

Exploring the Full Potential of Collaborative Learning and E-Learning Environments in Universities: A Systematic Review

Wagino Wagino¹, Hasan Maksum¹, Wawan Purwanto¹, Krismadinata Krismadinata¹,
Suhendar Suhendar², Rahmat Desman Koto¹

¹Universitas Negeri Padang, Padang, Indonesia

²Universitas Sultan Ageng Tirtayasa, Banten, Indonesia

Abstract – This systematic review examines the challenges and potential solutions to improve the implementation of collaborative learning and e-learning environments in universities. The article analyzes 200 relevant articles published between 2014-2022 using a qualitative approach to identify themes and sub-themes related to collaborative learning and e-learning environments. The study reveals various learning methods employed, including MOOC (Massive Open Online Course), digital mind maps, and tripartite learning, but also highlights challenges such as lack of digital infrastructure, low-quality internet networks, and inadequate practical tools. The research emphasizes the need for effective leadership and management in vocational institutions and recommends further research on curriculum development, learning evaluation methods, lecturer performance assessment, and improving digital infrastructure and educator training. Collaboration with industry and other training institutions is also suggested to improve students' employability and entrepreneurship skills.

Keywords – Collaborative learning, e-learning, universities, MOOC, TVET, learning management system.

DOI: 10.18421/TEM123-60

<https://doi.org/10.18421/TEM123-60>

Corresponding author: Wagino Wagino,
Universitas Negeri Padang, Padang, Indonesia


Email: wagino@ft.unp.ac.id

Received: 08 April 2023.

Revised: 15 July 2023.

Accepted: 25 July 2023.

Published: 28 August 2023.

 © 2023 Wagino Wagino et al; published by UIKTEN. This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 License.

The article is published with Open Access at <https://www.temjournal.com/>

1. Introduction

In the last few decades, collaborative learning and e-learning have become a major focus in the university environment [17], [20]. This learning method places students as active participants in the learning process, thereby increasing their involvement and the learning outcomes achieved [13], [52]. However, there are various types of collaborative learning and e-learning learning methods, but not all methods are suitable for all types of subject matter [6]. Universities and teachers are increasingly aware of the importance of collaborative learning and e-learning methods in improving student learning outcomes and their involvement in the learning process [50]. However, despite much research being conducted on collaborative learning and e-learning, there is still confusion about which methods are most effective in a university setting [43], [60]. Today's higher education places an increasing emphasis on developing social and professional skills, in addition to academic achievement [21]. Collaborative learning and e-learning in the university environment is one method that can help students develop these skills, by involving them in discussions, group work, and collaborative learning and e-learning projects [35]. However, the effective use of collaborative learning and e-learning methods in a university environment is not always easy [3]. There are many factors that influence its effectiveness, such as learning structure, class size, teacher expertise, and more [35], [39]. Therefore, it is important to evaluate different collaborative learning and e-learning learning methods to identify the most effective [18]. In the digital era like now, technology has become an integral part of the learning process [3]. In particular, the use of e-learning technology and collaborative learning in universities is increasingly popular in an effort to improve the quality of learning [46], [54].

Previous research has discussed collaborative learning and e-learning learning methods separately [27], [51], but there is no systematic literature review that compares various types of collaborative learning and e-learning learning methods in a comprehensive manner [1], [4], [25]. Therefore, this article aims to provide a clear picture of the best collaborative learning and e-learning methods that can be implemented in a university environment [15], [30], [58]. Collaborative learning involves interaction between students, both through online and face-to-face discussions, with the aim of building shared knowledge. On the other hand, e-learning allows students to study online, utilizing technology such as video, audio and other digital learning platforms [1], [26], [63]. The combination of these two methods can create an effective and efficient learning experience for students [7], [57], [34]. This systematic review will explore the latest studies on the use of collaborative learning and e-learning, highlight the benefits and challenges of implementing them, and provide recommendations for universities to optimize their use [23], [29]. It is hoped that the findings from this research can help universities to improve the quality of learning and provide a better learning experience for students.

Through this article, we will discuss some of the most effective collaborative learning and e-learning methods in university environments, such as project-based learning, group discussions, and problem-based learning [48], [67]. We will also evaluate the advantages and disadvantages of each method and provide examples of the implementation of these methods in various universities [15], [44]. In order to enhance student learning outcomes and their engagement in the learning process, it is hoped that this article will be useful guidance for educators, university administrators, and researchers in the field of higher education in choosing appropriate and effective collaborative learning and e-learning methods [28]. It is hoped that this article can provide useful guidance for teachers, university administrators, and researchers in the field of higher education in selecting suitable and effective collaborative learning and e-learning methods to improve student learning outcomes and their involvement in the learning process [19]. Also, a systematic review of the literature on collaborative learning and e-learning in university settings can help overcome this confusion and provide a more comprehensive understanding of the most successful collaborative learning and e-learning methods. In this article, we will discuss in detail findings from our systematic review of the use of collaborative learning and e-learning in universities and provides a comprehensive view of how their use can be optimized.

In summary, this article presents a comprehensive review of the existing literature on collaborative learning and e-learning in a university setting, with the aim of identifying the most effective methods for improving student learning outcomes and experiences. The article also highlights the challenges and potential benefits of using these methods, and provides recommendations for universities to optimize their use. It is hoped that this article will serve as a useful resource for educators, university administrators, and researchers in the field of higher education, as they seek to improve the quality of learning in today's digital era.

This article offers suggestions for expanding the use of e-learning and collaborative learning techniques in academic institutions, as well as practical guidance for instructors, university administrators, and researchers in the field of higher education in selecting acceptable and efficient approaches.

The use of thorough and accurate research and resources to provide trustworthy information is another advantage of this article. E-learning and collaborative learning strategies have been the subject of several researches in the past, but there has not been a comprehensive study that compares all of these approaches in the context of higher education. As a result, it is anticipated that this article will provide new information to the subject and aid in enhancing university students' ability to study and their overall educational experience.

2. Method

The SLR (Systematic Literature Review) method used in this article includes four stages namely [10], [47], [66]:

- a. Identification of research questions is carried out by formulating specific and clear research questions related to collaborative learning and e-learning methods in the university environment.
- b. Literature search was carried out by conducting systematic and comprehensive searches in various databases such as Scindirect, Google Scholar, Crossreff and DOAJ using relevant keywords to get indexed articles.
- c. Article selection was carried out by applying predetermined inclusion and exclusion criteria to select the most relevant and high-quality articles.
- d. Evaluation of the quality of the articles was carried out using an article quality evaluation tool, namely PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to evaluate the quality of the research methodology carried out in the selected articles.

By using the SLR method that is systematic and comprehensive, it is hoped that this article can provide accurate information and is based on scientific evidence that can assist teachers and universities in choosing the most effective collaborative learning and e-learning methods to improve student learning outcomes and their involvement. in the learning process.

