



TRENDS OF DIGITAL ASSESSMENT IN EDUCATION: A BIBLIOMETRICS ANALYSIS OF THE RECENT DECADE OF RESEARCH

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ABSTRACT

Digital assessment plays an important role in education, especially in the context of digital assessment research in Indonesia. Hence, it needs to be explored to gain insight for further research. Using the PRISMA method combined with VOS-Viewer through Scopus data collection, 302 articles were evaluated. Evaluation is carried out by analyzing the number of publications, countries, research disciplines, journals, and research collaborations on digital assessment in education. Co-occurrence mapping is also explored by analyzing knowledge maps. The research results show an increase in the number of articles each year, and the USA is the country with the most articles published. "Social science" is the most research discipline, "Journal of Dental Education" is the journal with the most publications, and Finland and Portugal's work is the most popular collaboration. Further, based on cluster analysis, there are 3 main categories that are most related, namely e-assessment, human, and education.

Keywords: *digital assessment, e-assessment, education*

1. INTRODUCTION

Assessment is critically important in supporting the success of education (Kift & Moody, 2009). It serves as a multifaceted tool that goes beyond merely evaluating student performance; rather, it plays a pivotal role in shaping the entire educational process. Assessment serves as a compass, guiding educators in tailoring their instructional approaches to meet the diverse needs of learners (Greenstein, 2010). By continuously assessing student understanding and progress, educators can identify areas of strength and weakness, allowing for timely interventions and personalized support. Moreover, assessment acts as a feedback mechanism, offering valuable insights into the effectiveness of teaching methods and curriculum design (Irons & Elkington, 2021). It not only gauges what students have learned but also informs educators about how well instructional goals are being met. In essence, assessment is a dynamic and integral component of education, providing the foundation for informed decision-making, continuous improvement, and the overall success of the learning journey.

In the ever-evolving landscape of education, the integration of digital assessment has emerged as a transformative force, fundamentally reshaping the dynamics of teaching and learning (Rodríguez-Abitia & Bribiesca-Correa, 2021). The profound impact of digital assessment on educational practices underscores the need for thorough exploration, providing essential insights that can drive and inform future research endeavors. This imperative stems from the pivotal role that digital assessment plays in shaping not only how knowledge is imparted but also how it is evaluated and understood in contemporary educational settings. As educational institutions increasingly embrace technology to enhance pedagogical methods, the multifaceted dimensions of digital assessment warrant a closer examination. Understanding the nuances of this technological intervention is essential for educators, researchers, and policymakers alike, as it influences not only the day-to-day practices within classrooms but also the broader strategies employed to adapt to the demands of the digital era. The significance of this research lies not only in its ability to provide a snapshot of the existing landscape but also in its potential to lay the groundwork for future inquiries. As we delve into the findings, we aim to uncover trends, identify prominent contributors, and discern the thematic clusters that define the discourse around digital



assessment. Through this exploration, we seek to contribute valuable insights that can guide educators, researchers, and policymakers in navigating the evolving intersection of technology and education.

2. METHODS

This study reviewed the current literature using the PRISMA framework (Tricco et al., 2018). The scoping approach was used in accordance with the PRISMA criteria to identify the most relevant papers on digital assessment in education. This method assisted in identifying the important components of critical lessons and categorizing prospective search phrases. Several keyword combination queries were used to get relevant published articles from a well-known and reliable research database, Scopus, in order to identify relevant scientific journals and publications. A database search was conducted using the terms "digital assessment", "e-assessment", "electronics assessment", and "education" to find relevant items. Predefined exclusion and inclusion criteria, as well as quality standards, were employed to narrow the data search. Each filter assures quality, and the next section describes exclusion and inclusion measures.

The literature search was extended to include the recent decade (2013-2023) to ensure that contemporary digital assessments were emphasized. Initially, 642 papers were presented; however, they included a variety of publications such as research articles, reviews, editorials, book chapters, and more. At this stage, 314 documents were selected from a search of the literature that was limited to research articles and reviews. Then, this investigation was confined to only utilizing English. As a consequence, 304 publications were appraised for further review and the application of exclusion and inclusion criteria. The data was then converted to an Excel file, allowing the systematic review to commence.

