research themes of management education and online learning. The findings revealed that the publications are concentrated in developed countries while European countries had accounted for the largest proportion of the listed publications. Five sub themes are identified for receiving the most scholarly attention, such as pedagogy, technology, assessment methods, learning outcomes or skills, and challenges. After all, the bibliometric and thematic findings identified pivotal theoretical contributions, including fields of online or blended learning and management education converge, to extend the existing online learning theories.

1. Introduction

The World Health Organization (WHO) declared the coronavirus outbreak on January 30, 2020 (World Health Organization, 2019). Since then, educational institutions across the globe had faced a closure, and been forced to emergently transform to online learning (e.g., Ng et al., 2020; Aguinis et al., 2020; Brammer et al., 2020; Laasch et al., 2020). Over the two years of online learning, the management academia struggled to accept new technologies and learning modes, such as distance education, blended learning, and self-paced learning (e.g., Garaus et al., 2016; Whitaker et al., 2016). Teachers need to enhance their technological skills to transfer their teaching from face-to-face to online basis, whereas companies or professional organizations had to adopt their training through an alternative online mode (Greenberg & Hibbert, 2020; Sriharan et al., 2021). To investigate the impact of the pandemic on management education, there is a considerable amount of timely research which covers issues related to online learning (e.g., organization and management, pedagogy, technological support, learning outcomes, digital skills). A systematic review can help document the lessons

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learned and challenges during the pandemic which guided future online learning strategies, policies and practices. Many disciplines (e.g., healthcare, language, tourism, kindergarten) are starting to summarize their online learning experience during the COVID-19 pandemic while they also document relevant publications to plan for future online education (e.g., Hao et al., 2022; Hope et al., 2021; Menon et al., 2022; Moorhouse & Kohnke, 2021; Ng et al., 2021). It is meaningful to conduct a review in management education that guides future online learning strategies, policies and practices.

Before the pandemic, the use of online learning in management education was not new, which has been widely discussed across management related disciplines and topics (Arbaugh et al., 2009; Garaus et al., 2016), for example, Arbaugh et al. (2009) conducted a review from 1994 to 2009 which identified a number of key issues including examination of stakeholders' characteristics, for example, learners and instructors, and the influence of institutions located outside North America. Furthermore, management educators have established pedagogical approaches to online or blended learning (e.g., Drennan et al., 2005). Advantages of online learning have been identified in these studies that online or blended learning strategies could offer learners positive perceptions on technology in terms of ease of access and use of digital flexible learning material, as well as facilitating autonomous learning styles (Drennan et al., 2005). However, little prior research has addressed how the management educators teach in new modalities, work with new classroom protocols, adjust students' expectations, adapt to technological solutions and obtain access to students' learning outcomes (Caza, Brower, & Wayne, 2015).

This review serves to use bibliographic and frequently-used keyword analysis to quantify the academic outputs for generating the online learning research trends and insights during the pandemic. This analysis could evaluate leading scientific researchers or publications, identify major relevant topics, and discover new future developments (Ellegaard & Wallin, 2015; Boudry & Mouriaux, 2015; Su et al., 2022). As such, this review presented a thorough bibliometric analysis from Scopus database about how the pandemic crisis profoundly affected the management of learning and education. Specifically, the purpose of this paper is to identify the publication information including authors, institutes, countries, and journals in the field of online learning on management education. Moreover, it contributes to extending the existing online learning theories such as Online Community of Inquiry (Khanna et al., 2021; Scaringella et al., 2022), and summarizing useful educational evidence for the pedagogies, content and technologies used in the online learning environment (Klarin et al., 2021). Based on these theories and new insights sought in this study, we adapt from Ng et al. (2023)'s instructional design framework for an AI-driven online environment, and propose a framework to connect the major elements in the four research questions which contribute to the online learning field. Therefore, this study further makes suggestions for future research on online learning in management education, which hopes to support policy arrangement and decision making on management learning, education, and industrial training.

Regarding management education, this study helps document how management educators implement online learning at the individual, organizational, and institutional levels (Cullen, 2017; Huang et al., 2020). This is supported by a recent bibliometric review which helps bridge the gap between education and the industry for presenting excellent educational value in business-related pedagogies (Klarin et al., 2021). This review aims to summarize the trend and major practices that were applied to management education using bibliometric analysis to identify the keywords. Concerning these keywords, this study explored the relationship between the online instructional design in terms of pedagogies and technologies, effectiveness of the interventions in terms of learning outcomes and skills, as well as assessment methods and challenges mentioned in the studies (Klarin et al., 2021). Bibliometric analysis was suitable since it provides visual images of the relationships between concepts and map analysis of the full pictures with large sets of selected studies (Chen et al., 2021; Fang et al., 2019; Hwang & Fu, 2019). First, the relationship between journals, abstracts, keywords and other background information such as countries, organizations and authors from the selected studies can be visualized through diagrams and tables, which enables future management education researchers to recognize the relationship behind (Donthu et al., 2021). It helps us project future trends and understand existing key concepts about online learning on management education. This analysis method allows researchers to formulate keywords and determine important factors for further content and thematic analysis. Offering theoretical contribution for future studies, this review investigates the key themes with evidence of online learning during the pandemic. Four research questions (RQs) were identified as follows.

- (1) What are the major countries publishing online or blended learning research related to management in the Scopus database?
- (2) What are the most-cited (citation and co-citation) journals and journal articles publishing online/blended learning research related to management in the Scopus database?
- (3) What are the most frequently used keywords in abstract sections of online or blended learning research related to management in the Scopus database?
- (4) What are the major findings on online or blended learning research related to management in terms of pedagogy, technology, learning outcomes and challenges?

2. Methods

2.1. Search strategies

An integrative review of the literature was implemented to understand a full picture of how online learning conducted during the pandemic in the field of management education. The search aimed to retrieve relevant articles published from 2020 to 2022. The first pandemic and online learning article appeared in 2020. Using the Scopus database, the search of SSCI publications was conducted on 24 December 2022 using the keyword ("business" OR "management" OR "accounting" OR "economics" OR "econometrics" OR "finance") AND ("online learning" OR "online teaching" OR "distance learning" OR "distance teaching" OR "digital literacy") AND

(“COVID” or “pandemic”). The subject areas including social science, business, management, accounting, economics, econometrics and finance were selected. Fig. 1 shows the procedure to search the online or blended learning research of management education during the pandemic. The two researchers used the VOSviewer program to analyze the citations for content and thematic analysis for identifying theoretical contributions. First, the two authors reviewed the abstracts and titles to ensure all articles meeting the inclusion criteria, and retrieved all of the full text articles. Consensus was reached by the research team on the final list to be included after comprehensive discussion has been conducted. As of 24 December 2022, 1,848 articles were identified.

2.2. Inclusion and exclusion criteria

All articles were published in English during the pandemic (2020–2022), including four preprint papers that have been included in the database, and focused on the management educators’ experience of online or blended learning. Management educators were defined as those teaching management undergraduates and postgraduates from different disciplines (e.g., business, medicine, science, education). Studies have highlighted the pedagogical interventions and strategies that have an impact on student learning outcomes through the implementation of their learning programmes in terms of online learning pedagogy, content and technology in higher education. The conference papers and book chapters were excluded due to a lack of peer review. Studies that did not have full text articles, and not written in English language were excluded. After excluding irrelevant studies, a total of 920 papers were chosen.

