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# Utilization of Universities' Massive Online Open Courses in Learning Management System: Research Trends and Bibliometric Analysis

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**ABSTRACT**

**Objective:** This study aims to explore research trends related to the use of Massive Open Online Courses in Learning Management Systems (MOOCs in LMS) in university environments and to conduct bibliometric analysis to understand research developments related to this topic. Online learning is increasingly popular with the MOOCs in LMS, which allows students to learn flexibly and independently through digital platforms. **Method:** The data is retrieved from the Google Scholar database, using keywords related to MOOCs in LMS and universities. This study uses a bibliometric analysis method using the Google Scholar and VOSviewer databases, which obtained 1,710 articles. **Results:** The results show that the use of MOOCs in LMS in the context of university learning has become an increasingly popular research topic in recent years, where the publication rate has increased significantly. This has the potential to be further investigated in the future. Further research related to MOOCs in LMS can be integrated with blended learning models. This is because the Blended learning model using MOOCs can improve critical thinking skills and problem-solving. This research has limitations, namely using only one database, Google Scholar, to obtain research data. **Novelty:** Therefore, it is recommended that MOOCs in LMS research at universities be carried out using other databases besides Google Scholar to obtain broader data.

## INTRODUCTION

21st century requited some specific academic abilities, skills, and knowledge of the learners. Higher education is an integral part of the education system, providing opportunities to develop academic abilities, skills, and knowledge in specific fields (Obloberdiyevna & Tuychiyevna, 2022; Dwikoranto et al., 2020). However, with the development of technology, higher education must also follow these changes. The use of technology in learning is a solution to overcome the challenges faced in the digital era (Wijaya et al., 2016). Massive Open Online Course in Learning Management System (MOOCs in LMS) is an increasingly popular learning technology in higher education (Belawati, 2019; Gusty et al., 2020; Simanihuruk et al., 2019). MOOC LMS enables students to access learning materials flexibly and independently through digital platforms (Pambudi & Wibawa, 2020). The use of MOOCs in LMS university environments provides various benefits, such as improving the quality of learning, reducing costs and time required for learning, and facilitating access to education for students who are in remote or remote locations (Farhan et al., 2019; Widyastuti et al., 2022). This technology also helps tertiary institutions develop and manage learning programs effectively and efficiently (Gusty et al., 2020; Mayulu et al., 2022).

MOOCs in LMS can also improve student learning outcomes in the university environment. By using MOOCs in LMS, students can access learning materials more flexibly and independently (Patandean & Indrajit, 2021) to learn more effectively and efficiently (Belawati, 2019). In addition, MOOCs in LMS also enable teachers to provide faster and more precise feedback to students to help them understand learning concepts better (Fajrillah et al., 2020; Khairi et al., 2022). Research by (Ikhwani & Kep, 2021; Saputro et al., 2022) also shows that using MOOCs in LMS can increase student involvement in learning and motivate them to be active in the learning process. In addition, MOOCs in LMS can also increase accessibility and inclusiveness for students with special needs or remote locations (Cinquin et al., 2019; Zdravkova et al., 2022). With increased student learning outcomes, it is hoped that the use of MOOCs in LMS in the university environment can strengthen the role of tertiary institutions in producing quality graduates who are ready to face challenges in the era of globalization (Lopukhova & Makeeva, 2017; Mishra et al., 2020).

Moreover, during the COVID-19 pandemic that hit almost the entire world, MOOCs in LMS became very important and helped maintain the continuity of university learning (Reimers et al., 2020). Social restrictions and physical distancing that must be maintained make face-to-face learning difficult. However, by utilizing LMS MOOC, students and teachers can continue online learning remotely (Kumar & Al-Samarraie, 2018). This makes MOOCs in LMS even more relevant and needed during the COVID-19 pandemic and shows how important this technology is in improving the quality and effectiveness of learning in the university environment (Khan et al., 2020; Xie et al., 2020). In addition, the use of MOOCs in LMS can also help overcome learning losses due to the COVID-19 pandemic (Kurniawan, 2021). Learning loss occurs when there is a loss or decrease in the quality of learning caused by school absences, ineffective distance learning, and learning fatigue (García & Weiss, 2020; Zhdanov et al., 2022). This causes students to experience difficulties in understanding concepts and learning materials, so their learning outcomes decrease. In this case, MOOCs in LMS can be the right solution to overcome learning loss (Reich, 2020). Through the MOOCs in the LMS platform, students can access various quality learning resources and learning content from around the world to gain a better understanding and additional knowledge (Belawati, 2019).

By utilizing MOOCs in LMS, it is hoped that students can obtain more optimal learning outcomes to overcome the learning loss due to the COVID-19 pandemic. This will help improve the quality and effectiveness of learning in the university environment. MOOCs in LMS can also broaden the scope of learning and provide opportunities for students to gain additional knowledge and skills that cannot be obtained in traditional classes (Israel, 2015; Simanihuruk et al., 2019). For example, MOOCs in LMS enable students to access learning content from leading sources worldwide to broaden their horizons and knowledge in specific fields (Rosenbusch, 2020; Simanihuruk et al., 2019).

Although MOOCs in LMS in the university environment provide various benefits, many obstacles and challenges still need to be encountered in implementing this technology. Some challenges include limited internet access, difficulties developing appropriate learning content, and teachers' and students' lack of support and motivation (Sarker et al., 2019). Of course, in implementing MOOCs in LMS in a university environment, careful preparation and strategies are needed. Efforts must be made to ensure that all parties involved in the learning process, including teachers and students, have adequate access to and understand how to use the MOOCs in the LMS platform

(Huang et al., 2020; Mishra et al., 2020). In addition, developing appropriate and helpful learning content is also an essential factor in successfully implementing this technology.

Research related to the use of MOOCs in LMS in the university environment is essential because this technology can affect the quality of learning in tertiary institutions. Therefore, exploring research trends related to MOOCs in LMS in universities and carrying out bibliometric analysis to understand related research developments is essential. This can help academics, researchers, and policymakers understand trends and research topics related to MOOCs in LMS in universities to develop strategies and policies that are more effective in using these technologies in university learning. Through research and bibliometric analysis, more comprehensive information and understanding will be obtained regarding MOOCs in LMS in university environments, including trends and challenges in implementing this technology. That way, universities can make the right decisions and strategies to improve learning quality and effectiveness and provide optimal student benefits.

This study will conduct bibliometric research. Bibliometric analysis is a method used to identify research trends, contributions of researchers, and the most researched research topics in a field (Lin et al., 2022). In the context of MOOCs in LMS in universities, bibliometric analysis can be used to understand publication trends, the most published journals, the most prolific authors, and the most researched research topics (Gao et al., 2021). Previous research by Prahani et al. (2022) conducts the bibliometric to LMS in field education during a decade by Scopus. However, few identified research trends on MOOCs in LMS in universities are still identified. Therefore, the novelties of this research examine the update on the use of MOOCs in LMS in universities and fulfill the recommendation of previous research. Also, this research has presented a review of the highest relevance journal that can be referenced for further researchers to develop MOOCs in LMS. Other than that, the previous research conducted bibliometrics in MOOCs in LMS using the Scopus database. Hence, this research tends to conduct bibliometrics using Publish or Perish (PoP) to compare the findings. Therefore, it is hoped that we can understand more about the use of MOOCs in LMS in the university environment and how this method can increase students' learning motivation, independence, and critical thinking. The information generated from the bibliometric analysis can also help the world of education, especially universities, optimize the use of MOOC LMS in the future. In addition, bibliometric analysis can provide insight into future research trends and enable researchers and educators to identify knowledge gaps that need to be filled in the future (Tlili et al., 2022).