This evaluation entails a careful analysis of both published original research papers and review articles to identify the most relevant discoveries and provide a full synthesis of past knowledge. To guarantee data organization, the findings, abstracts, and conclusions were divided into various categories. Furthermore, we examined the references cited in the reviewed papers. To avoid repetition, we thoroughly cross-checked the data and removed extraneous research to get the required findings.

After selecting the documents, a two-phase technique was used to assess the quality of the analysis performed on the chosen papers. First, the consistent information was imported into Microsoft Excel to conduct a descriptive analysis of the literature's conceptual knowledge. A complete content analysis was then conducted to outline and evaluate the key research themes, highlighting current investigations in a variety of areas while stressing prospective future research problems and possibilities. material analysis is a research approach that examines documents and texts in order to identify and quantify explicit communication material into specified categories. It utilizes a systematic procedure to generate reproducible and accurate conclusions from texts.

3. RESULTS & DISCUSSION

Analysing bibliometrics is crucial for comprehending patterns or advancements in a field of study. Digital assessment is a study topic that is substantial enough in this context to be investigated using a bibliometric approach. This analysis evaluates the number of publications, the number of participating nations, the number of citations, the number of participating journals, and the number of research collaborations pertaining to digital assessment in education. This method allows us to observe the degree to which digital assessment has taken centre stage in the scientific literature. Research trends, the geographic distribution of interest in the subject, the influence and popularity of linked papers, and the formation of research collaborations are all made easier with the use of bibliometric data. Through comprehension of these components, bibliometric analysis can offer profound awareness of the importance and dynamics of digital assessment topics in educational contexts.

Number of publications per year



The number of publications from 2013 to 2023 tends to increase. This indicates that during this time period, there was an increasing trend in the number of publications. This means that in the period from 2013 to 2023, the number of documents or scientific works published, whether in the form of articles, papers or other types of publications, shows a positive trend and is increasing. This may reflect the growth or intensification of research activities, scientific writing, or contributions in a particular field during that period.

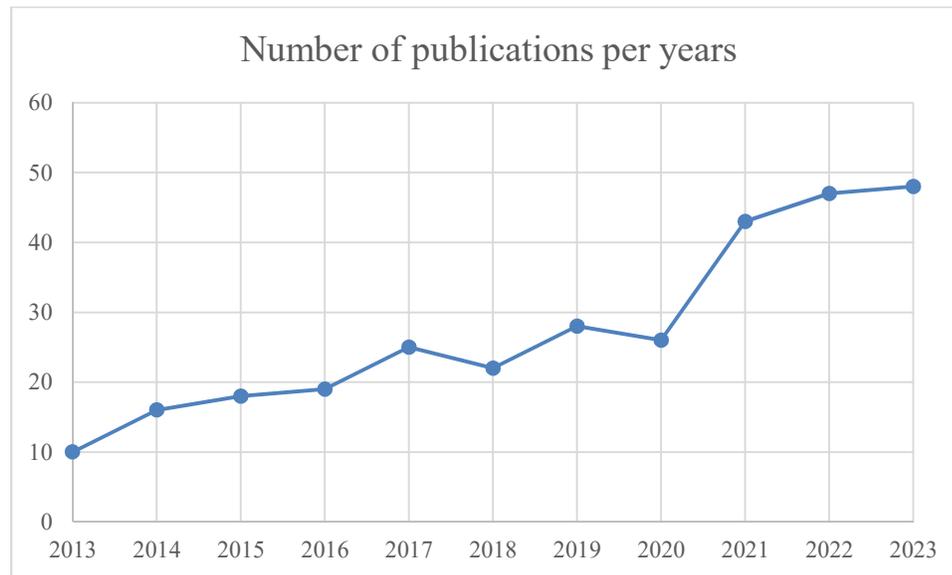


Figure 1. Distribution of Published Documents From 2012 to 2023

From Figure 1 above, it can be seen that there has been a significant increase in research on this topic, especially in the 2020-2021 period. This increase is likely influenced by several significant factors. These factors include the change in national assessment (Indahri, 2021), the renewal of education system (Sibuea, 2020), and the COVID-19 pandemic, which affected all aspects of the education system (Perwitasari et al., 2021). These factors together create conditions that encourage increased interest and urgency in research regarding digital assessment. With changes in national assessments, educational system updates, and the impact of the pandemic, this topic has become increasingly relevant and urgent for research to understand its implications in the educational context.