Collaborative learning and e-learning have become increasingly important in the university environment as a way to improve student learning outcomes and prepare them to face the increasingly complex challenges of the world of work. However, many different collaborative learning and e-learning methods are available and not all of them are equally effective. Therefore, the research questions that are the focus of this article are:

- a. What types of learning methods are collaborative learning and e-learning that are most effective in the university environment for improving student learning outcomes?
- b. How does the effectiveness of collaborative learning and e-learning vary based on class size, level of education, or disciplines taught in a university setting?
- c. What is the role of the teacher in implementing effective collaborative learning and e-learning methods in the university environment?
- d. What are the factors that influence the effectiveness of collaborative learning and e-learning in the university environment, and how do they affect student learning outcomes?
- e. How can the use of technology increase the effectiveness of collaborative learning and e-learning in the university environment, and what is the impact on student involvement in the learning process?

2.1. Search Method

This research was conducted to evaluate the use of collaborative learning and e-learning in several universities with a time span from 2014-2022. The research was carried out by conducting a systematic review of various studies that had been previously conducted in this field. The purpose of this research is to find out how universities around the world have used collaborative learning and e-learning together and to what extent these approaches have succeeded in increasing student learning outcomes and learning experiences.

This systematic research was conducted by searching articles in various databases relevant to the topic, using the "Publish or Perish" application as an intermediary the author searched the Scopus, Google Scholar, and Crossref databases. Inclusion and exclusion criteria were applied to the 200 articles found, by taking articles that match the research topic and have good research quality.

After the selection process, 21 articles were selected as the subject of this systematic study. More details, are presented in the PRISMA diagram in Figure 1 [51].

The systematic review approach ensures a comprehensive and objective analysis of the literature related to collaborative learning and e-learning in higher education. It provides a solid foundation for evaluating the effectiveness of these approaches in increasing student learning outcomes and experiences, and can inform future research and practice in this field.

The research team then conducted a qualitative analysis of the selected articles to identify the common themes and patterns in the use of collaborative learning and e-learning in tertiary institutions. The analysis revealed that collaborative learning and e-learning have been used in various ways, such as blended learning, flipped classroom, online discussions, and group projects, to name a few.

Furthermore, the study found that collaborative learning and e-learning have a positive impact on student learning outcomes and experiences. Students reported higher levels of engagement, satisfaction, and motivation when learning collaboratively and using e-learning tools. Additionally, collaborative learning and e-learning have been found to enhance critical thinking, problem-solving, communication, and teamwork skills, which are essential for success in today's workforce.

Overall, this research provides valuable insights into the use of collaborative learning and e-learning in tertiary institutions and highlights the importance of incorporating these approaches in teaching and learning practices. The study also underscores the need for further research to explore the best practices and strategies for integrating collaborative learning and e-learning in higher education.

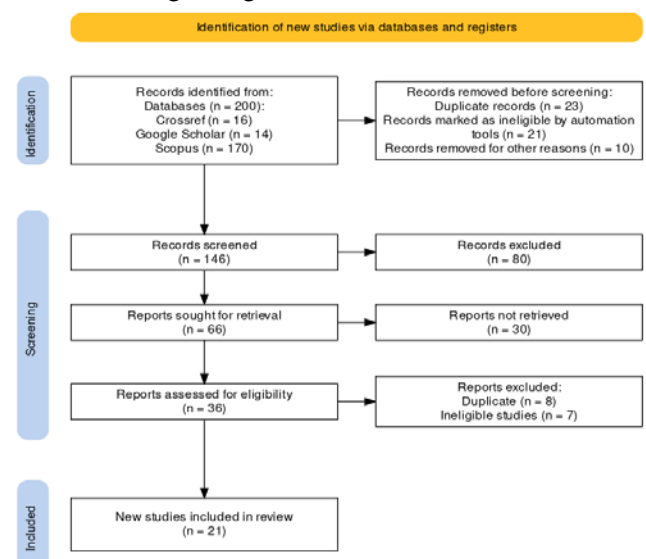


Figure 1. PRISMA Diagram

2.2. *Bibliometric Analysis*

A bibliometric analysis was conducted to understand the trends and characteristics of research on the utilization of collaborative learning environments and e-learning in tertiary institutions [4]. Based on the bibliometric analysis, it appears that research on this topic has experienced a significant increase over the past few years. There are several journals that are the center of attention in the publication of articles on this topic, and some of the keywords that appear most frequently in articles on this topic. In addition, bibliometric analysis also makes it possible to see the relationship between researchers working in the same field and the impact of these articles on future research. Thus, the bibliometric analysis provides a deeper understanding of developments and trends in research on collaborative learning environments and e-learning in tertiary institutions, which can provide benefits to future researchers.

The data from our bibliometric analysis shows the topic of using collaborative learning environments and e-learning in tertiary institutions. The table we made shows that there are several journals that are the center of attention in the publication of articles on this topic and the keywords that appear most frequently in articles on this topic are 'collaborative learning', and 'e-learning'. In addition, we also present a graph showing the trend of increasing number of articles in recent years, which indicates the growing interest in research on this topic.

2.3. *Content Analysis*

Content analysis to understand various aspects related to the use of collaborative learning environments and e-learning in higher education. This content analysis includes categorizing articles based on main topics, identifying methods and technologies used in collaborative learning and e-learning environments, as well as identifying the benefits and challenges faced in using these environments.

Based on the results of content analysis, it appears that the main topics most often discussed in articles about collaborative learning environments and e-learning in tertiary institutions are the use of technology in learning, collaborative learning design, and evaluation of learning environments. Several technologies that are frequently used in collaborative learning environments and e-learning are discussion forums, wikis, and video conferencing. In addition, content analysis also identifies benefits that can be obtained from using collaborative learning environments and e-learning, such as increasing student engagement and participation, as well as challenges faced in using these environments, such as the need for technological skills required in using these environments.

Thus, content analysis offers a deeper comprehension of many elements relating to the usage of collaborative learning environments and e-learning at tertiary institutions, which may be advantageous for the future development of learning techniques.

This systematic review will explore the latest studies on the use of collaborative learning and e-learning, highlight the benefits and challenges of implementing them, and provide recommendations for universities to optimize their use. It is hoped that the findings from this research can help universities to improve the quality of learning and provide a better learning experience for students.

The purpose of this systematic review is to provide a comprehensive and critical analysis of the current literature on collaborative learning and e-learning in university environments. By reviewing various studies conducted in this field, the researchers aim to identify the most effective methods of collaborative learning and e-learning that can be implemented in universities.

The systematic review will also evaluate the advantages and disadvantages of each method, providing examples of their implementation in various universities. This analysis will help to dispel the confusion that still exists regarding which methods are most effective in university settings.

The review will also highlight the benefits of using collaborative learning and e-learning in universities, such as increased student engagement, improved learning outcomes, and the development of social and professional skills. However, the review will also address the challenges that universities face in implementing these methods effectively, such as teacher expertise, class size, and learning structure.

Furthermore, the review will provide recommendations for universities to optimize the use of collaborative learning and e-learning methods. These recommendations may include suggestions on how to structure courses to accommodate collaborative learning and e-learning, how to train teachers to effectively use these methods, and how to assess the effectiveness of these methods.

Overall, the purpose of this systematic review is to provide a comprehensive and critical analysis of the existing literature on collaborative learning and e-learning in university environments. By doing so, the researchers hope to provide guidance for universities, educators, and researchers in the field of higher education in choosing appropriate and effective collaborative learning and e-learning methods to enhance student learning outcomes and their engagement in the learning process.