Therefore, this study aims to conduct a mapping analysis of the use of MOOCs in LMS in universities. This research will look at the opportunities for using MOOCs in LMS in universities in the future by analyzing the top 10 relevant articles that showed the most and less used keywords to find the novelties for further research and the prominent authors through the MOOCs in LMS publications. The results of this study will provide a deeper understanding of the use of MOOCs in LMS in universities and provide a foundation for further development in this field.

## RESEARCH METHOD

In this study, a bibliometric analysis was carried out using quantitative methods focusing on national journal publications. This research uses the Publish or Perish database as an alternative to finding indexed literature with comprehensive coverage from various nationally reputable publishers. This bibliometric analysis was carried out to provide a

broader understanding of all disciplines and see the visualization of the mapping of publication trends and the contribution of articles to the development of knowledge (Guo et al., 2019; Karakus et al., 2019; Yulianingsih et al., 2020; Dawana et al., 2022b).

**Figure 1** shows the process of data analysis using the bibliometric analysis method. The first step is to determine keywords such as "( MOOCs in LMS university)," and 1,710 articles were found, which were the data source for this research as an initial search result and refinement of the research. Furthermore, data were gathered and downloaded. Then the data obtained were then processed using Ms. Excel and VosViewer to get a bibliometric mapping as a data analyzing process.

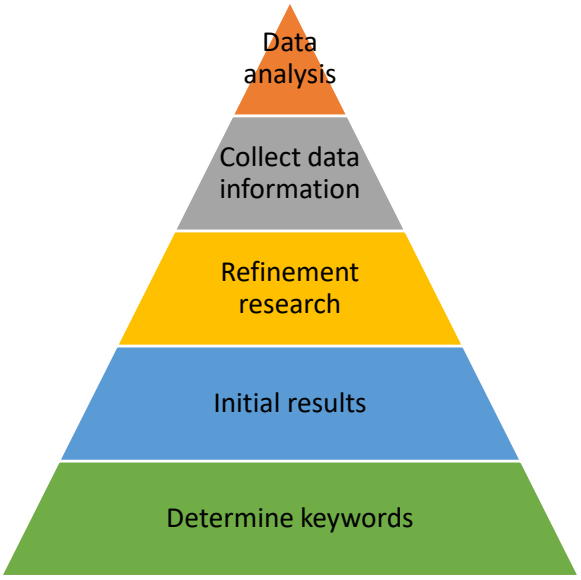



**Figure 1**. Five steps in performing a bibliometric analysis.
(Dawana et al., 2022; Saphira et al., 2022; Suprapto et al., 2021b)

This research was conducted on March 15, 2023, from 2012 to 2022. This bibliometric analysis can provide an understanding of novelty and trends in research, thereby helping researchers and educators identify knowledge gaps that need to be filled in the future. future (Suprapto et al., 2021a; Jatmiko, 2021). This method maps research trends using the Vosviewer software to show the co-occurrence of relationships between authors, documents, and keywords related to the research topic (Dawana et al., 2022a). The analysis was carried out by looking at network and overlay visualizations, which were then analyzed to see the relationship between learning at the university and using MOOCs in LMS at the university. Through this research, it is hoped that it will be known how MOOCs in LMS can be utilized in learning at universities and provides essential information for the development of learning methods in the future.

## RESULTS AND DISCUSSION

### *Result*

Based on search findings from the google scholar database, which was carried out using the keyword " MOOCs in LMS university," which produced a total of 1,710 articles, then the files were retrieved in (.csv) and (.ris) formats, which were then analyzed with MS.Excel and using VosViewer software. Then generate results that will systematically sort which are most relevant to identify keywords with the highest relevance level, as shown in **Table 1.**

**Table 1**. Top 10 articles with the highest relevance google scholar database.

| Authors | Results |
|---|---|
| (Praherdhiono et al., 2018) | The results showed that the MOOC learning culture is similar to the learning culture in the LMS. |
| (Putra et al., 2018) | LMS Innovation Makerspace strategy that utilizes unique experimentation via MOOCs was found helpful in boosting vocational learners' career readiness. |
| (Cahyono & Munawar, 2020) | UNNES MOOCs can be provided to all UNNES students, learners from affiliated institutions, or the general public. It is applied in order to improve the accessibility, performance, and effectiveness of educational endeavors. For future progress, additional investigation is required. |
| (Wonorahadjo & Dasna, 2021) | In this LMS platform, all activities can be adapted to the needs of the community, which are sustainable and have a broad reach. MOOCs also have a large capacity to enable a university to serve the general public. |
| (Harjanto et al., 2018) | E-Learning in Basic Nursing Profession Practice and Nursing Management Professional Practice has been implemented. Institutional policies, efforts to achieve learning objectives by the lecturer in charge, and the flexibility of learning media are opportunities that were discovered during the program's implementation. On the other hand, technical constraints, limited internet access, and weak mentoring and supervision are challenges in implementing professional nurse education with e-Learning integration. These challenges and opportunities need to be managed appropriately so that the outcomes of nursing education can be achieved with support through online learning. |
| (Maqbul, 2020) | The findings of the current research are connected to the function of MOOC in studying Al-Quran, which has several systems that may be used, such as those that are website-based (Tahfidzintensive, pesantren sites, JagoQuran) and others that use digital platforms such as WhatsApp, Facebook, and others. The distinction between MOOC and LMS may be found in their execution, with MOOC serving as the course and LMS serving as the platform. |
| (Harjanto, Sumunar, et al., 2018) | E-learning in rotational nursing schools is an uncommon occurrence in Indonesia. As measuring instruments for the assessment of programs, practical lecturers' assessments based on national nurse competency assessment products, the happiness of learners, and |

| Authors | Results |
|---|---|
| | university partnerships' recommendations were employed. Future e-learning projects and initiatives should be developed to improve the education of nurses in clinical rotation since achieving learning goals would be more achievable. |
| (Agsera & Adri, 2020) | Based on the test results, 85% of users stated that they were helped by this DMOT and had been able to improve participants' ICT skills to be implemented in their business. |
| (Darmi et al., 2022) | The results of the activities of 85% of lecturers in the Public Administration study program environment can organize distance learning through E-learning provided by the campus and Google Classroom. |
| (Aldosari et al., 2022) | The study discovered that the proposed strategy, which is based on models of instructional design that use OERs, such as blogs, audio recordings, and additional assets, may enhance both the effectiveness and quality of learning, provide students with skills, and help the Kingdom of Saudi Arabia accomplish sustainable development goals in education. |

**Table 1** is the result of a search of the top ten articles most relevant to the research topic "MOOCs in LMS Universities" in the Google Scholar database. These top ten articles are essential references in studying the use of MOOCs in LMS universities. Of the ten articles, the article with the highest level of relevance was ranked first. Therefore, further research on using MOOCs LMS in universities can significantly benefit future education development.