2.3. Bibliometric analysis

This study used a bibliometric analysis to map the existing literature about online or blended learning in management education between 2020 and 2022 from the Scopus database. Bibliometric analysis has been a widely used approach for academic research outputs to update the progress of online learning (e.g., Huang et al., 2020; Ng et al., 2022). It could identify major educational researchers and the important research topics for the current developments. In addition, it could also realize the collaboration network and author profiles. Furthermore, it also helps develop bibliometric indexes for evaluating academic output and discovering emerging research issues, while the insights for future research directions are also drawn. (Chen et al., 2021).

The selected articles were analyzed in terms of background information (e.g., countries, journals, authorships), as well as the identified themes based on keyword analysis that received most scholarly attention. This study applied the VOSviewer program to do the visualization and bibliometric analysis that was used in other research (e.g., Arici et al., 2019; Chen et al., 2021). The network visualization on background information and themes based on the keywords was applied. The number of occurrences is stated in each sub-theme while its link strength is found to indicate the total strength of the co-authorship links of a given researcher with other researchers, which indicates that the themes are worthy to be discussed (Donthu et al., 2020; Trotta & Garengo, 2018).

The two authors worked on the thematic analysis process to understand the trends of online or blended learning in management education, which generated the scheme of high frequently used keywords for identifying the highly frequently appeared keywords. In the table, pedagogies were categorized into online or blended learning, self-regulated learning, problem-based learning and collaborative learning. Furthermore, technological support includes learning management systems, social networks and video conferencing software. Thirdly, the assessment methods applied in the studies could be divided into quantitative and qualitative analysis to measure students’ learning outcomes and skills in terms of knowledge and techniques, as well as affective learning gains (e.g., wellbeing, interests and motivation). With this scheme, a researcher was invited to assist in the content and thematic analysis for categorizing related articles in the themes for analysis later according to the four themes (i.e., pedagogy, content, learning outcomes, challenges) (Vaismoradi et al., 2016). The two researchers performed an all-rounded analysis and discussed the discrepancies to reach a consensus

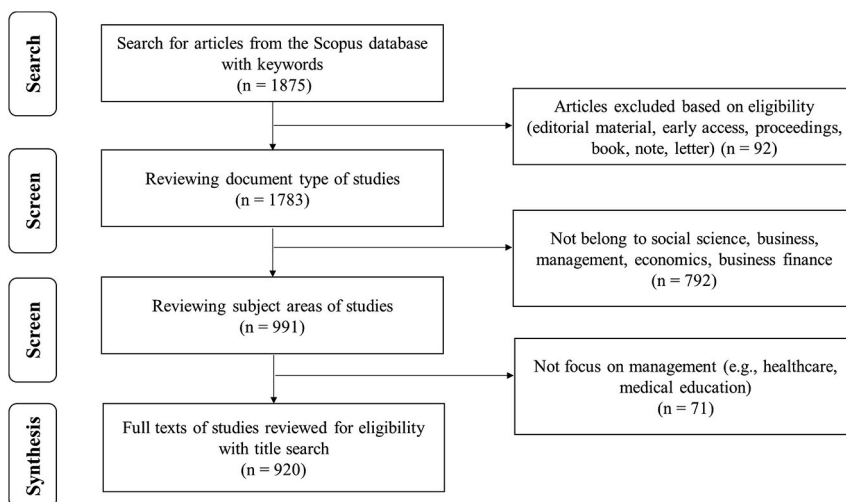


Fig. 1. The procedure to search the highly cited.

of the data analysis. Table 1 shows a keyword scheme for the online and blended learning articles.

2.4. Coding scheme

Inspired by Chen et al. (2021)'s coding scheme, this study illustrates the relationship of the bibliometric information including countries/area (RQ1), journals (RQ2), and keywords (RQ3), as well as the key elements of online management education (RQ4) (see Fig. 2). Catering to the rationale of the first three research questions, this article analyzed the top countries, trend of publications, cited papers, authors, and keywords by referring to Su et al. (2022) using the citation analysis of the VOSviewer software. Concerning the fourth research question, a theoretical basis of the coding scheme was tailored from existing reviews as designed by Ng et al. (2021, 2022), Fang et al. (2019) and Hwang and Fu (2019) which consisted of four key elements: pedagogy, technology, learning outcomes and challenges. Regarding RQ4, this study conducted a co-occurrence analysis using the VOSviewer software to generate 177 keywords that occurred throughout the articles at least five times (Chiu et al., 2022; Su et al., 2022). Then, the first and second authors categorized the keywords and also identified four key themes for online management education. In this way, the themes suggested in the prior studies are consistent with what the VOSviewer generated using the co-occurrence analysis. The details of the four key themes for RQ 4 are listed below.

- (1) Pedagogy: Pedagogies were coded based on Chang and Yang (2022), which included a set of learning strategies such as self-regulated learning, problem-based learning and collaborative learning.
- (2) Technology: Technologies were based on Gegenfurtner and Ebner (2019)'s review that consists of synchronous and asynchronous learning tools such as social media, learning management systems, and web-conferencing software.
- (3) Learning outcomes: Based on Tang et al. (2021)'s review, students' positive and negative learning outcomes were categorized into cognitive (e.g., knowledge, skills, abilities) and non-cognitive skills (e.g., interest, satisfaction, motivation).
- (4) Challenges: Challenges included motivation problems, emergency online teaching (Hofer et al., 2021), digital transformation and crisis management (Datta & Nwankpa, 2021). The challenges were identified as important aspects for the current paradigm of management education.

3. Results and findings

Online or blended learning amid the pandemic has received great attention that researchers across the globe have rigorously documented their practices to timely encounter the current online teaching crisis. Using citation analysis, the majority of studies on this topic were undertaken in countries from west to east such as the United States ($n = 113$), Indonesia ($n = 84$), India ($n = 52$), Malaysia ($n = 51$), China ($n = 50$), South Africa ($n = 50$), and Russia ($n = 42$). Fig. 3 illustrates the top ten countries or regions ranked by the number of citations. The number of online learning studies about management is shown in Fig. 4. It was identified that the research has grown rapidly from 2020 ($n = 136$) to 2021 ($n = 366$). These results imply that online or blended learning researchers have worked vigorously to document and summarize meaningful solutions for management settings.

3.1. RQ1. Countries and highly cited journals

The citation analysis based on country distribution was implemented to analyze the most-cited countries. In the VOSviewer program, the minimum number of publications was set as five, and then top five countries were selected. Table 3 illustrates the top five cited countries or areas in which the researchers are employed according to the number of citations. The country with the highest number of citations was the United States (citations = 1579; publications = 113). However, this study can see that some Asian regions have their publications highly cited such as India (citations = 1114; publications = 84), Saudi Arabia (citations = 513; publications = 26) and Indonesia (citations = 388; publications = 84).

To explore the relationship between publications and citations, citation analysis and sources were selected. This study sets the

Table 1

A keyword scheme for the online/blended learning articles.

Themes	Sub-themes	No. of occurrence (Link strength)
Pedagogy	Online/blended learning	318 (1007)
	Problem/project-based learning	14 (43)
	Self-regulated strategies	12 (39)
	Collaborative learning	12 (36)
Technology	Learning management systems	61 (258)
	Video conferencing software	10 (27)
	Social networks/media	7 (54)
	Artificial intelligence	7 (42)
Learning outcomes	Academic performance (Cognitive gain)	7 (34)
	Affective gain	Self-efficacy: 13 (31) Satisfaction: 10 (21) Motivation: 10 (47)

Table 2
Top ten most frequently used keywords.

Keywords	Occurrences
Covid-19	490
Online learning	318
E-learning	181
Students/teachers/humans	157
Distance learning	145
Teaching/learning	136
Higher education	110
Education	63
Learning systems	47
Learning management system	43

Remarks: Some terms with similar meanings (e.g., pandemic, learning, teaching) are combined to prevent double counting in this section.