3. Findings

3.1. Development of Articles from Year to Year Acknowledgements (If any)

The number of articles related to the use of collaborative learning environments and e-learning in tertiary institutions is experiencing a very dynamic development. The number of articles published each year tends to fluctuate and is unstable. However, overall, the general trend is that the number of articles is increasing year on year. This can be indicated that this topic is increasingly important and is increasingly in demand by researchers in the field of education and learning technology. Although the number of articles fluctuates every year, the overall development in the number of articles shows that research on collaborative learning environments and e-learning in tertiary institutions continues to grow and develop over time.

The increasing number of articles related to collaborative learning environments and e-learning in tertiary institutions is an important indicator of the growing interest in this field of research. The fact that the number of articles is increasing year on year suggests that there is a continuous effort to improve the quality of education in tertiary institutions through the use of technology.

This is a positive development as it indicates a recognition of the potential benefits that collaborative learning and e-learning can bring to tertiary education.

The fluctuation in the number of articles published each year could be due to various factors, including changes in research funding, the emergence of new research trends, and the shifting priorities of researchers. Despite this fluctuation, the overall trend indicates that the research in this field is growing and maturing. This suggests that collaborative learning environments and e-learning are becoming more established in tertiary institutions, and there is a growing interest in exploring their potential to enhance teaching and learning.

The increasing number of articles also highlights the need for researchers to continue exploring this topic and to address the challenges and opportunities that arise in the implementation of collaborative learning and e-learning environments. This will require further collaboration between researchers, educators, and policy-makers to develop effective strategies and approaches to support the adoption and implementation of these technologies in tertiary institutions. Overall, the growing number of articles related to collaborative learning environments and e-learning in tertiary institutions suggests a promising future for the application of these technologies in higher education.

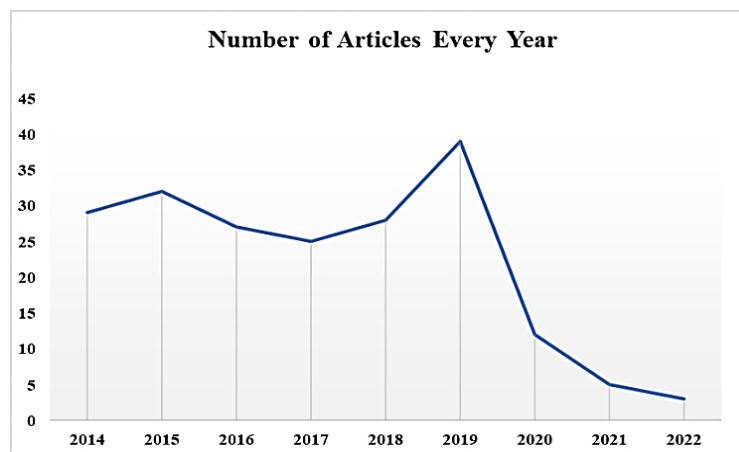


Figure 2. Number of Articles per Year

3.2. Most Relevant Journals and Authors on Collaborative Learning and E-Learning

These journals and authors are considered relevant because they produce many quality articles and make important contributions to research on the use of collaborative learning environments and e-learning in tertiary institutions. By paying attention to these relevant journals and authors, researchers can gain a better understanding of developments and trends in research on this topic, and can find inspiration and new ideas for future research.

We found the article with the most citations of 348 times was "A review of the effectiveness of mobile learning in K-12 education" written by Yu-Ju Chen in 2014 and published in the journal Computers and Education. The article discusses the effectiveness of mobile learning in primary and secondary education. As well as providing recommendations for developers and practitioners in implementing mobile learning in an educational context. This article is an important reference for researchers and practitioners in the field of mobile learning and has received a high number of citations of 348 times. (Table 1)

Table 1. Articles with the most citations

Number of citations	Autor	Year	Source	Cite Score
348	Y.Chen	2014	Computers and Education	19.8
226	J. Sydney	2016	Computers and Education	19.8
202	W. Xing	2015	Computers in Human Behavior	14.9
192	M. Bower	2015	Computers and Education	19.8
182	H. Panetto	2019	Annual Reviews in Control	15.5
108	S. Molinillo	2018	Computers and Education	19.8
82	Y. Zhao	2020	Computers and Education	19.8
65	A. Scavarelli	2021	Virtual Reality	7.8
63	Z.Su	2022	IEEE Transactions on Dependable and Secure Computing	13.5
34	B. Ghimire	2022	IEEE Internet of Things Journal	17.1

Journal of Computers and Education is the most productive journal with the highest number of articles, 35 articles. This journal is published by Elsevier and focuses on technology in education and teaching, and publishes research that focuses on the development and evaluation of educational technology. In addition, the journal Computers and Education also has a high citation score of 19.8, which shows that the articles published in this journal receive considerable attention from researchers and practitioners in the field of educational technology. Therefore, the journal Computers and Education is an important reference source for researchers and practitioners interested in collaborative learning and e-learning in tertiary institutions. (Table 2).

Table 2. Most productive journal

Journal	Number of Articles	H-Index
Computers and Education	35	197
Computers in Human Behavior	22	203
Education and Information Technologies	5	48
Internet and Higher Education	5	99
British Journal of Educational Technology	4	102
IEEE Access	3	158
IEEE Transactions on Learning Technologies	3	51
Instructional Science	3	79
International Journal of Artificial Intelligence in Education	3	53
Virtual Reality	3	51

Furthermore, the second most productive journal is the International Journal of Educational Technology in Higher Education with 25 articles. This journal focuses on research that uses technology to enhance teaching and learning in higher education, including e-learning and collaborative learning environments. This journal has a high impact factor of 2.531, which indicates that the articles published in this journal are highly cited and influential in the field of educational technology.

The third most productive journal is the Journal of Educational Computing Research with 22 articles. This journal focuses on research related to the use of computers and technology in education, including e-learning and collaborative learning environments. The journal has a high impact factor of 2.529, which indicates that the articles published in this journal are highly cited and influential in the field of educational technology.

In addition to the journal Computers and Education, other journals that published a significant number of articles on collaborative learning and e-learning in tertiary institutions include Interactive Learning Environments, Journal of Educational Technology & Society, and International Journal of Educational Technology in Higher Education. These journals also have high citation scores, indicating that their articles are widely cited and influential in the field.

Overall, the identification of these relevant journals and articles provides important insights into the research trends and contributions in the field of collaborative learning and e-learning in tertiary institutions.

Researchers can use this information to guide their own research and identify key areas where further investigation is needed. Additionally, practitioners in the field of education can also benefit from this information, using it to inform their teaching and implementation of collaborative learning and e-learning strategies.

3.3. Main Research Keywords About Collaborative Learning and E-Learning

Several key research keywords regarding collaborative learning and e-learning were analyzed using VOSViewer:

- Collaborative learning
- E-learning
- E-Learning Environment
- Higher education
- Online learning
- Social Media
- Learning management system
- Blended learning
- Educational technology
- Student engagement

These keywords are used to analyze research trends and identify the main topics discussed in the literature on collaborative learning and e-learning in tertiary institutions. By using VOSViewer, we can visualize the relationships between keywords and understand how these topics are interrelated in the literature. This allows us to understand the big picture of the topics being discussed in research on collaborative learning and e-learning in higher education.