Top 10 Countries

The contribution and emphasis of research from different regions are best described by examining the correlation between the number of publications on a given topic and the countries. The quantity of publications coming from a nation indicates that nation's level of participation and importance in the field's knowledge development. Understanding the effect and involvement of each nation in examining particular facets of the subject, as well as the global distribution of research, may be gained by analysing the relationship between publication count and a country's publication rate. Furthermore, the degree to which a topic is deemed significant or pertinent in a global setting, encompassing the input of scholars from other regions, can also be reflected in this connection. Overall, the examination of the relationship between publication count and nation-state offers a summary of the dynamics of international cooperation in tackling particular problems or research areas and illustrates the varied ways in which different nations have contributed to the understanding and resolution of global issues.

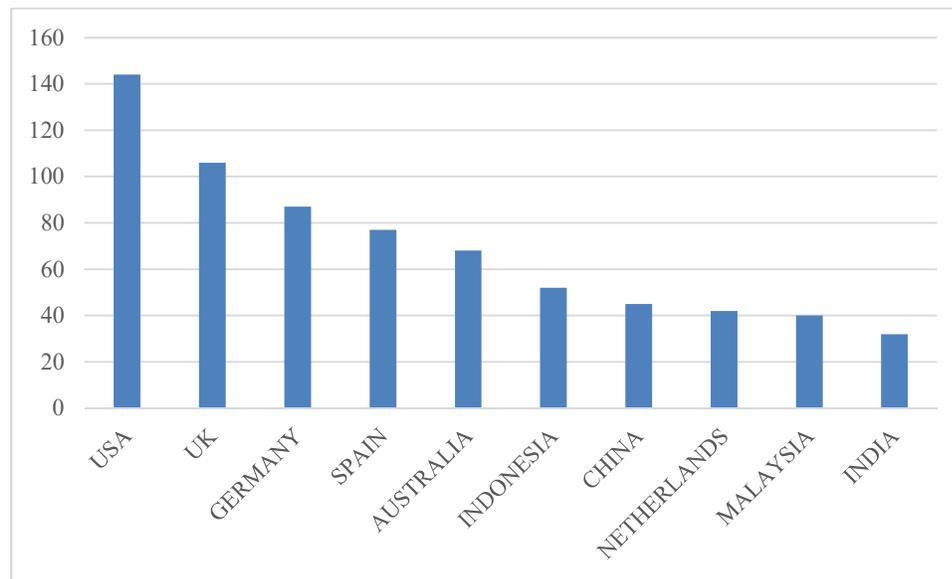


Figure 2. Distribution of Published Documents Among Top 10 Countries (2013–2023)

Figure 2 above shows that the USA has the highest ranking in digital assessment publications, followed by the UK and Germany. Of the 10 highest countries in assessment publications, half of the countries are developed countries and the other half are developing countries. This indicates that the topic of digital assessment in education is equally needed and of interest to various countries, both developed and developing countries. However, the top 3 countries that publish about digital assessments are developed countries. Several higher education institutions in developed countries, such as Cambridge University, have a focus on digital assessment research. So, it is not surprising that developed countries dominate in publications on this topic.

Distribution of published records according to research discipline

Research disciplines are subfields of study or knowledge domains that concentrate on certain issues or challenges. Conceptual frameworks, research techniques, and epistemological perspectives unique to the objectives and nature of that subject are features shared by all research disciplines. Research topics in academia include a wide range of fields, including technology, medicine, the humanities, and social and natural sciences. Comprehending a research discipline is crucial since it allows one to stay up to date with new findings, identify influential ideas, and get involved in the relevant academic community.

Figure 3 provides an overview of the distribution of research disciplines on the topic of digital assessment, and here it can be seen that Social Science (44.4%) is the largest research discipline in this context. The research discipline of Social Science, or social science, covers various aspects of study related to human behavior, society and social interaction. In the context of digital assessment, the Social Science research discipline can be involved in many aspects, such as analyzing the impact of digital assessment on student learning (Sarkar et al. 2017; Loureiro & Gomes, 2022; Tapingkae et al. 2020), evaluating the effectiveness of digital assessment methods in the context of education (Leo et al. 2021), as well as understanding the social and psychological factors that influence the acceptance and implementation of digital assessments (Yen & Chiang, 2021).