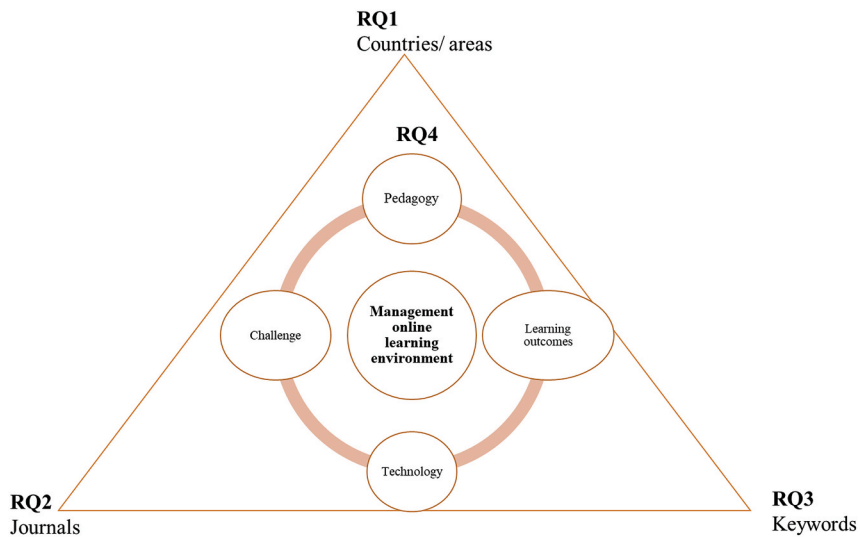


Fig. 2. Online learning environment in management education.

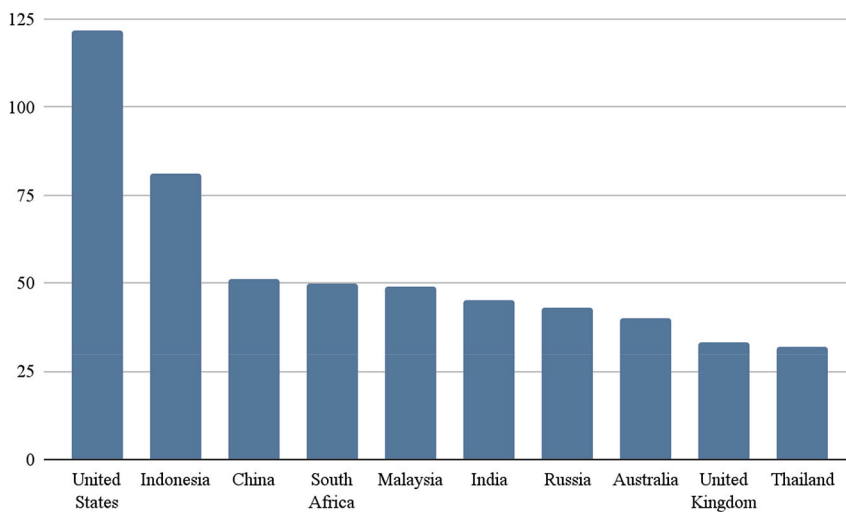


Fig. 3. Top ten countries/regions ranked by the number of publications.

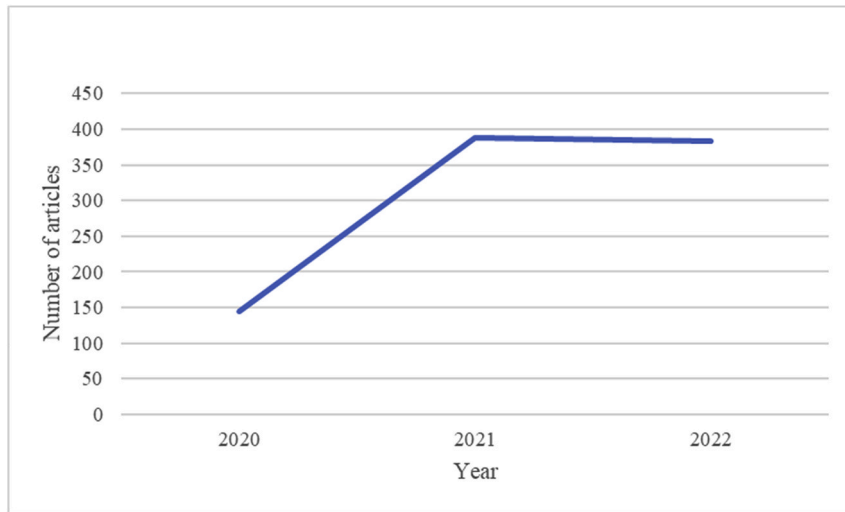


Fig. 4. Trend of publications.

Table 3
Top five countries and journal ranked according to citations.

Country	No. of articles	Citations	Index
The United States	113	1579	4.0
India	84	1114	13.3
The United Kingdom	52	594	11.4
Saudi Arabia	26	513	19.7
Indonesia	84	388	4.6
Denmark	5	338	67.6
Journal	No. of articles	Citations	Index
Education and Information Technology	18	311	17.3
Sustainability	37	294	7.9
Education Sciences	23	276	12.0
International Journal of Emerging Technologies in Learning	9	107	11.9
Interactive Technology and Smart Education	8	57	7.1

Remarks: Index = Citations/number of articles.

number of articles of a source as five. Table 3 shows the top three cited journals are Education and Information Technology (citations = 311; publications = 18), Sustainability (citations = 294; publications = 37), Education Sciences (citations = 276; publications = 23). Co-citation analysis was further applied and the top three publication sources were Computers and Education (co-citations = 403; H-index = 197), Computers in Human Behavior (co-citations = 271; H-index = 203) and the Internet and Higher Education (co-citations = 209; H-index = 99). The three journals are one of the top three journals in educational fields with high H-index. It is found that, as expected, more recent articles have fewer citations because they have had less opportunity to be cited (Polonsky & Ringer, 2012).

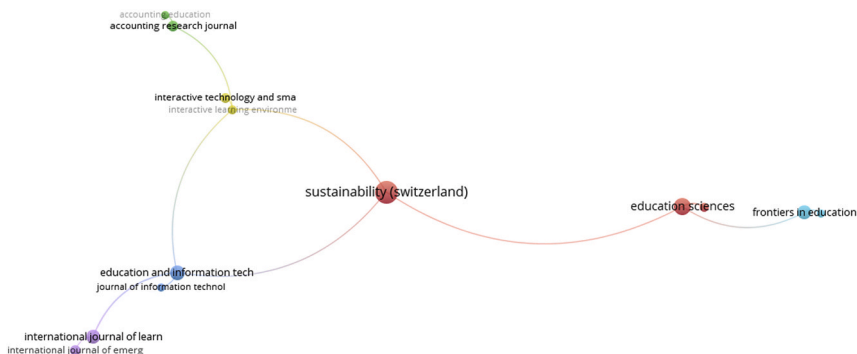


Fig. 5. Most cited journals using co-citation analysis.

Fig. 5 shows the most cited journals using co-citation analysis.

3.2. RQ2. Most frequently cited article

According to the citation and document analysis, the top three management related articles were studied. There are some articles that gained high citations such as Demuyakor (2020) and Chick et al. (2020). However, their discussions did not focus on management related (e.g., business, accounting, information management) industries. As such, this section will not discuss these types of articles. Chick et al. (2020) was taken as an example, which mentioned how the medicine industry could handle disaster and safety management in addition to mass casualty triage principles for sustaining medical education in hospital settings. Another study conducted by Demuyakor (2020) identified that the university administrators and managers could learn how to take future emergency decisions concerning the implementation of online learning programs for student's different backgrounds. Table 4 shows the top four cited articles.