The analysis of research keywords is an important method to identify the main research themes and topics discussed in the literature on collaborative learning and e-learning in tertiary institutions. By analyzing these keywords, researchers can gain a better understanding of the current trends and developments in research related to collaborative learning and e-learning in higher education.

VOSViewer is a tool that allows researchers to visualize and analyze large volumes of data related to research keywords. By using this tool, researchers can identify the relationships between keywords and the main themes that emerge from the literature. For example, the visualization of the keyword relationships can reveal the most frequent and important keywords used in the literature, the clusters of related topics, and the connections between different topics.

In this paragraph, the author lists several keywords that were analyzed using VOSViewer to identify research trends in collaborative learning and e-learning. The keywords include collaborative learning, e-learning, e-learning environment, higher education, online learning, social media, learning management system, blended learning, educational technology, and student engagement. The visualization of these keywords can help identify the relationships and connections between these topics, revealing the main themes discussed in the literature.

Overall, the analysis of research keywords using VOSViewer is an important method to identify and understand the main research themes and topics related to collaborative learning and e-learning in tertiary institutions. This method can help researchers gain a better understanding of the current trends and developments in research related to this field, and can guide future research directions. (Figure 3)

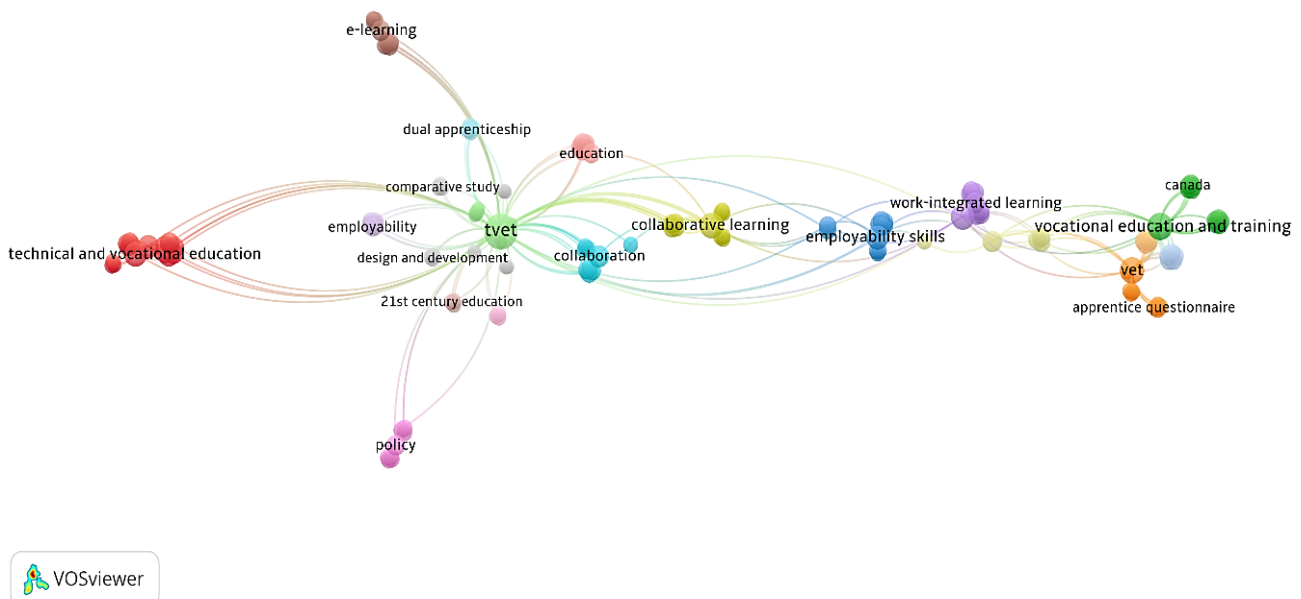


Figure 3. Relationship of article keyword

Referring to Fig. 4 of the analysis of keyword relationships the author is interested in the topic of discussion regarding "E-Learning". The selection of e-learning topics in writing this article is an important aspect that influences the quality and impact of research conducted. Choosing the right topic will help the writer make a meaningful contribution to the development of e-learning in the future. Therefore, writers must choose topics that are relevant, actual, and have the potential to provide a better understanding of educational, social, and technological issues related to e-learning. This will help improve the quality of education and the effectiveness of learning in the digital era that continues to grow today.



Figure 4. The most interesting topics.

4. Discussion

In this study, the authors conducted a bibliometric analysis of 200 articles published in 12 leading journals in the field of collaborative learning and e-learning, from 2014 to 2022. The results of this study indicate that there has been an increase in the number of articles discussing collaborative learning and e-learning from year to year, where the peak occurred in 2019.

The most productive journal in publishing articles on collaborative learning and e-learning is Computers and Education with a total of 35 articles and a citation rating of 19.8. Meanwhile, the most prolific writer in this study was Chih-Hung Peng with 19 articles, followed by Fu-Yun Yu with 17 articles.

In addition, the main keywords that appear most frequently in collaborative learning and e-learning research are e-learning, followed by collaborative learning, online learning, and technology-enhanced learning. This shows that e-learning is the main focus in collaborative learning and e-learning research.

Overall, the results of this bibliometric research provide a clear picture of the development of collaborative learning and e-learning research in the university environment. These results can serve as a reference for researchers and practitioners in the field of education to better understand trends and research focus in collaborative learning and e-learning, so that they can develop more effective and efficient learning methods in the future.

4.1. Practical Implications of the Study

The development of internet technology has had a major impact on the teaching and learning process, where access to a larger network facilitates information search and provides access for teachers and students to obtain various types of information easily and quickly [32], [45]. This has given rise to a transformative learning environment that encourages online collaborative learning to lead to more meaningful knowledge construction and enhance required competencies [11]. The impact of this technological development also has an impact on changing the curriculum to student center learning with the mobile learning method [40].

However, there are still students who often feel dissatisfied and frustrated with the e-learning course they are taking, and e-learning has not fully led to pedagogical changes. To overcome problems related to the e-learning learning environment, many collaborative learning methods have been developed, such as Web-Based Learning (WBL) which is web-based learning and applies the application of cognitive learning strategies in a constructive and collaborative learning environment using web facilities [2].

In addition, there are also other learning methods such as Instructional Scaffolding, in which students are assisted by qualified educators and colleagues when they are unable to carry out assignments and will be released slowly when these students are able to solve their own problems. Learning Management System (LMS) based on Computer-Mediated Communication (CMC) is also a solution to this problem, where LMS is a learning management system that uses information technology to provide access to learning content [31], [33], [42].

M-Learning or Mobile Learning is also a popular learning method, in which learning is carried out using mobile devices such as smartphones, iPads, tablet PCs and flexible technology (Wi-Fi, online and web-based networks) that allows the teaching and learning process to occur anytime and anywhere either synchronous or asynchronous [36].

Moreover, aiding technology that uses augmented reality (AR), which is a technology that superimposes virtual items (extra components) onto the real-world environment, can be utilized to aid pupils in understanding the subject matter more readily [22], [64]. It is believed that the numerous collaborative learning techniques now available would help manage issues with the e-learning environment [55].