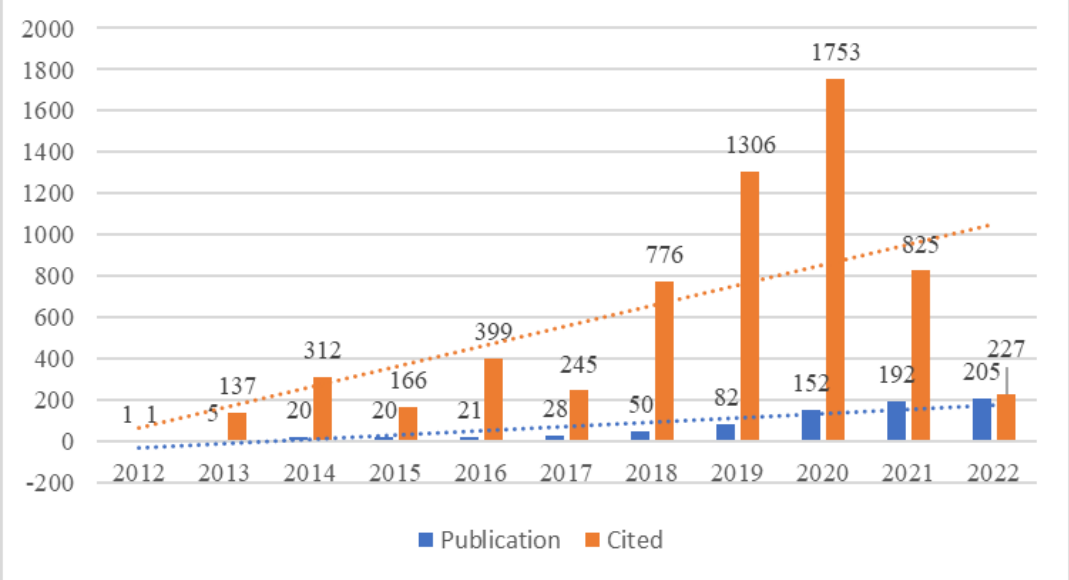



**Figure 2.** In the last ten years, several Google Scholar database publications and cites of MOOCs in LMS in university.

**Figure 2** shows trends in the results of MOOCs in LMS research at universities on the Google Scholar database, which is an essential indicator in identifying developments and challenges in the field of MOOCs in LMS learning. In addition, mapping bibliometric analysis was carried out with Vosviewer software and visualized as an analysis network with the university MOOCs in LMS keywords. As a result of the investigation, the network analysis mapping depicted in **Figure 3** was obtained.

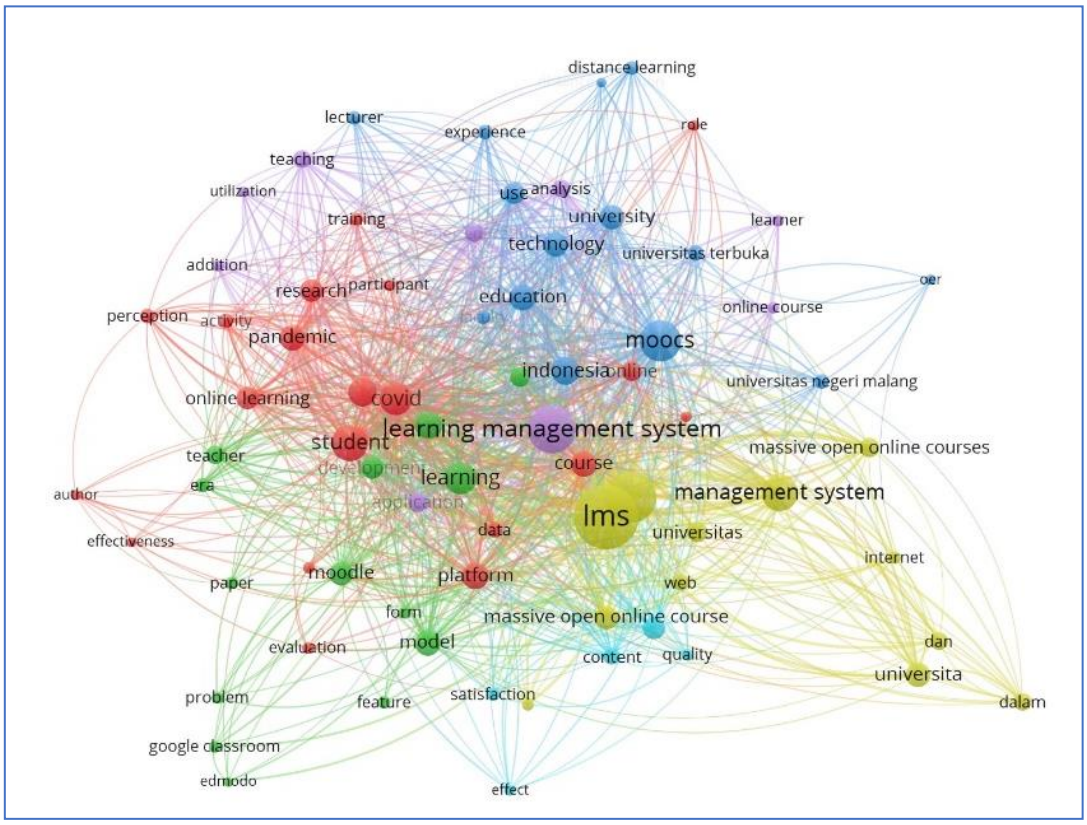
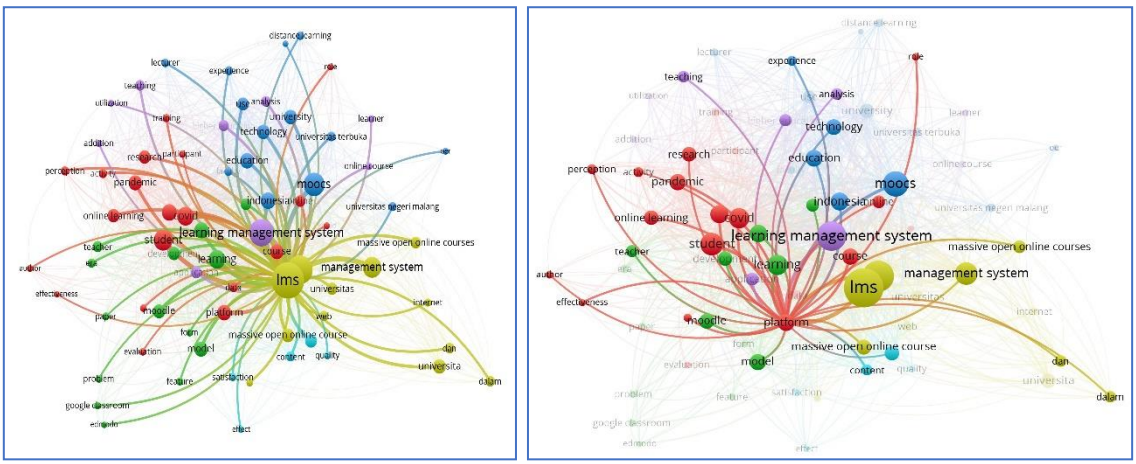



**Figure 3**. Mapping on university MOOCs in LMS on the Google Scholar database.

The results of mapping the research trends of MOOC LMS at universities are shown in **Figure 3**. This mapping aims to find the latest research based on mapping trends. The mapping results show 6 **MOOCS LMS** clusters at the university.