The most highly-cited article is Dwivedi et al. (2020)'s opinion paper in which key challenges of pandemic were presented through an information management perspective (citations = 337), including the management academics, which were forced to apply a blended mode, including both face-to-face and online teaching delivery). It was challenging for educators to ensure that students could be involved in a high-quality learning experience, neither without feeling isolated nor doubling the teaching load of the academia. Throughout the year(s) of online learning, students can access more online courses from universities in the world, which can greatly reduce the learning cost and disruption. Student applicants may reassess their priorities when they decide where and how to continue their learning. After a year of pandemic, governments and policymakers have tried to apply artificial intelligence systems to retrieve information for generating more informed decision making during crisis management scenarios (Moser et al., 2022). Although other underlying concerns such as privacy, security, and digital divide due to social and cultural barriers could be encountered when the management teaching world drives to a more digitized one.

The second highly-cited article identified is Iivari et al. (2020) in International Journal of Information Management (citations = 300). The authors wrote a discussion paper to drive the importance of young people's basic education as a significant area of concern for information management research, especially how education was digitally transformed during the COVID-19 pandemic. The authors revealed an issue of digital divides that were the barriers of digital transformation encountered by the learners. On the other hand, the third frequently cited article is Teräs et al. (2020) who reflected the problems arising from adoption of commercial digital learning solutions as design may not be driven by best pedagogical practices (citations = 168). Furthermore, the business models leverage learners' data for profit-making and capitalize the data into market mechanisms which may seriously affect pandemic education and online learning.

3.3. RQ3. Most frequently used keywords

The Scopus database file was input into the VOSviewer to produce a map of the most frequently used words mentioned in the abstract. The most frequently used keywords applied in the selected studies include covid-19 (n = 490), online learning (n = 318), e-learning (n = 181), and students/teachers/humans (n = 157) (see Fig. 6). It is understood that the keywords related to background information would be mostly used. Table 2 shows the top ten most frequently used keywords with their occurrences. However, some pedagogy and technology related terms were identified in the searching. Regarding pedagogical approaches, supplementing the aspects of mentioning online, blended, remote and distance education, researchers discussed terms including problem/project-based learning (n = 14), self-regulated learning (n = 12), and collaborative learning (n = 12). In terms of learning technology, the researchers mentioned terms like learning management system (n = 61), video conferencing (n = 7), social network (n = 7) and some other emerging technologies such as artificial intelligence (n = 7) and virtual reality (n = 5). There are some keywords related to assessments and learning outcomes: questionnaires/surveys (n = 31), motivation/self-efficacy/leadership (n = 31), student engagement (n = 14), digital literacy (n = 13), perception (n = 10), communication (n = 7) and academic performance (n = 7).

3.4. RQ4. Pedagogy, technology, learning outcomes/skills and challenges

Inspired by the identified keywords driven from the bibliometric analysis, this study classifies the keywords into four clusters

Table 4
Top four cited articles.

Authors	Title	Journal	Citations
Dwivedi et al. (2020)	Impact of COVID-19 pandemic on information management research and practice: Transforming education, work and life	International Journal of Information Management	337
Iivari et al. (2020)	Digital transformation of everyday life – How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care?	International Journal of Information Management	300
Teräs et al. (2020)	Post-Covid-19 Education and Education Technology 'Solutionism': a Seller's Market	Postdigital Science and Education	168
Krishnamurthy (2020)	The future of business education: A commentary in the shadow of the Covid-19 pandemic	Journal of Business Research	152

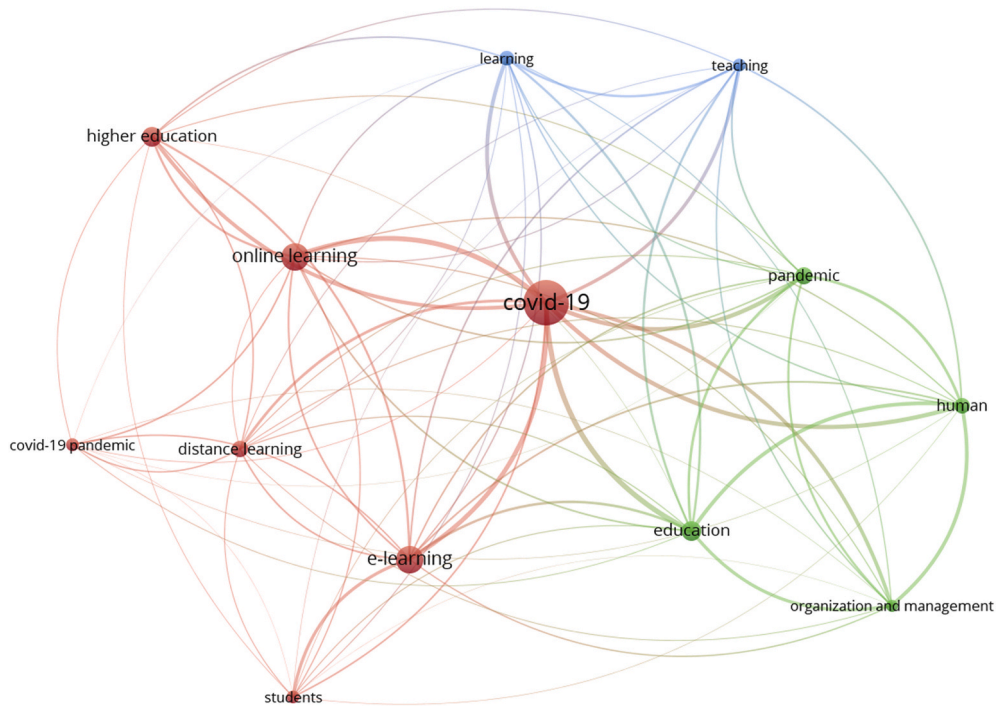


Fig. 6. Most used keywords.

(pedagogy, technology, learning outcomes/skills, challenges). This section will evaluate the theoretical contribution with respect to the categories to generate the lessons learnt from the pandemic learning in management education.

3.4.1. Pedagogy

According to the bibliometric analysis, the most frequently used online or blended learning pedagogies includes self-regulated learning, problem-based learning and collaborative learning.

Self-regulated learning involves several aspects (e.g., cognitive, metacognitive, behavioral, motivational, emotional/affective). It refers to students' abilities (e.g., goal setting, self-monitoring, self-instruction, self-reinforcement) to understand and control their learning environment (Panadero, 2017). Concerning management education, Igwe et al. (2021) studied 62 university students across Nigerian public and private universities in entrepreneurial education and indicated that the learning opportunity is important for students to learn in small groups through group projects, networking, collaborative learning and cross-cultural collaborations. Another study conducted by Romero-Frías et al. (2020, pp. 1–17) explored how students' motivation related to the acceptance and participation in MOOCs. It is identified that students with better learning motivation, self-regulated learning strategies, attitudes, and behavior could have a higher tendency to understand the MOOC experience better. Mitchell et al. (2021) mentioned the importance of task mastery which could orient students with a greater sense of perceived autonomy and competence, and they are more likely to be motivated and leveraged by self-regulated learning strategies (e.g., goal setting and self-monitoring).

Problem/project-based learning (PBL) enabled students to work in collaborative groups and learn by resolving authentic problems or projects under the guidance of teachers (Allen et al., 2011; English & Kitsantas, 2013). In management or business education, PBL could facilitate students to solve unstructured problems and provide a better vehicle for managerial learning than traditional lectures (Perusso & Leal, 2022). While this strategy was introduced to management students in a qualitative study, students encountered authentic scenarios to implement professional practice, execute real-life solutions and have a close contact with the intricacies of the work environment (Perusso & Leal, 2022). Allen et al. (2022) suggested a set of problem-solving strategies for adult learners who could give a speech, collaborate in teams, lead meetings, and have different conversations in a business school leadership program. Vieregger and Bryant (2020) documented a business capstone class in which students were required to work in groups and prepare a 45-min presentation that identified the current challenges of their assigned company. The students then proposed strategic recommendations to address those challenges and solve ill-structured real-world problems.