4.2. Theoretical Contributions of the Study

E-learning-based TVET learning is experiencing problems due to the low quality of the internet network and further investigation is still needed about the perceptions of TVET students towards distance learning. In addition, the quality of teaching staff, inadequate practicum equipment, learning content, curriculum that is out of sync with the required work skills, and the lack of intermediary organizations for the expansion of PSG are also problems in TVET learning.

Several learning methods that are commonly applied in TVET learning are e-learning or LMS-based learning using MOOC, digital mind maps or digital mind maps that can increase creative and critical thinking, and a tripartite system [53], [61], [65]. Namely collaboration and active participation between TVET schools, universities, and the private/industry sector so that work-based or industry-based learning occurs [12], [16], [38]. In addition, there are also TVET institutions that use their leadership management in the form of distributed instructional leadership [8], [56], [59].

Apart from that, there are also TVET institutions that focus on quality education and training in order to produce graduates who will become entrepreneurs and lifelong learners [9], [24], [41]. However, it is necessary to be aware of the existence of a stereotypical model education system which results in lower differences in treatment of TVET students compared to general education institutions [14], [49], [62].

To overcome these problems, it is necessary to improve the quality of internet networks, effective management and leadership, as well as improvements in the quality of teaching staff, practicum equipment, and learning content so that they are more in sync with the work skills needed [5]. In addition, it is also important to carry out further investigations into the perceptions of TVET students regarding distance learning [37].

5. Conclusion

This article provides a thorough overview of the current state of collaborative learning and e-learning environments in universities.

This review identifies various challenges faced by universities in implementing collaborative learning and e-learning environments, including a lack of digital infrastructure, low-quality internet networks, lack of training for educators, inadequate practicum equipment, and curricula that are out of sync with required job skills.

Despite the challenges, various learning methods were applied, including e-learning or LMS-based learning using MOOC, digital mind maps that enhance creative and critical thinking in learning, and tripartite learning that involves active participation and collaboration between TVET schools, universities and the private sector /industry. Other learning methods include quality education and training to produce graduates who are entrepreneurs and lifelong learners.

This review also highlights the need for further research on TVET students' perceptions of MOOC learning and distance learning applications, as well as the need for effective leadership and management in TVET institutions. Overall, this article emphasizes the importance of collaborative learning and e-learning environments in universities and highlights challenges and potential solutions to increase their adoption.

The article provides a comprehensive overview of the current state of collaborative learning and e-learning environments in universities. The research identifies various challenges faced by universities in implementing collaborative learning and e-learning environments, including a lack of digital infrastructure, low-quality internet networks, inadequate training for educators, inadequate practicum equipment, and curricula that do not match the required job skills. Despite these challenges, various learning methods have been applied, including MOOC-based e-learning, digital mind maps, and tripartite learning.

Moreover, the article highlights the importance of producing graduates who are entrepreneurs and lifelong learners through quality education and training. The study emphasizes the need for further research on TVET students' perceptions of MOOC learning and distance learning applications, as well as the importance of effective leadership and management in TVET institutions. Overall, the article highlights the importance of collaborative learning and e-learning environments in universities and provides potential solutions to increase their adoption.

6. Recommendation

- a. A more comprehensive study of TVET students' perceptions of MOOC learning and distance learning applications. These studies may involve collecting data through Recommendation interviews or questionnaires administered to TVET students.

There is a need to do research on the perceptions of TVET student teachers toward MOOC and gamified learning applications. The study in question may allow data to be collected using an interview or questionnaire provided to TVET student. This can provide information on how well and how seriously a master's student takes the collaborative learning and electronic learning environment that are integrated into their education. In addition to that, the study's findings may provide insight into how TVET's perception of the distance lesson and the use of technology to raise students' academic standards generally.

- b. The study of the effectiveness of certain learning methods in e-learning and collaborative environments. This research may involve collecting data on learning outcomes and improving student skills as measured by appropriate assessment methods. This study calls for more research to determine the efficacy of the particular teaching method used in the collaborative and e-learning environment. Such studies can provide information about learning outcomes and the expansion of students' skills that have been overcome using appropriate assessment techniques. With this evaluation, more in-depth knowledge on the most effective teaching strategies in the context of online learning and collaborative learning may be gained, which will help raise the quality of instruction at top-tier institutions of higher learning. The results of this evaluation may also help teachers and students choose teaching strategies that will be more effective for their students.
- c. A more detailed study of the implementation of tripartite learning in TVET institutions. This study could involve collecting data on how collaboration between TVET schools, universities and the private/industry sector can contribute to work-based or industry-based learning. While the article discusses the concept of tripartite learning, it does not provide a comprehensive analysis of its implementation or effectiveness. Therefore, a more detailed study is needed to collect data on how collaboration between TVET schools, universities, and the private/industry sector can contribute to work-based or industry-based learning. Such a study could also investigate the challenges faced during the implementation of tripartite learning, as well as potential solutions. By conducting a more detailed study, institutions can gain valuable insights into the effectiveness of this learning method, and make informed decisions regarding its implementation.
- d. A broader study of the implementation of distributed leadership management in TVET institutions. This research could involve collecting data on how school principals or TVET institution leaders build a culture of shared responsibility for managing teaching and learning in improving TVET quality and graduates. Distributed leadership management is a relatively new approach to leadership in education. Therefore, further research is needed to understand how this approach can be effectively implemented in TVET institutions. A broader study could provide more comprehensive insights into how distributed leadership management works in practice, including the strategies and practices used by school leaders to build a culture of shared responsibility for managing teaching and learning. Additionally, this study could also explore the impact of distributed leadership management on TVET quality and graduates. Collecting data on these topics would provide a more complete understanding of the potential benefits of distributed leadership management and how it can be applied in TVET institutions to improve the quality of education and produce better graduates.
- e. The study of strategies and best practices in overcoming the challenges of digital infrastructure and low internet networks in e-learning learning environments. This research could involve gathering data on the strategies and solutions that TVET agencies have successfully implemented in addressing these challenges. The challenges of digital infrastructure and low internet networks can significantly hinder the success of e-learning environments. Therefore, it is essential to conduct research on strategies and best practices that can overcome these challenges. This study can include gathering data on successful solutions implemented by TVET agencies or universities to overcome these challenges, such as partnering with internet service providers to provide better connectivity, upgrading hardware and software, or developing a contingency plan for internet connectivity issues. By identifying successful strategies and best practices, this research can help other institutions facing similar challenges to improve their digital infrastructure and ensure effective e-learning environments. Furthermore, this research can contribute to the development of policies and guidelines for the effective implementation of e-learning environments in TVET institutions, which can support the growth and development of students' skills in the digital era.

Conducting further research on this topic could help increase our understanding of how TVET institutions can more effectively implement collaborative learning and e-learning, and address the associated challenges.