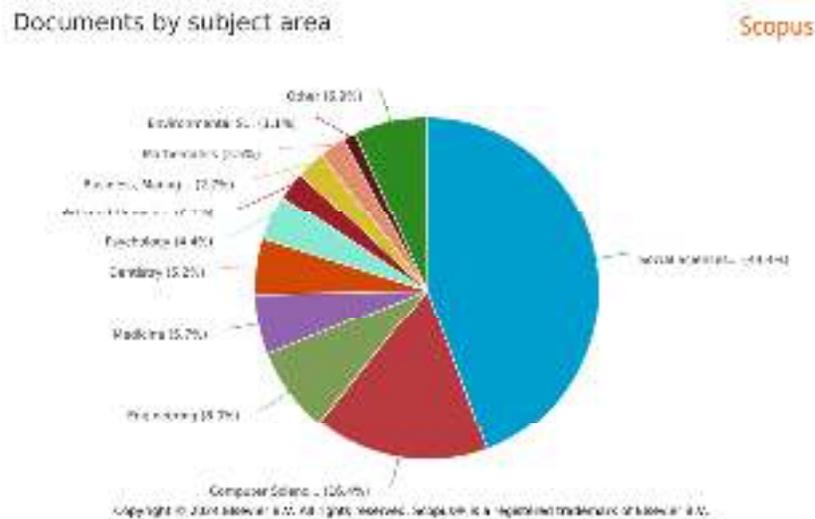


Figure 3. Distribution of Published Records According to Research Discipline (2012–2023)

Research methods in Social Science often involve qualitative and quantitative approaches, with a focus on observation, experiments, surveys, or analysis of social data. Research in this discipline can also involve analysis of educational policies, classroom dynamics, and the role of technology in shaping behavior and social interactions in educational contexts. Seeing that Social Science dominates in digital assessment research, this reflects the importance of understanding the social and human dimensions in the application of technology in the context of modern education. Further analysis in this discipline could provide in-depth insights regarding the impact of digital assessment on students, teachers, and the education system as a whole.

Journal Distribution of Published Records

Each scientific journal has a special scope or focus in a particular field of science. Thus, selecting the right journal is a critical step in publishing research results. The connection between journals and research topics is reflected in the suitability between the scope of the journal and the scope and objectives of the research being conducted. Researchers tend to choose to submit their research results to journals that have a focus or coverage that is in line with their research topic.

The "journal of dental education" is the publication that publishes the most articles about digital assessment, as seen in Figure 4 above. Among the elements that could be to blame are: Specialization of the Journal: The "Journal of Dental Education" might concentrate particularly on dental education. Consequently, this publication might end up being the primary choice for researchers to publish their findings if digital assessment turns out to be a pertinent and significant topic in the context of dental education. 2) publication Reputation: Among scholars and researchers working on the subject of dentistry, this publication may enjoy a positive reputation.

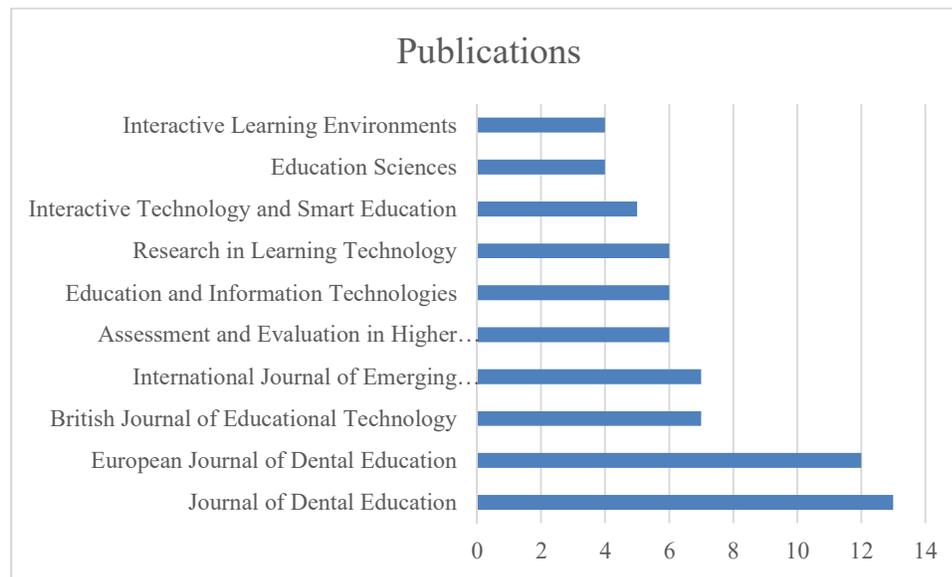


Figure 4. Journal Distribution of Published Records (2013–2023)