Collaborative learning promotes peer support behavior in student groups that further improve their learning performance and problem-solving (Rummel & Spada, 2005). Regarding management education, scholars have strived the importance of working in teams and collaborating with each other through mutual communication to facilitate team and business management, for example, Rajaram (2021) proposed that scholars and teachers should reflect to identify meaningful activities, approaches and strategies to develop a collaborative and cohesive learning environment in management education. Vieregger and Bryant (2020) improved students' enjoyment through team-based projects and facilitated them to develop team-working skills which is important for achieving

success along their future career in a student-alumni mentoring program. [Allen et al. \(2022\)](#) discussed from the lens of teaming or leadership theory that social cognitive orientation could encourage students to appreciate their colleagues, learn from their supervisors and role models, and formulate a social network for supporting their business/management learning and growth. [Fernando et al. \(2020\)](#) found that the use of collaborative learning could encourage interdisciplinary learning and facilitate business students to work with people from a wide spectrum of backgrounds.

3.4.2. Technological support

This part will summarize the top three technological support used by the researchers: learning management system, social network and video conferencing. Researchers have explored how these tools are implemented in online learning to support students to learn cognitively and socially.

Learning management system (LMS). Digital transformation is of utmost importance to upgrade the school's technological infrastructure. Faculties and educators needed to quickly equip with new online teaching skills (i.e., facilitation, student engagement, discussion), and use online e-learning tools (e.g., learning management system) ([Ng et al., 2020](#); [Darley, 2021](#)). It is found that teachers could use e-learning resources such as videos, discussion, presentation slides and webinars to quickly transform their teaching to LMS and web conferencing software such as Microsoft Teams, Google Meet, YouTube, and PowerPoint recording ([Ng et al., 2020](#); [Darley, 2021](#)). [Kirkpatrick \(2020\)](#) emailed the resources to students and posted them on a learning management system class page. [Zulfiqar et al. \(2021\)](#) also adopted a learning management system to deliver learning materials for enhancing students' entrepreneurial intention through business simulation games.

Social media and social networking tools. Social media and networking platforms have applied to establish connections and relationships between students, alumni, and faculty and other staff in a continuous manner ([Khanna et al., 2021](#)). This technology aids students to get updated information and quick responses to students' queries, thus enabling more productive communication ([Chu & Du, 2013](#); [Ng et al., 2020](#)). Online business education faces challenges that there was a lack of communication among teachers and students which led to a decline in teaching effectiveness ([Zhang et al., 2021](#)). In [Zhang et al. \(2021\)](#)'s study, they applied the use of social media application to enhance students' socialization and maintain their attitudes about corporate social responsibility in a social media environment. [Igwe et al. \(2021\)](#) mentioned the importance for management students and educators to learn how to use technologies to learn or teach, maintain transparency, and act appropriately on the usage of social media. [Haverila et al. \(2021\)](#) constructed a learning satisfaction model that incorporated social and interactive tools to facilitate collaboration and connection with students through social media applications. Social media could make online learning more interactive and enjoyable, amplifying positive effects on students' satisfaction.

Video conferencing. [Costigan and Brink \(2020\)](#) adopted the use of video conferencing tools to facilitate business students' listening skills and communication skills that are emphasized on business curricula for their future places of work. The web-conferencing practices could enable students to have more oral expressive opportunities to improvise with well-articulated answers and sound solutions to questions. [Molthan-Hill et al. \(2020\)](#) enabled companies to have video conferencing which could effectively reduce business travel cost and carbon emissions while companies could continue to communicate and collaborate with their stakeholders. [Scaringella et al. \(2022\)](#) used the desktop video conferencing technology to support students' collaborative learning, asynchronous learning networks, virtual worlds and online social networking in MBA programs among 93 faculty members and 366 students. These hybrid modes could improve the online teaching quality, course value, and course satisfaction. [Billiot and Forbes \(2021\)](#) engaged business students to learn empathy using Microsoft PowerPoint and video conferencing tools which could allow them to screen-share and virtually present their final project in an online format throughout the 16-week pilot course.

Artificial Intelligence. With the trend of using emergent technologies in management education, recent studies shed some light on Artificial Intelligence (AI) that offer students adaptive, automatic and individualized features to sustain their self-paced online learning ([Ng et al., 2022](#); [Chan et al., 2022](#); [Votto et al., 2021](#)). Moreover, AI has become more important in the post-pandemic world, and it is estimated that at least 70% of companies will adopt some aspects of AI technologies by 2030 ([Sollosy & McInerney, 2022](#)). During the pandemic, AI could be a powerful tool to generate effective strategies and make management decisions based on massive amounts of data. It works as a driving force for knowledge sharing and provides service automation, especially under the unavailability of face-to-face services. ([Votto et al., 2021](#)). Researchers propose that students are no longer merely end users who can manipulate AI tools to facilitate their online learning effectively. It is also crucial for them to navigate this domain and manage their future work-places. Schools and universities also start to develop curricula, for example, schools started to create AI curricula in business schools to foster students' positive attitudes towards AI and strengthen their basic knowledge about AI, programming skills, and problem-solving strategies ([Xu & Babaian, 2021](#)). It is believed that AI has become an important digital literacy in the post-pandemic world ([Ng et al., 2022](#); [Panigrahi & Chandra, 2022](#); [Sollosy & McInerney, 2022](#)).

3.4.3. Learning outcomes/skills

This section discusses the potential effects of online learning in management education. Learning outcomes are categorized into two domains in terms of cognitive and non-cognitive learning gain.

Cognitive learning. Management education is important to equip not only managers through lifelong learning, but also future managers (university students), with skills and knowledge to encounter upcoming challenges ([Almeida et al., 2021](#)). Regarding students, [Roldan \(2022\)](#) recorded a longitudinal study of a blended course with extensive use of digital media for learning materials and discussions. Students need to use their devices to access digital course materials. Students' learning outcomes in various knowledge tests (e.g., SAT, ACT scores, GPA) were recorded to evaluate the effectiveness of the course. Furthermore, managers have obtained skills and knowledge and become capable of answering organizations' needs and contributing effectively to society's transformation

through their business practices (Almeida et al., 2021; Klein & Todesco, 2021). Concerning future managers, Alm et al. (2021) recognized that the capital needs to equip students with twenty-first century skills for facilitating interdisciplinary cooperation and address systemic problems, such as the challenge of achieving sustainable development.

In Allen (2020)'s study, it is believed that management educators could help students better understand the language acquisition and use of disruptive technologies in the industry 4.0 era. Students would be informed of future trends better, the business shaping technologies, applications of corresponding technologies, and ethical considerations (Allen, 2020). Students could also keep their knowledge, skills, and abilities at the forefront of their professions. Another study conducted by Schulz et al. (2020) acknowledged that it is important to develop management leaders and students' responsibility, technical mindsets and abilities for them to embrace future challenges. Furthermore, student-centered instruction methods were also mentioned among studies on improving students' learning progression to obtain formal knowledge and employability skills in higher education (e.g., Perusso & Leal, 2022; Tuzlukaya et al., 2022).