(a) (b)

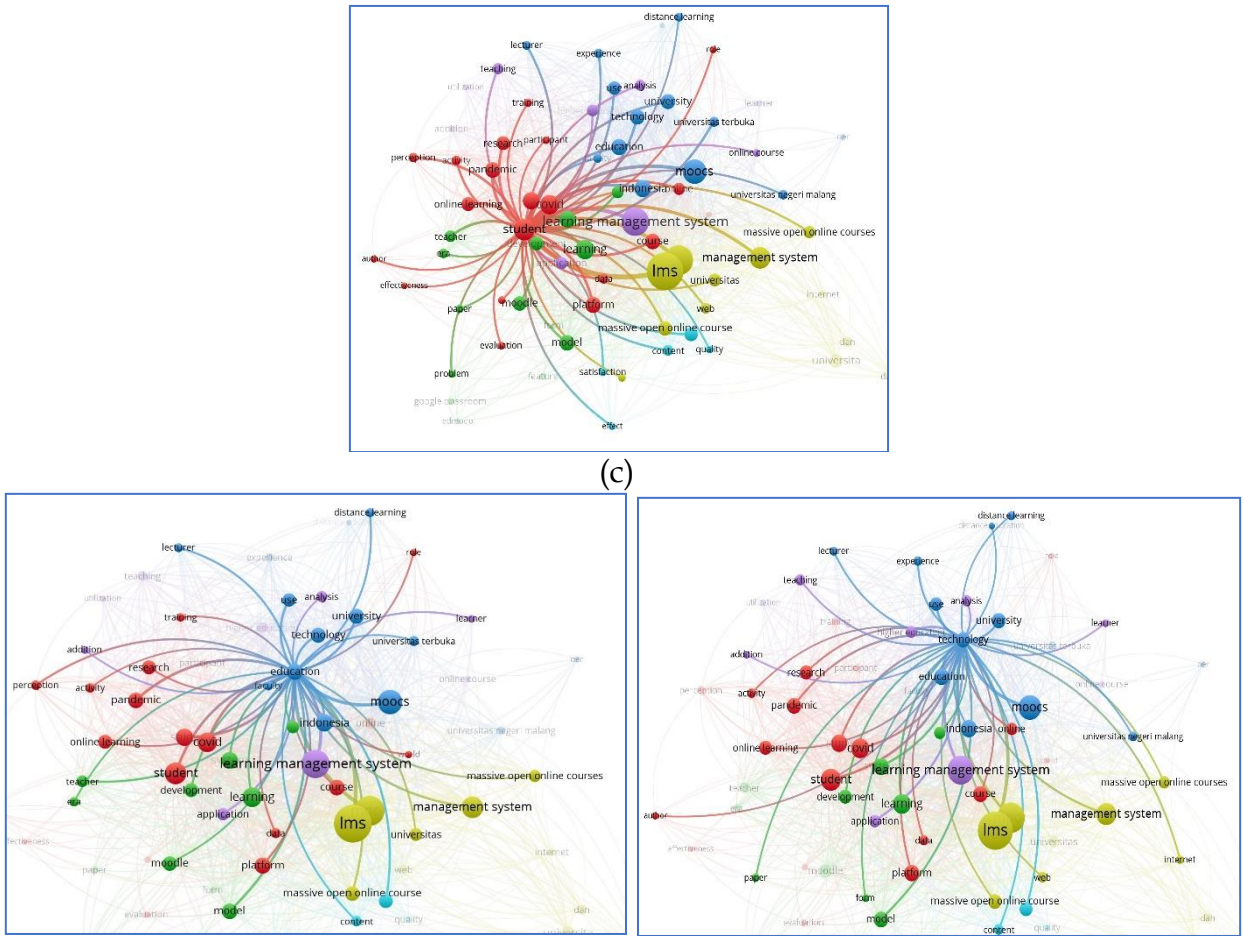



**Figure 4**. More specific keyword mapping results with topics a) LMS, b) platform, c) student, d) education, e) and technology.

**Figure 4** shows an example of mapping keywords more specific to MOOCs in LMS at universities, namely LMS, Platform, Student, Education, and Technology. There are five related authors based on the 47 authors in the information for related co-authors. From the results of the bibliometric mapping, there is still no one to discuss or see for this topic, so this could be potential for further research.

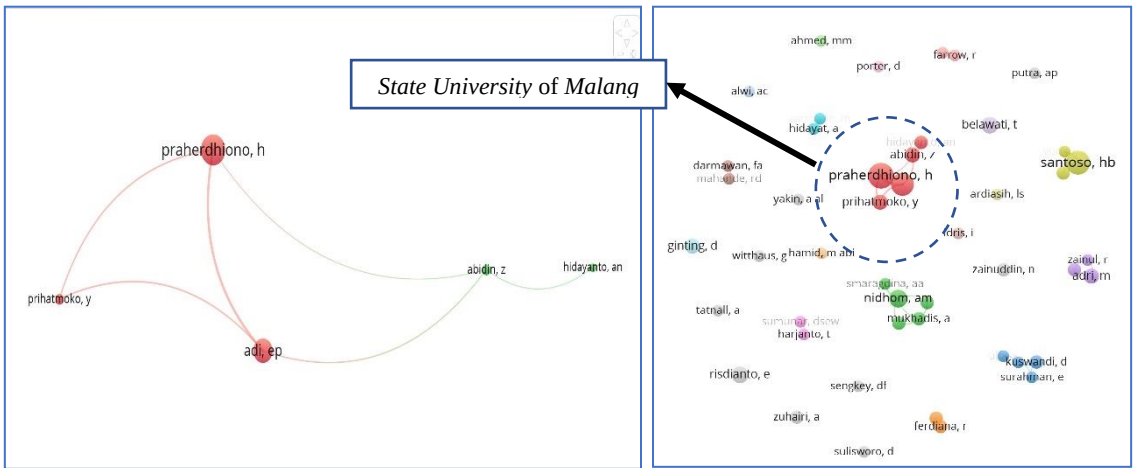



**Figure 5**. Based on the Google Scholar database, top author visualizations and overall author visualizations in database Google Scholar.

***Discussion***

Based on the research that has been conducted. The study's results based on **Table 1** show that MOOCs in LMS are an effective E-Learning-based technology in enhancing university learning. In addition to increasing student learning outcomes, MOOCs in LMS can also increase learning motivation in distance learning. MOOCs can also be used as a digital-based marketing exercise for entrepreneurial students. Within website-based learning, MOOCs can provide a practical learning experience and help students develop a culture of continuous learning throughout lectures. Therefore, this topic is crucial for further research in the future. MOOCs in LMS are an effective and innovative E-Learning-based technology for enhancing university learning (Harjanto & Sumunar, 2018). MOOCs in LMS in universities provide many benefits, such as increasing the accessibility and flexibility of learning and allowing students to study at a pace and style that suits their needs (Patandean & Indrajit, 2021; Veluvali & Surisetti, 2022).