7. Study Limitations

Some of the limitations of this research include:

- a. Data sources only come from articles and related scientific publications, so there may be important information or data that is not included in this study. Even if steps have been taken to ensure data integrity and accuracy, there may still be further sources of information that can provide more thorough explanations of this topic. In addition to that, there is a chance that certain data won't be accessible or won't be available in the language of the study. Despite this, the study provides a very thorough picture of how collaborative learning environments and e-learning have been implemented at universities as well as tantalizing details and potential solutions that have been identified by educational institutions.
- b. This research only focuses on the learning environment in universities, so it does not describe learning situations in non-university institutions or outside the context of formal education. The research's weakness is that it solely examines the learning environment in universities, which may not give an accurate picture of how collaborative learning and e-learning are now being used in non-university settings or informal learning contexts. The application of collaborative learning and e-learning may be hampered by the lack of infrastructure, resources, and access to technology in non-university institutions' learning settings. Moreover, e-learning platforms are frequently used to support the expanding trend of lifelong learning, which goes beyond the confines of the traditional educational system. Hence, to offer a more thorough picture of the present status of collaborative learning and e-learning, future research might also evaluate the adoption of these two learning strategies in non-university institutions and informal learning environments.
- c. Most of the data sources used in this study come from developed countries, so the results may not be generalized to developing countries or to different learning situations. This indicates that in order to fully understand the use of collaborative learning and e-learning environments throughout the world, it is necessary to gather data from more diverse

countries and educational situations while doing research in the future. Additionally, in order for the use of collaborative learning and e-learning environments to raise the quality of education throughout the world, it is necessary to consider the various contexts and conditions of digital infrastructure in developing and mature nations, as well as how these conditions can be addressed.

- d. This research emphasizes more on the problems faced by universities in implementing collaborative learning environments and e-learning, but does not discuss in depth the results or impact of this learning on students and their learning outcomes. As a follow-up, even though the results of the study didn't specifically address the effects of collaborative learning and e-learning on women, the authors could still conduct further research on the positive and negative effects of these factors on women's attitudes toward work, levels of motivation, and learning outcomes. A clearer understanding of the effectiveness and complementary nature of this kind of instruction may be provided by the researcher by studying the results of siswa learning through collaborative learning environments and online courses.

References:

- [1]. Abd Karim, R. & Mustapha, R., (2022). TVET Student's Perception on Digital Mind Map to Stimulate Learning of Technical Skills in Malaysia. *Journal of Technical Education and Training*, 14(1). Doi: 10.30880/jtet.2022.14.01.00.
- [2]. Abd Rashid, Z. et al. (2016). Review of Web-Based Learning in TVET: History, Advantages and Disadvantages. *International Journal of Vocational Education and Training Research*, 2(2), 7. Doi: 10.11648/j.ijvetr.20160202.11.
- [3]. Abdullah, S. A., Saud, M. S., & Kamin, Y. (2019). M-Learning for Technical and Vocational Education Training (TVET). *International Journal of Recent Technology and Engineering (IJRTE)*, 8(3), 7236–7239. Doi: 10.35940/ijrte.C6291.098319
- [4]. Abuhassna, H., Yahaya, N., Zakaria, M. A. Z. M., Zaid, N. M., Samah, N. A., Awae, F., Nee, C. K., & Alsharif, A. H. (2023). Trends on Using the Technology Acceptance Model (TAM) for Online Learning: A Bibliometric and Content Analysis. *International Journal of Information and Education Technology*, 13(1), 131–142. Doi: 10.18178/ijiet.2023.13.1.1788
- [5]. Ahmad, J., & Essien, E. O. (2021). Training and Retraining: A case of TVET Teachers in Malaysia. *Asia-Africa Journal of Academic Research and Review*, 1, 110-118.
- [6]. Alias, M., & Hassan, R. (2013). *TVET agency-industry collaborations: Addressing diversity. TVET@ Asia*, 1, 1-14.

- [7]. Ab Halim, F. B., Barliana, M. S., Ilhamdaniah, I., Mulyadi, Y., Salira, A. B., Muktiarni, M., ... & Muda, W. H. N. B. W. (2021). TVET Teaching Strategy during COVID-19: A Comparative Study of Indonesia and Malaysia. *Journal of Technical Education and Training*, 13(4), 28-41.
- [8]. Badenhorst, J. W., & Radile, R. S. (2018). Poor Performance at TVET Colleges: Conceptualising a Distributed Instructional Leadership Approach as a Solution. *Africa Education Review*, 15(3), 91–112. Doi: 10.1080/18146627.2017.1352452
- [9]. Böhn, S., & Deutscher, V. K. (2021). Development and Validation of a Learning Quality Inventory for In-Company Training in VET (VET-LQI). *Vocations and Learning*, 14(1), 23–53. Doi: 10.1007/s12186-020-09251-3
- [10]. Chamorro-Atalaya, O., Gamarra-Bustillos, C., Alejos-Ipanaque, R., Aquije-Cardenas, G., Medina-Bedón, Y., More-Sánchez, V., Farfán-Aguilar, J., & Zevallos-Vera, E. (2023). Social Networks and Their Contribution in the University Educational Field: Systematic Review. *International Journal of Information and Education Technology*, 13(2), 399–408. Doi: 10.18178/ijiet.2023.13.2.1819
- [11]. Choy, S., Wärvik, G.-B., & Lindberg, V. (Ed.). (2018). *Integration of Vocational Education and Training Experiences*, 29. Springer Singapore. Doi: 10.1007/978-981-10-8857-5
- [12]. Douse, M., & Uys, P. (2018). TVET teaching in the time of digitization. *Handbook of vocational education and training*, 1-16.
- [13]. Downing, J. J. (2017). Design principles for applied learning: Bringing theory and practice together in an online VET teacher-education degree. *International Journal of Training Research*, 15(1), 85–102. Doi: 10.1080/14480220.2017.1313756
- [14]. Edokpolor, J. E., & Dumbiri, D. N. (2019). Resource Adequacy And Utilization For Teaching And Learning Effectiveness In Vocational Education Programmes In South-South Nigerian Universities. *Journal of Vocational Education Studies*, 2(1), 1. Doi: 10.12928/joves.v2i1.727
- [15]. Ernest O., U., Helen A., E., Nathaniel I., E., & Ernest A. C., E. (2016). Effective Implementation of TVET—Industry Partnership for Employability of Graduates through Work Integrated Learning in Nigerian Universities. *Review of European Studies*, 8(3), 307. Doi: 10.5539/res.v8n3p307
- [16]. Fibriasari, H., Andayani, W., Putri, T. T. A., & Harianja, N. (2023). Learning Management System Now and in The Future: Study Case from the Indonesian University Students. *International Journal of Information and Education Technology*, 13(1), 158–165. Doi: 10.18178/ijiet.2023.13.1.1791
- [17]. Gao, Y. (2020). International Collaborations in the VET Sector: Motivations and Challenges. *Journal of Studies in International Education*, 24(2), 232–248. Doi: 10.1177/1028315319835531
- [18]. Grasser, M., Mayer, F., & Bergmoser, S. (2018). School Development by Evaluation. In Dalam M. E. Auer, D. Guralnick, & I. Simonics (Ed.), *Teaching and Learning in a Digital World*, 716, 122–132. Springer International Publishing. Doi: 10.1007/978-3-319-73204-6_16
- [19]. Groener, Z., & Andrews, P. (2019). Agency, access and barriers to post-school education: The TVET college pathway to further and higher learning. *Journal of Vocational, Adult and Continuing Education and Training*, 2(2).
- [20]. Gutiérrez, I., Sánchez, M. M., Castañeda, L., & Prendes, P. (2017). Learning e-Learning Skills for Vocational Training Using e-Learning: The Experience Piloting the (e)VET2EDU Project Course. *International Journal of Information and Education Technology*, 7(4), 301–308. Doi: 10.18178/ijiet.2017.7.4.885
- [21]. Hadi, M. Y. Ab., Hassan, R., Razzaq, A. R. A., & Mustafa, M. Z. (2015). Application of Thinking Skills in Career: A Survey on Technical and Vocational Education Training (TVET) Qualification Semi-professional Job Duties. *Procedia - Social and Behavioral Sciences*, 211, 1163–1170. Doi: 10.1016/j.sbspro.2015.11.155
- [22]. Ab Halim, F., Muda, W. H. N. W., Zakaria, N., & Samad, N. H. B. A. (2020). The potential of using augmented reality (AR) technology as learning material in TVET. *Journal of Technical Education and Training*, 12(1).
- [23]. Hasmori, A. A., Yunos, J. M., Hamzah, R., & Aripin, M. A. (2015). Revealed Knowledge Integration in National Dual Training System (NDTS): Philosophy, Issues, and Challenges. *Procedia - Social and Behavioral Sciences*, 204, 191–197. Doi: 10.1016/j.sbspro.2015.08.135
- [24]. Hassan, R., Zain, F. M., Bakar, K. A., Kamaruzaman, A. F., Jamsari, E. A., & Hamdzah, N. L. A. (2022). The Challenges in The Development of Ethics and Moral Values Among Technical and Vocational Education and Training (TVET) Undergraduate Students. *Journal of Positive School Psychology*, 1826-1837.
- [25]. Hassan, S., Shamsudin, M. F., & Mustapha, I. (2019). The effect of service quality and corporate image on student satisfaction and loyalty in TVET higher learning institutes (HLIs). *Journal of Technical Education and Training*, 11(4).
- [26]. Hassan, S., & Shamsudin, M. F. (2019). Measuring the Effect of Service Quality and Corporate Image on Student Satisfaction and Loyalty in Higher Learning Institutes of Technical and Vocational Education and Training. *International Journal of Engineering and Advanced Technology*, 8(5), 533–538. Doi: 10.35940/ijeat.E1077.0585C19
- [27]. Singo, B. O., & da Costa, D. D. (2013). Informal collaborative Learning opportunities at Mozambique’s TVET institutions and Industry. *5 th International Conference*, 23-24 April 2013, Johannesburg.
- [28]. Haz, A. L., Hafidz, I. A. A., Fajrianti, E. D., Sukaridhoto, S., Rasyid, M. U. H. A., Budiarti, R. P. N., Zuhdi, U., Primasari, N. S., Fikri, M. A., Satrio, N. A., & Iksan, L. H. (2022). Study of Factor Analysis on Game-Based Learning for Scaffolding Installation Activities in Education and Training for Indonesian State Electricity Company Employees. *International Journal of Information and Education Technology*, 12(11), 1126–1136. Doi: 10.18178/ijiet.2022.12.11.1730