Non-cognitive learning. Singh and Jasial (2021) examined various factors such as teaching skills of teachers, staff competence, reputation and access, which could have significant impact on student satisfaction in higher management education institutes. Likewise, a qualitative study conducted by Javadizadeh et al. (2022) who surveyed 345 students from 11 business schools throughout the United States. It was found that the characteristics of a class structure, teaching style, and class environment could significantly motivate students and enhance class performance. Promoting affective learning, various pedagogies have been applied to enhance students' interest, satisfaction and motivation (e.g., Durrani et al., 2022; Jääskä et al., 2021). Durrani et al. (2022) illustrated an example which investigated the effect of flipped classrooms and gamification among 105 students via surveys and questionnaires. It was found that students in gamified flipped classroom settings are more efficient in terms of complexity of the technique, task orientation, student engagement, satisfaction, knowledge and learning motivation. Another study conducted by Martínez-Jiménez and Ruiz-Jiménez (2020) also identified that students could improve their satisfaction and learning outcomes using flipped classrooms among 63 students. Jääskä et al. (2021) explored the development and use of a novel project business game which provide students and teachers to facilitate project planning, stakeholder management, cost management, decision making, and risk management skills through experiential, situational, and problem-based learning.

3.4.4. Challenges

This section identified the challenges according to the keyword analysis. Looking at the number of occurrences, the three most common challenges met by educators during the pandemic were found: motivational problems (n = 31), emergency remote teaching (n = 17), and crisis management (n = 14).

Motivational problems. Motivating students to learn in an online learning environment is not an easy task (e.g., Bolliger et al., 2010; Chiu et al., 2021; Yang et al., 2006; Ng et al., 2020). Motivation is a critical factor influencing the cognitive learning process, while highly motivated students tend to deliberately interact with other learners to seek out learning resources and information, and utilize better digital tools to connect with others in online contexts (Yang et al., 2006). During the pandemic, studies have addressed the psychological needs of students on online learning, especially the well-being aspects (e.g., isolation, stress, demotivation) (Dyck & Caza, 2021). Finding ways to help students cope with stress and negative emotions during their academic life and beyond are important and urgent for management education research (Seijts et al., 2021). Research has shown that effective learning could reduce students' stress among them which can improve their well-being and mental health (e.g., McCray et al., 2021; Wei & Bunjun, 2021). Moreover, external rewards, certificates and credits are also useful to promote students' extrinsic motivation on enhancing their learning satisfaction and cognitive learning gains (Romero-Frías et al., 2020, pp. 1–17).

A range of motivational theories derived from research such as self-determination theory (SDT) (Mousa, 2021; Tandon et al., 2021), expectancy-value theory (Bacon & Stewart, 2022), achievement goal theory (Senko et al., 2011), and control-value theory (Sholihin et al., 2020) have been widely discussed in the business and management education studies during the pandemic to understand the environmental, emotional and psychological factors that motivate students' learning. These theories have been applied to understand the underlying affective, behavioral and cognitive factors which improve learners' motivation, engagement, and learning (Chiu et al., 2021). When pedagogical design adequately addresses students' needs, who are actively motivated to engage in learning tasks for improving learning and working efficiency (Chiu, 2022; Li et al., 2020).

Emergency remote teaching/digital transformation. Management educators (like other teachers across disciplines) perceived an emergent transition of distance learning or teaching. The first challenge was identified on providing just-in-time professional development for teachers to learn new technologies and transform the digitalization of instructional design (e.g., Bhuwandeep et al., 2022; Pucciarelli & Kaplan, 2022). Articles found in this review illustrate that IT and faculty management took a leading role in institutions and commercial sectors while resources and infrastructure were necessary to support educators to transform teaching online gradually (e.g., Allen, 2020; Ibrahim et al., 2021). Timely support and professional training at a management level become necessary to facilitate them on gaining experience in online learning and teaching (Fellenz et al., 2022).

Secondly, not all business and management activities could be smoothly transformed online, especially those requiring practical and experiential learning in an authentic setting (Dust & Gerhardt, 2020; Shahrill et al., 2021). With the unexpected shift to emergency remote teaching due to the pandemic, a major challenge is teaching a course that usually takes place in face-to-face modes while it was redesigned to deliver education at home, for example, internship, face-to-face networking, team building, company visits and business exhibition or trade shows. The aforementioned examples were traditionally better to be conducted in a face-to-face setting (e.g., Ng et al., 2020; Park & Jones, 2021; Thompson et al., 2021). Currently, business and management have transformed online to reach customers and colleagues under the new norm of virtual communication caused by the pandemic (Dwivedi et al., 2020; Iivari et al., 2020). However, the effectiveness of these online activities is questionable with less in-person participation. People, companies and

organizations faced great challenges due to the closure of thousands of businesses and the loss of millions of jobs (e.g., Kaushik & Guleria, 2020; Vig & Agarwal, 2021).

Crisis management. Our society faced a number of challenges during the pandemic crisis that required teachers and students to update their online teaching/learning knowledge and strategies in rapid ways (e.g., Dhawan, 2020; Donthu & Gustafsson, 2020). Management education has played a key role in acquiring knowledge and skills which can help equip students and teachers to manage throughout the crisis. Students and teachers are required to acquire and advance their knowledge, knowledge structures, skills, attitudes (e.g., values, beliefs, habits) towards using technologies for solving different problems (Kakouris & Liargovas, 2021). Overcoming the pandemic challenges, a set of practices was proposed for faculty and educators to cater for any similar crisis situation in the future. First, teachers and students have developed new skills and knowledge to build a structured blended teaching and learning experience (Shahrill et al., 2021). This can enhance the quality of online education to achieve their intended learning goals. Moreover, blended learning will offer more opportunities in a “flexible, personalized, student-centric and lifelong learning manner” (Shahrill et al., 2021, p. 10). Furthermore, there will be more exchanges of online modules with international partner universities (Ng et al., 2022).

4. Discussion

Bibliometric analysis has been increasingly considered as an effective approach to analyze and map academic research. Throughout this review, 920 articles in the field of management education during the pandemic were retrieved to present corresponding theoretical contributions. After presenting the bibliometric and key themes, this section firstly discussed the background information of the selected studies. Then, this study further underlined the significant advances of online learning studies in management education that extend the existing theories. This review contributes to the relevant literature on highlighting the challenges of online learning in management education. At the end, a management education model is proposed to summarize the findings identified in the previous sections.

4.1. Distribution by background information

This review makes the following contributions. Firstly, this review analyzed the background information (e.g., years, authors, institutions, countries, journals) that can assist researchers to know the influential scholars in a particular field for finding suitable collaborators, identifying appropriate journals, and facilitating resource management. Researchers could understand better which topics are mostly discussed and cited by researchers. In addition, a summary of emergent topics in management education was offered during the COVID-19 pandemic, which supports business and management researchers to identify new areas for future research. Moreover, keywords have been identified and constructed into clusters based on bibliometric and keyword analysis. Future researchers can conduct more systematic analyses, such as meta-analysis and qualitative systematic review to see how the keywords are extracted and discussed using data mining techniques for improving management students' online learning in the post-pandemic world. In addition, articles with high citations can be used as an indicator for researchers to follow and build on future research directions which help them gain a greater understanding of online learning in management education.

Furthermore, through searching relevant studies for the keywords, this study overviewed and gathered relevant topics that required to be addressed in management education research during the pandemic, thus helping educators understand the state of online learning and education development better during the pandemic and what they should do next for resolving the current crisis.