In the context of online learning, which is increasingly popular and essential in today's digital era, MOOCs in LMS can be the right solution to meet learning needs that are more effective and efficient (Setia et al., 2019). In addition, MOOCs in LMS also allow for interaction between students and teachers and allow the use of various technologies and multimedia in the learning process (Miranda et al., 2021). This can enrich students' learning experiences and help increase their motivation. Therefore, research on MOOCs in LMS in universities is fundamental to continue developing and improving to provide more significant benefits for students and educational institutions.

MOOCs in LMS learning achieve higher scores than students who use conventional learning methods. This is per research by Bralić & Divjak (2018) and Mohamad et al. (2019), which shows that using MOOCs in LMS can improve student learning outcomes, learning motivation, and critical thinking skills. This research also aligns with De Freitas et al. (2015), who found that MOOCs in LMS can increase interaction between students and teachers and provide a more varied and exciting learning experience. This shows that MOOCs in LMS can be an effective tool in improving student learning outcomes. In addition, using MOOCs in LMS can also increase student learning motivation because the learning experience is more exciting and interactive (Namestovski et al., 2018). Students can access learning materials anytime and anywhere and interact with students and teachers worldwide through discussion forums or chat rooms (McKnight et al., 2016). Research (Miranda et al., 2021) also shows that MOOCs in LMS can improve students' critical thinking skills. Some tasks and activities require students to solve problems and think critically and creatively. This is very important in equipping students with the skills needed in an increasingly complex and changing world of work (Mutohhari et al., 2021).

F**igure 2** shows that the number of publications about MOOCs in LMS at universities has increased significantly yearly. In addition, there has been a significant increase in the number of citations received by these publications (Albreiki et al., 2021; Turnbull et al., 2021). In 2012, there was only one publication about MOOCs in LMS at the university with only one citation. However, in 2013, the number of publications increased to five, and the number of citations also increased significantly to 137. The increase in the number of publications and citations continued in the following years, although there were several years when the number of publications remained stagnant. In 2014 and 2015, the number of publications remained at around 20, and the number of citations decreased. However, in 2016, there was an increase in the number of publications to 21, while the number of citations increased sharply to 399 citations. This increase continued in the following years, with a significant increase in publications and citations from 2018 to

2020. In 2021, the number of publications reached 192, totaling 825 citations. However, in 2022, the number of citations decreased to 227, but the number of publications increased to 205.

**Figure 2** shows a clear trend in the use of MOOCs in LMS universities, where MOOCs in LMS are increasing exponentially yearly. This suggests that using MOOCS LMS is increasingly important in higher education. More and more universities are using it to improve the quality of learning and address the challenges of distance learning. As a result, it can significantly contribute to education and improve the quality of learning in universities. Previous research by Irwanto et al. (2023) also showed increased publications over the same period. Therefore, research on MOOCs in LMS learning requires further efforts from researchers to maintain consistency in the number of publications and develop new methods and techniques in studying this topic. In this context, research on learning using MOOCs in LMS universities is an exciting topic for research in the future because there is still much that is unknown, and there are many extraordinary research possibilities in this field.

Based on **Figure 3**, the first cluster in red (n = 20) focuses on distance learning or learning during a pandemic, such as a pandemic, online learning, MOOC platforms, etc. MOOC is one type of online learning platform that is widely used (Agsera & Adri, 2020; Darmi et al., 2022). Then obtained is a cluster with a green color (n = 14) that focuses on the implementation and use of learning platforms such as learning, google classroom, Moodle, implementation, teacher, etc. Furthermore, clusters with dark blue color (n = 14) were obtained, focusing on distance learning approaches, such as distance education, distance learning, MOOCs, lectures, etc. Furthermore, the yellow cluster (n = 12) focuses on online learning outcomes at universities, focusing on platforms such as universities, the internet, video, web, MOOC, LMS, etc. The cluster with purple color (n = 9) focuses on the use and application of technology in online learning, such as online courses, teaching, utilization, application, etc. Finally, the light blue cluster (n = 6) focuses on e-learning, quality, satisfaction, and effect, which has more occurrences of minor keywords and research focus.

**Figure 4a-b** shows that MOOCs in LMS research trends at universities have great potential to be explored further because the topic has broad coverage and is flexible in its application (Setia et al., 2019). In this case, the MOOCs learning platform can contribute to education, such as web-based learning, and can be used for distance learning. Then, if we look at **Figure 4c-e**, there is a relationship pattern of many connections; this topic can also be explored further because MOOCs in LMS can contribute and focus on online and distance learning. By utilizing the MOOCs in LMS E-Learning-based learning platform, educational institutions can provide access to online courses and learning materials that students worldwide can use without being constrained by geographical distance or time factors. MOOCs can also help motivate learning (Veluvali & Surisetti, 2022). In addition, MOOCs can be a valuable platform for developing skills and problem-solving because the platform can provide access to classes taught by leading experts and practitioners in various fields (Bendezu-Quispe et al., 2020). MOOCs can also be used as a measure of skills and student learning outcomes (Lu et al., 2017). Overall, MOOCs have great potential to change the way we learn and help students from around the world gain access to quality education. By leveraging bibliometric mapping, we can continue to develop and improve our use of MOOCs to help meet our future educational needs.

Three clusters are depicted in **Figure 5(a):** red cluster with three authors and green cluster with two authors. Based on the Google Scholar database, it can be seen that

Praherdhiono, H. is the Top Author with a prominent visualization, namely the big red circle in the middle of the MOOCs in the LMS topic at the university. **Figure 8 (b)** is a visualization without being limited by connections to one another. It can be seen that Praherdhiono, H from Malang State University is the Top Author on this research topic in the Google Scholar database. This means that Praherdhiono, H. is a MOOCS LMS research contributor at universities on a national scale indexed by Google Scholar. It is in line that Praherdhiono H.'s paper is one become the top 10 most relevant papers according to Table 1 (Praherdhiono et al., 2018).

The trend of MOOCs in LMS publication topics at universities has experienced a significant increase. The recommendation for further research is to utilize the MOOCs in the LMS platform to develop a curriculum based on MOOCs that universities can use. Curriculums can help increase educational accessibility and flexibility while ensuring students acquire knowledge and skills relevant to learning (Volungeviciene et al., 2020). Recommendations The following study is about the use of video in MOOCs: Videos have become an essential part of MOOCs and can be used to provide a clear explanation of complex learning material. Based on research by Bayeck & Choi (2018), MOOCs can be used to evaluate the use of video in MOOCs, focusing on its effectiveness and attractiveness to students.

Moreover, Evaluation of blended learning models with MOOCs: Blended learning, a combination of online and face-to-face learning, is increasingly popular in universities. Research can be conducted to evaluate blended learning models that use MOOCs, focusing on their effectiveness in enhancing student learning (Bralić & Divjak, 2018; Gynther, 2016). The limitation of this study is using the Google Scholar database, so it can only visualize data from Google Scholar. This is a challenge for future research, whether there is an increase in research topics because the MOOCs in LMS topics at this university have the potential to be studied in the future.