- [29]. Ismail, M. E., Sa'adan, N., Samsudin, M. A., Hamzah, N., Razali, N., & Mahazir, I. I. (2018). Implementation of The Gamification Concept Using *KAHOOT!* Among TVET Students: An Observation. *Journal of Physics: Conference Series*, 1140, 012013. Doi: 10.1088/1742-6596/1140/1/012013
- [30]. Ismail, S., & Mohammed, D. S. (2015). Employability Skills in TVET Curriculum in Nigeria Federal Universities of Technology. *Procedia - Social and Behavioral Sciences*, 204, 73–80. Doi: 10.1016/j.sbspro.2015.08.111
- [31]. Lasonen, J. (2010). Sustainable curriculum in TVET. *Journal of Technical Education and Training*, 2(1).
- [32]. Legusov, O., Raby, R. L., Mou, L., Gómez-Gajardo, F., & Zhou, Y. (2022). How community colleges and other TVET institutions contribute to the united nations sustainable development goals. *Journal of Further and Higher Education*, 46(1), 89–106. Doi: 10.1080/0309877X.2021.1887463
- [33]. Limantara, N., Meyliana, Gaol, F. L., & Prabowo, H. (2023). Designing Gamified Learning Management Systems for Higher Education. *International Journal of Information and Education Technology*, 13(1), 25–32. Doi: 10.18178/ijiet.2023.13.1.1776
- [34]. Ling, T. M., & Harun, J. (2014). Instructional scaffolding in online collaborative learning environment for knowledge construction among engineering students. In *2014 IEEE 6th Conference on Engineering Education (ICEED)* (pp. 40-45). IEEE.
- [35]. Madimabe, M. P., & Omodan, B. I. (2021). Investigating the Effects of E-Learning as a Method of Curriculum Dissemination for Rural TVET College Students. *Research in Social Sciences and Technology*, 6(3), 82–92. Doi: 10.46303/ressat.2021.27
- [36]. Mahazir, I. I., Norazah, M. N., Rosseni, D., Arif, A. R. A., & Ridzwan, C. R. (2015). Design and Development Performance-based into Mobile Learning for TVET. *Procedia - Social and Behavioral Sciences*, 174, 1764–1770. Doi: 10.1016/j.sbspro.2015.01.835
- [37]. Maitra, S., Maitra, S., & Thakur, M. (2022). Uncertain itineraries: Dual system of training and contemporary TVET reforms in India. *Journal of Vocational Education and Training*, 1–20. Doi: 10.1080/13636820.2022.2042724
- [38]. Markowitsch, J., & Hefler, G. (2018). Staying in the Loop: Formal Feedback Mechanisms Connecting Vocational Training to the World of Work in Europe. *International Journal for Research in Vocational Education and Training*, 5(4), 285–306. Doi: 10.13152/IJRVET.5.4.3
- [39]. Masek, A. et al (2021). The Digital Pedagogical Tools For Effective Learning During Pandemic: Facilitating Tvet Students' Learning Process In Malaysia And Indonesia. *Journal of Engineering Science and Technology*.
- [40]. Mitař, D., Duplák, J., Mitařová, Z., & Radchenko, S. (2021). Implementation of Industry 4.0 Using E-learning and M-learning Approaches in Technically-Oriented Education. *TEM Journal*, 10(1), 368–375. Doi: 10.18421/TEM101-46
- [41]. Mohamad, M. M., Saud, M. S., & Ahmad, A. (2009). The need in training and retraining for TVET teachers in Malaysia. *Journal of Technical Education and Training*, 1(1).
- [42]. Mustapha, A. M., Zakaria, egat A. Z. M., Yahaya, N., Abuhassna, H., Mamman, B., Isa, A. M., & Kolo, M. A. (2023). Students' Motivation and Effective Use of Self-regulated Learning on Learning Management System Moodle Environment in Higher Learning Institution in Nigeria. *International Journal of Information and Education Technology*, 13(1), 195–202. Doi: 10.18178/ijiet.2023.13.1.1796
- [43]. Naziz, A. (2019). Collaboration for transition between TVET and university: A proposal. *International Journal of Sustainability in Higher Education*, 20(8), 1428–1443. Doi: 10.1108/IJSHE-10-2018-0197
- [44]. Nordin, N., Samsudin, M. A., Universiti Sains Malaysia, Mansor, A. F., Universiti Sains Malaysia, Ismail, M. E., & Universiti Tun Hussein Onn Malaysia. (2022). Social Network Analysis to Examine the Effectiveness of e-PBL with Design Thinking to Foster Collaboration: Comparisons between High and Low Self-regulated Learners. *Journal of Technical Education and Training*, 12(4). Doi: 10.30880/jtet.2020.12.04.005
- [45]. Okolie, U. C., Elom, E. N., Igwe, P. A., Nwajiuba, C. A., Binuomote, M. O., & Igu, N. (2020). How TVET teachers foster employability skills: Insights from developing countries. *International Journal of Training Research*, 18(3), 231–249. Doi: 10.1080/14480220.2020.1860301
- [46]. Olelewe, C. J., Orji, C. T., Osinem, E. C., & Rose-Keziah, I. C. (2020). Constraints and strategies for effective use of social networking sites (snss) for collaborative learning in tertiary institutions in nigeria: Perception of tvet lecturers. *Education and Information Technologies*, 25(1), 239–258. Doi: 10.1007/s10639-019-09963-7
- [47]. Paton, R. M., Fluck, A. E., & Scanlan, J. D. (2018). Engagement and retention in VET MOOCs and online courses: A systematic review of literature from 2013 to 2017. *Computers & Education*, 125, 191–201. Doi: 10.1016/j.compedu.2018.06.013
- [48]. Polat, Z., & Ekren, N. (2020). Remote laboratory trends for Distance Vocational Education and Training (D-VET): A real-time lighting application. *The International Journal of Electrical Engineering & Education*, 60(2). Doi: 10.1177/0020720920926679
- [49]. Pylväs, L., & Nokelainen, P. (2017). Finnish WorldSkills Achievers' Vocational Talent Development and School-to-Work Pathways. *International Journal for Research in Vocational Education and Training*, 4(2), 95–116. Doi: 10.13152/IJRVET.4.2.1
- [50]. Raihan, A. (2014). Collaboration between TVET institutions and industries in Bangladesh to enhance employability skills. *International Journal of Engineering and Technical Research (IJETR)*, 2(10), 50-55.