4.2. Extend the existing theoretical frameworks and educational theories

This review advances our understanding of online learning scenarios and strategies used during the pandemic among management educators. Through keyword analysis, this study formulated the key aspects (e.g., pedagogy, technology, learning outcomes) that online educators need to consider. Our findings provide evidence to support some classic educational theories such as the social and cognitive practice in the Community of Inquiry model (Garrison et al., 2010; Shea & Bidjerano, 2012), Technological Pedagogical Content Knowledge theory (Archambault & Barnett, 2010; Graham, 2011), and Affective, Behavioral and Cognitive learning outcome model (Post et al., 2019; Rogaten et al., 2019; Rovai et al., 2009).

Community of Inquiry model (Students' support/needs). The Community of Inquiry model represents a process of creating a deep and meaningful learning experience through the development of social, cognitive and teaching support (Akyol & Garrison, 2011). This model provides evidence of considering students' social and cognitive needs for teachers to design appropriate pedagogies and technologies in management education. For example, the use of video conferencing and social media technology could support students' collaborative learning and facilitate learners' knowledge co-construction to meet students' socialization needs (Khanna et al., 2021; Scaringella et al., 2022). Studies also documented the adoption of pedagogies to facilitate students' cognitive gains through authentic project and problem-based learning. Business students could sustain the disciplines-specific practices such as giving a speech, collaboration in interdisciplinary teams, leading meetings, and reinforcing business school leadership (e.g., Allen et al., 2022; Vieregger & Bryant, 2020). These studies aligned with the Community of Inquiry Framework as an online learning model to facilitate students' knowledge and skill construction in terms of social and cognitive support in instructional design. This serves as essential inputs for students to gain knowledge and socialize with others through well-designed online learning activities.

TPACK design (Teachers' inputs). The TPACK model identifies three types of knowledge educators need to combine for successful technology instructional integration (Chai et al., 2011). It helps with the instructional design of pedagogies and technological

considerations to build students' attitudes, knowledge and skills along their online learning process. Online learning can take many forms including lectures, digital technologies, explanation, and modeling to attain learning goals (Williams & Clark, 2004; Zhang, 2016). Educators can consider different components to offer pedagogical and technological support for facilitating student learning. In this review, the findings identified three most used pedagogies and technologies in online management learning research. A set of pedagogies (e.g., self-regulated learning, problem-based learning, collaborative learning) and technologies (e.g., LMS, social media tools, video conferencing, AI) are highlighted. Teachers can then connect these pedagogies and technologies and develop interactive online learning environments to help build students' knowledge structure in management education.

Affective, Behavioral and Cognitive learning outcome model. The keyword analysis brings three clusters of learning outcomes to help teachers evaluate their learning programs: affective, behavioral and cognitive gain. This aligns with prior educational research that uses the perspective of Affective, Behavioral, and Cognitive (ABC) learning to explain and examine students' learning and cognitive development (Jindal-Snape & Rienties, 2016). In management education, researchers have investigated measuring students' affective learning such as motivation, confidence and attitudes. For example, Zhang et al. (2021) used social media tools to sustain students' attitudes and motivation on learning corporate social responsibility. Moreover, behavioral learning enhances students' changes such as engagement and leadership skills. Student engagement is considered as important factors in educational settings for student learning success (McCormick et al., 2013), and experiences that influence their intrinsic motivation and cognitive gain (Afzal & Crawford, 2022). Afzal and Crawford (2022) investigated students' online learning engagement in an online project of undergraduate and postgraduate project management programs. On the other hand, cognitive learning refers to students' development in knowledge, understanding and other skills such as communication, and digital literacy. Petkova et al. (2021) examined students' teamwork effectiveness using peer-evaluation feedback to maintain students' interaction, keep the team on track, expect learning quality, and equip them with adequate knowledge, skills, supplementing with abilities in an online setting.

To measure students' learning outcomes, a set of assessment methods were identified in the study such as knowledge test, self-reported questionnaire, surveys, interviews, and log data analysis. Francescucci et al. (2020) proposed the use of a self-paced management learning software with assessment tools (e.g., quizzes, progress indicators) to adapt to student needs and facilitate classroom learning with positive manners and attitudes. Regarding assessment methods in management education, surveys, individual/focus-group interviews, and observations were used as external evaluation tools to explore students' learning outcomes in online settings (e.g., Ersoy-Babula & Babula, 2018; Kang & Park, 2022; Petkova et al., 2021). Knowledge tests, examinations and perceived ability and skill tests (e.g., entrepreneurial ability, professional knowledge, soft skill assessments) were incorporated into management educational programs to examine whether students achieve their learning goals set by educators (Kang & Park, 2022; Petkova et al., 2021). Moreover, log data analysis is also helpful for educators to critically analyze students' online learning behaviors in their profiles and record with multimedia content, dialogue (e.g., comments, replies) and commitment (e.g., indicators among participants) to understand students' communication via social networks (Schulz et al., 2020).

4.3. Challenges of online learning and teaching

Before the pandemic, studies had reflected numerous online learning challenges. Students usually met various technical difficulties, time management problems, and insufficient teachers' support, and lacked personal motivation and engagement (Bonk et al., 2015; Hwang & Cruthirds, 2017). The review identified four major challenges that commonly occurred in the selected studies. The findings align with previous work regarding online learning challenges. During the pandemic, students met similar online learning problems, which included technical difficulties with digital equipment, internet connection and interference in addition to inadequate digital literacy skills (Petkova et al., 2021; Sharipov et al., 2021). Students reported themselves to have a lower level of motivation, and find it hard to adapt to new modes in online learning environments (Mousa, 2021). Furthermore, there is a lack of resources (e.g., digital technology, the internet infrastructure) to support the geographically distant and culturally diverse students (Ngoasong, 2022). However, the pandemic brings out the issue of crisis management that educators and students have never met before. Educators and students need to transform their teaching/learning practices, and rapidly equip with necessary knowledge and skills to learn online (Dhawan, 2020). The challenges could help refine the pedagogy and technology design to meet students' social and cognitive needs.

To tackle these challenges, researchers propose practical recommendations to adapt their teaching strategies and strengthen their pedagogies and technologies for enhancing students' business-related knowledge and skills (Mousa, 2021; Ngoasong, 2022).

- The faculty needs to enhance centralized decision making, stakeholder engagement, and international cooperation for sharing good practices (Mousa, 2021). It needs a purposeful effort to bring existing materials into alignment with new perspectives through supplementing, adapting, and transforming those materials (Ngoasong, 2022).
- Teachers need to create modern learning environments, new materials and adapt their existing curriculum to the new execution and delivery modes for enabling dynamic interactions among teachers, learners, subject matter, and settings (Ngoasong, 2022).
- University students need to prepare themselves for digital competencies and discover new opportunities, especially entering the job market and society (Coraiola et al., 2022). It is important for them to obtain knowledge and digital literacy about how to conduct business online, and recognize business, commerce in addition to work opportunities (Shahrill et al., 2021; Sharipov et al., 2021).
- In the management industry, businessmen and entrepreneurs were suggested to evaluate their relevance in the business-related learning programs. Companies need to take care of their readiness for digital transformation and application of the latest digital technologies to overcome various challenges (Sharipov et al., 2021).
- Management professionals need to learn how to utilize emergent technologies in fighting these challenges, and the pandemic or similar crisis in the future for facilitating business automation, user journeys and decision making (Aggarwal & Elembilassery,

2022; Dwivedi et al., 2020). Sheng et al. (2021) and Dwivedi et al. (2020) are cases in point. They recognized the great potential of Artificial Intelligence and big data analysis which aim at catering for the future pandemic management and exploring how people can leverage digital technologies for better decision making.

- At the same time, researchers also raised the importance of responsible management education that people need to handle technologies critically and ethically (e.g., Haski-Leventhal et al., 2020; Schulz et al., 2020).