## CONCLUSION

**Fundamental Finding:** The trend of MOOCs in LMS publication topics at universities has experienced a significant increase. This is a challenge for future research, whether there is an increase in research topics because the MOOCs in LMS topics at this university have the potential to be studied in the future. Based on research mapping, it is known that MOOCs in LMS research trends in universities: 1) focus on online learning such as internet, video, web, MOOC, and LMS; 2) Focusing on the use and application of technology in learning, online courses, teaching, utilization, application. 3) focusing on the results of implementing and using learning platforms such as google classroom, Moodle, implementation, and teacher. **Implication:** The implication of this study is the discovery of several examples of novelty in the topic of MOOCs in LMS learning at universities so that this research can be used as a reference for further research using MOOCs in LMS. This research also found the most relevant articles related to MOOCs in LMS Universities in the Google Scholar database and the authors with the most significant links from each journal. **Limitation:** Therefore, this study also limits the future research trends that may develop on this topic. This study recommends finding updates in the MOOCs in LMS studies at universities by integrating the Blended learning model that uses MOOCs because it can improve students' critical thinking skills and problem-solving. **Future Research:** The existence of this research can be used as a reference for further research on MOOCs in LMS at universities. Further research related to MOOCs

in LMS at universities should be developed by utilizing other database sources besides Google Scholar.

## REFERENCES


Agsera, N., & Adri, M. (2020). Pengembangan digital marketing online training berbasis learning management system moodle bagi mahasiswa wirausaha UNP. *Jurnal Vocational Teknik Elektronika Dan Informatika*, *8*(4), 1-11.

Albreiki, B., Zaki, N., & Alashwal, H. (2021). A systematic literature review of student performance prediction using machine learning techniques. *Education Sciences*, *11*(9), 1–27. https://doi.org/10.3390/educsci11090552

Aldosari, A. M., Eid, H. F., & Chen, Y. P. P. (2022). A proposed strategy based on instructional design models through an LMS to develop online learning in higher education considering the lockdown period of the COVID-19 pandemic. *Sustainability (Switzerland)*, *14*(13), 1-14. https://doi.org/10.3390/su14137843

Bayeck, R. Y., & Choi, J. (2018). The influence of national culture on educational videos: The case of MOOCs. *International Review of Research in Open and Distributed Learning*, *19*(1), 1–16.

Belawati, T. (2019). *Pembelajaran online*. Universitas Terbuka.

Bendezu-Quispe, G., Quijano-Escate, R., Hernández-Vásquez, A., Inga-Berrospi, F., & Condor, D. F. (2020). Massive open online courses for continuing education for nursing professionals in peru. *Revista Latino-Americana de Enfermagem*, *28*, 1-10.

Bralić, A., & Divjak, B. (2018). Integrating MOOCs in traditionally taught courses: Achieving learning outcomes with blended learning. *International Journal of Educational Technology in Higher Education*, *15*, 1–16. http://dx.doi.org/10.1186/s41239-017-0085-7

Cahyono, A. N., & Munawar, A. (2020). UNNES MOOCs: What strengths does the university have, and the society needs? *Journal of Physics: Conference Series*, *1567*(3), 1-7. https://doi.org/10.1088/1742-6596/1567/3/032026

Cinquin, P. A., Guitton, P., & Sauzéon, H. (2019). Online e-learning and cognitive disabilities: A systematic review. *Computers & Education*, *130*, 152–167. https://doi.org/10.1016/j.compedu.2018.12.004

Darmi, T., Anwar, F., & Mujtahid, I. M. (2022). Akselerasi pengembangan pembelajaran jarak jauh untuk mahasiswa. *BEMAS: Jurnal Bermasyarakat*, *3*(1), 59–64. https://doi.org/10.37373/bemas.v3i1.255

Dawana, I. R., Dwikoranto, D., Setiani, R., & Marsini, M. (2022a). E-book learning research in physics education during the last five years: a review and bibliometric study. *Journal of Physics: Conference Series, 2392*, 1-7. http://doi.org/10.1088/1742-6596/2392/1/012016

Dawana, I. R., Setyarsih, W., Suprapto, N., & Dwikoranto, D. (2022b). The effectiveness of virtual class-based e-learning with video-assisted google classroom as a physics learning media (2016-2020). *Momentum: Physics Education Journal*, *6*(2), 188–198. https://doi.org/10.21067/mpej.v6i2.5849

De Freitas, S. I., Morgan, J., & Gibson, D. (2015). Will MOOCs transform learning and teaching in higher education? Engagement and course retention in online learning provision. *British Journal of Educational Technology*, *46*(3), 455–471. http://dx.doi.org/10.1111/bjet.12268

Dwikoranto, D., Setiani, R., Prahani, B. K., & Mubarok, H. (2020). Mobile learning to improve student collaborative skills: An alternative to online learning in the era of COVID-19 pandemic. *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: e-Saintika, 4*(3), 259–271. https://doi.org/10.36312/e-saintika.v4i3.314

Fajrillah, F., Sulaiman, O. K., Hamid, A. M., Simanihuruk, L., Simarmata, J., Hasibuan, M. S., Hasibuan, A., Purnomo, A., Muttaqin, M., & Guci, D. A. (2020). *MOOC: Platform pembelajaran daring di abad 21*. Yayasan Kita Menulis.

Farhan, W., Razmak, J., Demers, S., & Laflamme, S. (2019). E-learning systems versus instructional communication tools: Developing and testing a new e-learning user interface from the perspectives of teachers and students. *Technology in Society*, *59*, 1-18.

http://dx.doi.org/10.1016/j.techsoc.2019.101192

Gao, P., Meng, F., Mata, M. N., Martins, J. M., Iqbal, S., Correia, A. B., Dantas, R. M., Waheed, A., Xavier, R. J., & Farrukh, M. (2021). Trends and future research in electronic marketing: A bibliometric analysis of twenty years. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(5), 1667–1679. http://dx.doi.org/10.3390/jtaer16050094

García, E., & Weiss, E. (2020). *COVID-19 and student performance, equity, and US education policy: Lessons from pre-pandemic research to inform relief, recovery, and rebuilding*. Economic Policy Institute.

Guo, Y. M., Huang, Z. L., Guo, J., Li, H., Guo, X. R., & Nkeli, M. J. (2019). Bibliometric analysis on smart cities research. *Sustainability (Switzerland)*, *11*(13), 1–8. https://doi.org/10.3390/su11133606

Gusty, S., Nurmiati, N., Muliana, M., Sulaiman, O. K., Ginantra, N. L. W. S. R., Manuhutu, M. A., Sudarso, A., Leuwol, N. V., Apriza, A., & Sahabuddin, A. A. (2020). *Belajar mandiri: Pembelajaran daring di tengah pandemi COVID-19*. Yayasan Kita Menulis.

Gynther, K. (2016). Design framework for an adaptive MOOC enhanced by blended learning: Supplementary training and personalized learning for teacher professional development. *Electronic Journal of E-Learning*, *14*(1), 15–30.