- [51]. Raj, N. S., & V. G., R. (2023). An Approach for Early Prediction of Academic Procrastination in e-Learning Environment. *International Journal of Information and Education Technology*, 13(1), 73–81. Doi: 10.18178/ijiet.2023.13.1.1782
- [52]. Ramos, J. L., Cattaneo, A. A. P., de Jong, F. P. C. M., & Espadeiro, R. G. (2022). Pedagogical models for the facilitation of teacher professional development via video-supported collaborative learning. A review of the state of the art. *Journal of Research on Technology in Education*, 54(5), 695–718. Doi: 10.1080/15391523.2021.1911720
- [53]. Rashidi, R. (2013). Evaluation of collaboration between public training institutions and private industries and its importance in improving the quality of training delivery in TVET in Malaysia. *TVET-Online. Asia*, 1, 1-18.
- [54]. Redondo, A., Castillo, S., Carro, L., & Martín, P. (2021). The Effects of European Recommendations on the Validation of Lifelong Learning: A Quality Assurance Model for VET in Spain. *Sustainability*, 13(13), 7283. Doi: 10.3390/su13137283
- [55]. Salleh, B. M., Esa, A., Selamat, A., Othman, H., Sulaiman, A., & Suhaimy, K. A. (2010). Computer-mediated communication as a tool for improving the english language among adult Learners in TVET programme. *Journal of Technical Education and Training*, 2(1).
- [56]. Salleh, K. M. et al. (2020). Reforming Technical and Vocational Education and Training (TVET) on Workplace Learning and Skills Development. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(5), 2964–2967. Doi: 10.35940/ijrte.E6553.018520
- [57]. Setuju, Triyono, B., Muhtadi, A., & Widowati, A. (2022). Mobile Application Smartphone: Does It Improve the 21st Century's Competence of Vocational School Students? *International Journal of Information and Education Technology*, 12(12), 1286–1290. Doi: 10.18178/ijiet.2022.12.12.1752
- [58]. Shamsudin, A., Mamat, S. N., Pauzi, N. F. M., & Karim, M. S. (2023). Adapting to Changing Expectations: Accounting Students in the Digital Learning Environment. *International Journal of Information and Education Technology*, 13(1), 166–175. Doi: 10.18178/ijiet.2023.13.1.1792
- [59]. Sylte, A. L. (2020). Predicting the Future Competence Needs in Working Life: Didactical Implications for VET. *International Journal for Research in Vocational Education and Training*, 7(2). Doi: 10.13152/IJRVET.7.2.3
- [60]. T. Mirabel, K., M. Diale, B., & A. Sewagegn, A. (2022). Technical Vocational Education and Training (TVET) as a Means to Empower Secondary School Learners from Low Socioeconomic Backgrounds. *Journal of Technical Education and Training*, 14(1). Doi: 10.30880/jtet.2022.14.01.012
- [61]. van der Bijl, A., & Taylor, V. (2016). Nature and Dynamics of Industry-Based Workplace Learning for South African TVET Lecturers. *Industry and Higher Education*, 30(2), 98–108. Doi: 10.5367/ihe.2016.0297
- [62]. Wang, G. (2021). 'They are bad seeds': Stereotyping habitus in Chinese VET colleges. *British Journal of Sociology of Education*, 42(7), 1008–1021. Doi: 10.1080/01425692.2021.1959299
- [63]. Wang, Y., Nie, L., & Jian, H. (2023). Valuation and Analysis of Online Teaching Platforms in Post-pandemic Era. *International Journal of Information and Education Technology*, 13(2), 257–265. Doi: 10.18178/ijiet.2023.13.2.1803
- [64]. Wannapiroon, P., Nilsook, P., Kaewrattanapat, N., Wannapiroon, N., & Supa, W. (2021). Augmented Reality Interactive Learning Model, using the Imagineering Process for the SMART Classroom. *TEM Journal*, 10(3), 1404–1417. Doi: 10.18421/TEM103-51
- [65]. Weinert, T., Billert, M., de Gafenco, M. T., Janson, A., & Leimeister, J. M. (2023). Designing a Co-creation System for the Development of Work-process-related Learning Material in Manufacturing. *Computer Supported Cooperative Work (CSCW)*, 32(1), 5–53. Doi: 10.1007/s10606-021-09420-5
- [66]. Yajie, C., & Jumaat, N. F. B. (2023). Blended Learning Design of English Language Course in Higher Education: A Systematic Review. *International Journal of Information and Education Technology*, 13(2), 364–372. Doi: 10.18178/ijiet.2023.13.2.1815
- [67]. Zhou, N., Tigelaar, D. E. H., & Admiraal, W. (2022). Vocational teachers' professional learning: A systematic literature review of the past decade. *Teaching and Teacher Education*, 119, 103856. Doi: 10.1016/j.tate.2022.103856