4.4. A proposal: management education model of online learning

During the pandemic, digital transformation and online learning have become a necessity for universities worldwide. Universities and management educators may no longer be dependent upon the traditional forms of learning as they need to cope with different challenges posed by globalization (e.g., crisis in the pandemic, global competitiveness). To understand the widespread globalized management education, universities and management educators need to identify widespread globalized situations, shape students' learning and development, knowledge delivery and educational mechanisms. Bibliometric analysis is a meaningful approach for them to learn essential information on the global situation and trend of management education in addition to prospect research opportunities. They would meet various scenarios for digital transformation to equip students with necessary knowledge and skills for enhancing efficiency, high-quality learning experience, business agility and unlocking value for employees demonstrated in their future workplace. Before the pandemic, educators and students had several common online teachings or learning challenges such as motivation problems, technological issues, digital transformation, and decision-making in (pandemic) crisis situations. During this time of uncertainty, universities need to be adaptive and flexible on designing new solutions when they are facing emerging challenges and considering students' social and cognitive needs which help establish meaningful learning support. Management academia worldwide are pushed to improve their virtual administrative, pedagogical, and technological capabilities for satisfying the demand of stakeholder parties. They use technologies (e.g., AI, big data, cloud computing) to trigger paradigm shifts, and refine their curriculum in addition to content knowledge with suitable pedagogies for designing and delivering meaningful digital learning. Evaluation is necessary to understand students' learning outcomes (e.g., affective, behavioral, cognitive dimensions) and needs, which help refine their interventions, pedagogies and technologies.

In brief, the impactful global pandemic changes accelerate the management academia to shape and restructure the process of building meaningful experience in terms of the aforementioned dimensions. Universities have been under tremendous pressure from the government and the public to restructure their education systems according to the impactful changes in socio-economic and socio-political situation (Mohamed Hashim et al., 2022). Therefore, the management education model of online learning adapts from the existing theories (e.g., Community of Inquiry model, the affective, behavioral and cognitive learning outcomes, and the Technological Pedagogical Content Knowledge theory) to summarize the identified themes for online management education which improve students' learning experience for future digital transformation.

Based on these classic theories, a model is proposed to illustrate the instructional design for online management education to summarize the four key themes (i.e., pedagogy, technology, learning outcomes, and challenges) generated by the bibliometric and thematic analysis (see Fig. 7). The model has been proposed by Su et al. (2022) to design instruction in AI-driven online learning environments. Ng et al. (2022) proposed that online educators should consider students' social and cognitive needs to design instructional inputs, which could be incorporated in management programmes. Su et al. (2022) further designed an instructional design framework to indicate the relationship between pedagogy, technology, students' learning outcomes and challenges in an AI-driven online learning environment.

The development of the model could support future strategic management practices in higher education and companies for online education or training and digital transformation. The model gathers empirical insights and identifies important considerations which are dedicated to embracing rapidly changing conditions of the management and education industry to generate meaningful students' learning experience. Through integrating online training or education and digital transformation capabilities, management educators, universities and companies could leverage their knowledge delivery via distance learning and innovative approaches. To sum up, the model consists of four dimensions: (1) challenges, (2) social and cognitive support, (3) pedagogy, technology and content, supplementing with (4) learning outcomes.

5. Conclusion

After the three-year COVID-19 pandemic, online learning and education have become part of mainstream education (business as usual). This review presented an overview of the state of management education during the pandemic by examining 920 studies from 2020 to 24 December 2022. Through analyzing the most frequently cited articles, countries or regions ranked by the number of publications, trend of publications, countries and highly cited journals, this review aims to facilitate researchers and practitioners to gain a deeper understanding of current trends and impacts of online learning in management education aroused from the pandemic on. Moreover, this review updated researchers, educators and policymakers a detailed and comprehensive picture of current online learning scenarios during the pandemic, which is essential for scholars and educators to be committed to the growth and development of management education.

Faced by powerful drivers of the pandemic changes, this review brought management education scholars, practitioners, and stakeholders together to identify recent trends and to critically analyze key themes from their respective perspectives. This study explores changes, opportunities, and challenges around themes such as pedagogy, technologies and learning outcomes. Based on subjective bibliometric and keyword analysis, studies were identified to reflect present situations for the future of management

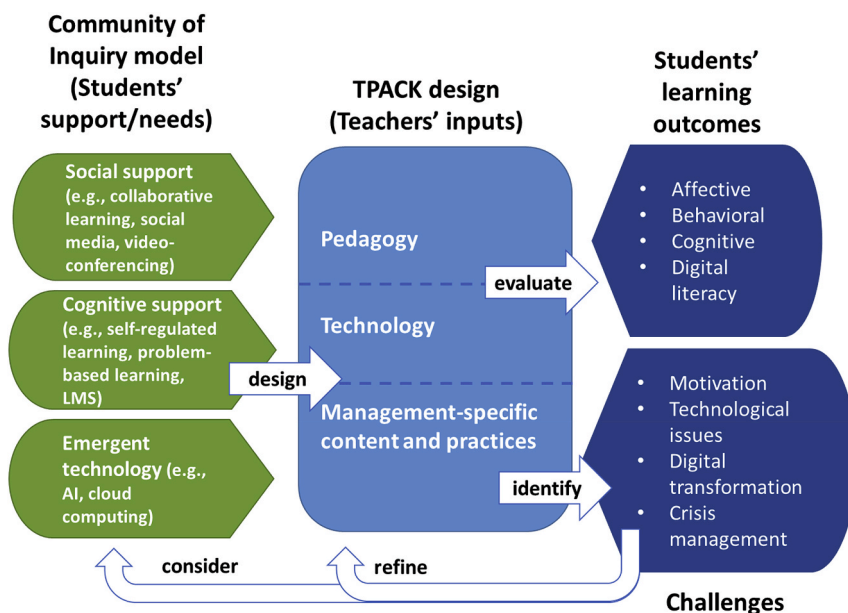


Fig. 7. Instructional design framework for online management education (adapted from Su et al., 2022).

education. First, it gives an overview of online learning in management education. On the other hand, it aligns with existing educational theories including Community of Inquiry Model, the Technological Pedagogical Content Knowledge theory, and the affective, behavioral and cognitive learning gains. Furthermore, an instructional design framework is proposed to connect all of the components suggested by the main clusters which facilitate future educators to develop their instructional design. The evidence is essential for scholars, educators and administrators to grow, improve and develop effective strategies which shape the management education of the future.

Through the empirical evidence of online learning research in management education, this review confirms the roles of management education on acquiring stakeholders in the management industry with digital knowledge and skills that can help manage future crises. While global leaders work actively to respond to the crisis, it is also of paramount importance for them to organize a network of teams, engender stability, mobilize their organizations by setting clear priorities for the response, and empower people to discover and implement solutions to serve these priorities. During a crisis, a network of management teams conducted responsive measures to maintain normal operations and adjust routine business activities. The roles of education have become important to facilitate these teams with mindsets, abilities and digital competencies for better preparation in making appropriate adjustments and decisions during the crisis. This research assists the public and private institutes to summarize the most important research trends and issues on business or management education throughout the pandemic, thereby facilitating them to arrange policies and implementations for future crises.

Two limitations were identified. Although bibliometrics provide subjective insights to identify a fuller understanding of a situation using statistical software, it may not necessarily be accurate and thorough as the subject breath, depth and coverage may not be considered. The following example is a case in point. ideas in low-cited papers in top journals may have a good quality; it is not wise to distinguish the papers according to citations. Moreover, the articles chosen to be discussed in each theme may fail to turn up related materials that don't specifically use the search terms. Therefore, articles may merely mention the terms while they did not deeply discover how the terms were used, which may have issues on reliability.

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Author statement

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Data availability

Data will be made available on request.

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