Harjanto, T., & Sumunar, D. S. E. W. (2018). Tantangan dan peluang pembelajaran dalam jaringan: studi kasus implementas elok (E-learning: Open for knowledge sharing) pada mahasiswa profesi Ners. *Jurnal Keperawatan Respati Yogyakarta*, *5*, 24–28.

Harjanto, T., Sumunar, D. S. E. W., & Putri, K. A. K. (2018). E-learning implementation on clinical rotation nursing education: A case report of universitas gadjah mada. *Proceedings - 2018 4th International Conference on Science and Technology, ICST 2018*, *1*, 1–5. https://doi.org/10.1109/ICSTC.2018.8528612

Huang, R. H., Liu, D. J., Tlili, A., Yang, J. F., & Wang, H. H. (2020). *Handbook on facilitating flexible learning during educational disruption: The Chinese experience in maintaining undisrupted learning in COVID-19 outbreak*. Smart Learning Institute of Beijing Normal University.

Ikhwani, N. D. A., & Kep, M. (2021). *Strategi pembelajaran efektif masa pandemi COVID-19*. Media Sains Indonesia.

Irwanto, I., Wahyudiati, D., Saputro, A. D., & Lukman, I. R. (2023). Massive open online courses (MOOCs) in higher education: A bibliometric analysis (2012-2022). *IJIET: International Journal of Information and Education Technology*, *13*(2), 223–231.

Israel, M. J. (2015). Effectiveness of integrating MOOCs in traditional classrooms for undergraduate students. *The International Review of Research in Open and Distributed Learning*, *16*(5), 102–118. http://dx.doi.org/10.19173/irrodl.v16i5.2222

Jatmiko, B., Sunarti, T., Prahani, B. K., Hariyono, E., Dwikoranto, D., Wibowo, F. C., Mahtari, S., Misbah, M., & Asy'ari, A. (2021). Critical thinking skills on physics learning during COVID-19 pandemic: A bibliometric analysis using VOSViewer. *Journal of Physics: Conference Series, 2110*, 1-7. http://doi.org/10.1088/1742-6596/2110/1/011001

Karakus, M., Ersozlu, A., & Clark, A. C. (2019). Augmented reality research in education: A bibliometric study. *Eurasia Journal of Mathematics, Science and Technology Education*, *15*(10), 1-12. https://doi.org/10.29333/ejmste/103904

Khairi, A., Kohar, S., Widodo, H. K., Ghufron, M. A., Kamalludin, I., Prasetya, D., Prabowo, D. S., Setiawan, S., Syukron, A. A., & Anggraeni, D. (2022). *Teknologi pembelajaran: Konsep dan pengembangannya di era society 5.0*. Penerbit NEM.

Khan, M. A., Nabi, M. K., Khojah, M., & Tahir, M. (2020). Students' perception towards e-learning during COVID-19 pandemic in India: An empirical study. *Sustainability*, *13*(1), 57-61. http://dx.doi.org/10.3390/su13010057

Kumar, J. A., & Al-Samarraie, H. (2018). MOOCs in the malaysian higher education institutions: The instructors' perspectives. *The Reference Librarian*, *59*(3), 163–177. http://dx.doi.org/10.1080/02763877.2018.1458688

Kurniawan, H. (2021). Heroe's model: A case study to reduce students' learning loss and anxiety.

*Cypriot Journal of Educational Sciences*, *16*(3), 1122–1140. http://dx.doi.org/10.18844/cjes.v16i3.5830

Lin, G. X., Nan, J. N., Chen, K. T., Sun, L. W., Tai, C. T., Jhang, S. W., Chen, C. M., Rui, G., & Hu, B. S. (2022). Bibliometric analysis and visualization of research trends on oblique lumbar interbody fusion surgery. *International Orthopaedics*, *46*(7), 1597–1608. http://dx.doi.org/10.1007/s00264-022-05316-1

Lopukhova, J., & Makeeva, E. (2017). Creating virtual learning environment: Shared online learning in university education. *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE)*, *8*(2), 3045–3050. http://dx.doi.org/10.20533/ijcdse.2042.6364.2017.0412

Lu, O. H. T., Huang, J. C. H., Huang, A. Y. Q., & Yang, S. J. H. (2017). Applying learning analytics for improving students' engagement and learning outcomes in a MOOCs-enabled collaborative programming course. *Interactive Learning Environments*, *25*(2), 220–234. http://dx.doi.org/10.4324/9780429428500-7

Maqbul, M. (2020). Peran massive open online course terhadap pembelajaran al-quran di indonesia. *Inovasi-Jurnal Diklat Keagamaan*, *14*(3), 239–250. https://doi.org/10.52048/inovasi.v14i3.180

Mayulu, H., Sawitri, E., Daru, T. P., Tricahyadinata, I., & Rorimpandey, B. (2022). Strategi sukses belajar era digital di perguruan tinggi. *INOVASI*, *18*(4), 784–791. https://doi.org/10.30872/jinv.v18i4.11741

McKnight, K., O'Malley, K., Ruzic, R., Horsley, M. K., Franey, J. J., & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. *Journal of Research on Technology in Education*, *48*(3), 194–211. http://dx.doi.org/10.1080/15391523.2016.1175856

Miranda, J., Navarrete, C., Noguez, J., Molina-Espinosa, J. M., Ramírez-Montoya, M. S., Navarro-Tuch, S. A., Bustamante-Bello, M. R., Rosas-Fernández, J. B., & Molina, A. (2021). The core components of education 4.0 in higher education: Three case studies in engineering education. *Computers & Electrical Engineering*, *93*, 1-13. http://dx.doi.org/10.1016/j.compeleceng.2021.107278

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during the lockdown period of the COVID-19 pandemic. *International Journal of Educational Research Open*, *1*, 1–9. http://dx.doi.org/10.1016/j.ijedro.2020.100012

Mohamad, S. N. M., Salleh, M. A. M., Hakim, M., Hamid, A., Sui, L. K. M., & Mohd, C. K. N. C. K. (2019). Adaptive learning strategies with gamification to enhance learning engagement. *Indian Journal of Science and Technology*, *12*(31), 1–8. http://dx.doi.org/10.17485/ijst/2019/v12i31/146871

Mutohhari, F., Sutiman, S., Nurtanto, M., Kholifah, N., & Samsudin, A. (2021). Difficulties in implementing 21st-century skills competence in vocational education learning. *International Journal of Evaluation and Research in Education*, *10*(4), 1229–1236. http://doi.org/10.11591/ijere.v10i4.22028

Namestovski, Ž., Major, L., Molnár, G., Szűts, Z., Esztelecki, P., & Kőrösi, G. (2018). External motivation is the key to success in the MOOCs framework. *Acta Polytechnica Hungarica*, *15*(6), 125–142. http://dx.doi.org/10.12700/APH.15.6.2018.6.7

Obloberdiyevna, D. S., & Tuychiyevna, R. L. (2022). Distance learning in the system of higher education. *Web of Scholars: Multidimensional Research Journal*, *1*(4), 53–59. http://dx.doi.org/10.31392/2311-5491/2019-70.13

Pambudi, M. B., & Wibawa, S. C. (2020). Pengaruh model pembelajaran massive open online courses terhadap hasil belajar peserta didik. *IT-Edu: Jurnal Information Technology and Education*, *5*(1), 294–302.

Patandean, Y. R., & Indrajit, R. E. (2021). *Flipped classroom: Membuat peserta didik berpikir kritis, kreatif, mandiri, dan mampu berkolaborasi dalam pembelajaran yang responsif*. Penerbit Andi.

Prahani, B. K., Alfin, J., Fuad, A. Z., Saphira, H. V., Hariyono, E., & Suprapto, N. (2022). Learning

management system (LMS) research during 1991–2021: How technology affects education. *International Journal of Emerging Technologies in Learning*, *17*(17), 28–49. https://doi.org/10.3991/ijet.v17i17.30763

Praherdhiono, H., Adi, E. P., & Prihatmoko, Y. (2018). Konstruksi demokrasi belajar berbasis kehidupan pada implementasi LMS dan MOOC. *Edcomtech: Jurnal Kajian Teknologi Pendidikan*, *3*(1), 21–28.

Putra, A. B. N. R., Mukhadis, A., Poerwanto, E. E., Irdianto, W., & Sembiring, A. I. (2018). LMS technology by using a maker space approach on unique experiments-based through MOOCs in improving the professional competence of vocational students paper. *3rd International Conference on Sustainable Information Engineering and Technology, SIET 2018 - Proceedings*, 312–316. https://doi.org/10.1109/SIET.2018.8693194

Reich, J. (2020). *Failure to disrupt: Why technology alone can't transform education*. Harvard University Press.

Reimers, F., Schleicher, A., Saavedra, J., & Tuominen, S. (2020). Supporting the continuation of teaching and learning during the COVID-19 Pandemic. *Oecd*, *1*(1), 1–38.

Rosenbusch, K. (2020). Technology intervention: Rethinking the role of education and faculty in the transformative digital environment. *Advances in Developing Human Resources*, *22*(1), 87–101. http://dx.doi.org/10.1177/1523422319886297

Saphira, H. V., Suprapto, N., & Setyarsih, W. (2022). Track video analysis as physics media research during 2016 to 2020 a bibliometric analysis. *IPF: Inovasi Pendidikan Fisika*, *10*(3), 32–39. https://doi.org/10.26740/ipf.v10n3.p32-39

Saputro, R., Komarasary, D., & Sari, R. F. (2022). Pengaruh elemen rewards terhadap keterlibatan mahasiswa dalam mengikuti pembelajaran online pada platform G-MOOC. *CogITo Smart Journal*, *8*(2), 308–320. http://dx.doi.org/10.31154/cogito.v8i2.408.308-320

Sarker, M. F. H., Mahmud, R. Al-Islam, M. S., & Islam, M. K. (2019). Use of e-learning at higher educational institutions in Bangladesh: Opportunities and challenges. *Journal of Applied Research in Higher Education*, *11*(2), 210–223. http://dx.doi.org/10.1108/JARHE-06-2018-0099

Setia, S., Tay, J. C., Chia, Y. C., & Subramaniam, K. (2019). Massive open online courses (MOOCs) for continuing medical education – why and how? *Advances in Medical Education and Practice*, *10*, 805–812. https://doi.org/10.2147/AMEP.S219104

Simanihuruk, L., Simarmata, J., Sudirman, A., Hasibuan, M. S., Safitri, M., Sulaiman, O. K., Ramadhani, R., & Sahir, S. H. (2019). *E-learning: Implementasi, strategi dan inovasinya*. Yayasan Kita Menulis.

Suprapto, N., Kusnanik, N. W., Iriani, S. S., Wibawa, S. C., Sujarwanto, S., Yulianto, B., Suprapto, S., Hariyanto, A., & Nurhasan, N. (2021a). The comparison of Scimago Institutions Rankings (SIR), scopus, and SINTA profile: A case of the top indonesian institutions. *Library Philosophy and Practice (e-Journal)*, *5788*, 1–11.

Suprapto, N., Prahani, B. K., & Deta, U. A. (2021b). Research trend on ethnoscience through bibliometric analysis (2011-2020) and the contribution of indonesia. *Library Philosophy and Practice*, 1–17.

Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., Wang, H., Denden, M., Bozkurt, A., & Lee, L.-H. (2022). Is metaverse in education a blessing or a curse: A combined content and bibliometric analysis. *Smart Learning Environments*, *9*(1), 1–31. http://dx.doi.org/10.1186/s40561-022-00205-x

Turnbull, D., Chugh, R., & Luck, J. (2021). Issues in learning management systems implementation: A comparison of research perspectives between Australia and China. *Education and Information Technologies*, *26*(4), 3789–3810. https://doi.org/10.1007/s10639-021-10431-4

Veluvali, P., & Surisetti, J. (2022). Learning management system for greater learner engagement in higher education—A review. *Higher Education for the Future*, *9*(1), 107–121. http://dx.doi.org/10.1177/23476311211049855

Volungeviciene, A., Tereseviciene, M., & Ehlers, U. D. (2020). When is open and online learning relevant for curriculum change in higher education? Digital and network society perspective. *Electronic Journal of E-Learning*, *18*(1), 88–101. http://dx.doi.org/10.34190/EJEL.20.18.1.007

Wonorahadjo, S., & Dasna, I. W. (2021). MOOC untuk kegiatan pengabdian pada masyarakat di universitas negeri malang. *Prosiding Seminar Nasional Pengabdian Kepada Masyarakat (SINAPMAS)*, 1-5.

Widyastuti, A., Subakti, H., Gaol, R. L., Sinaga, R., Sari, H., Al Haddar, G., Yurfiah, Y., Saputro, A. N. C., Wibowo, F. C., & Susanti, D. (2022). *Media dan sumber belajar*. Yayasan Kita Menulis.

Wijaya, E. Y., Sudjimat, D. A., & Nyoto, A. (2016). Transformasi pendidikan abad 21 sebagai tuntutan pengembangan sumber daya manusia di era global. *Prosiding Seminar Nasional Pendidikan Matematika*, *1*(26), 263–278.

Xie, X., Siau, K., & Nah, F. F. H. (2020). COVID-19 pandemic–online education in the new normal and the next normal. *Journal of Information Technology Case and Application Research*, *22*(3), 175–187. http://dx.doi.org/10.1080/15228053.2020.1824884

Yulianingsih, S., Kurnia, D., & Julia, J. (2020). Pemetaan sistematik dalam topik kajian problem posing berdasarkan analissis bibliometrik. *Jurnal Pena Ilmiah*, *3*(2), 1-11. https://doi.org/10.17509/jpi.v3i2.26477

Zdravkova, K., Dalipi, F., & Krasniqi, V. (2022). Remote education trajectories for learners with special needs during the COVID-19 outbreak: An accessibility analysis of the learning platforms. *International Journal: Emerging Technologies in Learning*, *17*(21), 89–122. http://dx.doi.org/10.3991/ijet.v17i21.32401

Zhdanov, S. P., Baranova, K. M., Udina, N., Terpugov, A. E., Lobanova, E. V, & Zakharova, O. V. (2022). Analysis of learning losses of students during the COVID-19 pandemic. *Contemporary Educational Technology*, *14*(3), 369-379. https://doi.org/10.30935/cedtech/11812

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