Because a journal is regarded as a recognized platform, researchers may choose to publish their work there due to its excellent reputation. 3) Special Forums May Be Available: The "Journal of Dental Education" may have a special section or a number of special issues devoted to digital assessment. Should this be the case, scientists studying these subjects might be more likely to submit their work to those journals. 4) Networking and Collaboration: A higher number of articles may result from the involvement or collaboration of specific researchers or research groups with this journal. Collaboration and networking can promote the publication of digital assessment research in this journal more regularly. The combination of these factors may make the "Journal of Dental Education" a top choice for researchers interested in digital assessment in the context of dental education.

Content Analyze in VOS-Viewer

Understanding the relationships between different elements in scientific publishing datasets and observing publication patterns in a certain research field or topic can be accomplished through content analysis utilizing VOS Viewer. Visual representations that map the relationships between keywords, authors, or journals can be used to visualize these linkages and provide light on the patterns and relationships that exist within them. Typically, distinct hues are assigned to these interactions.

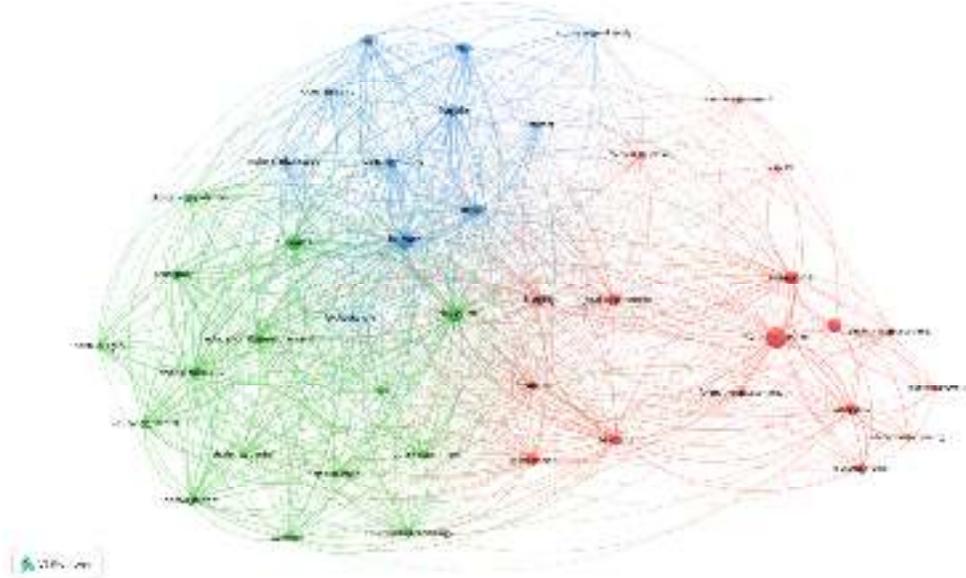


Figure 5. Result of the Content Analyze in VOS-Viewer

Figure 5 above displays three colors, namely red, green and blue which show the clusters in the field. The first cluster (red) is dominated by e-assessment, the second cluster (green) is dominated by education and the third cluster (blue) is dominated by humans. Through this visual image, we can see that online assessment, feedback systems and self-evaluation have blurred circles, which shows that there is still not much research on these topics. So this could be a research gap in the future.

Collaboration World Map

Research trends collaboration among nations is essential for boosting scientific advancement, generating more comprehensive answers, and guaranteeing a major global impact. When scholars from many nations collaborate, a rich and creative research environment is created by bringing together a variety of perspectives, expertise, and resources. This partnership not only expands the field of study but also makes it possible to develop more thorough answers to the challenging issues that the world community faces. Collaboration across nations enhances the validity and relevance of research findings, facilitates the accomplishment of common objectives, and creates a strong foundation of knowledge to address global concerns by exchanging information, data, and resources.

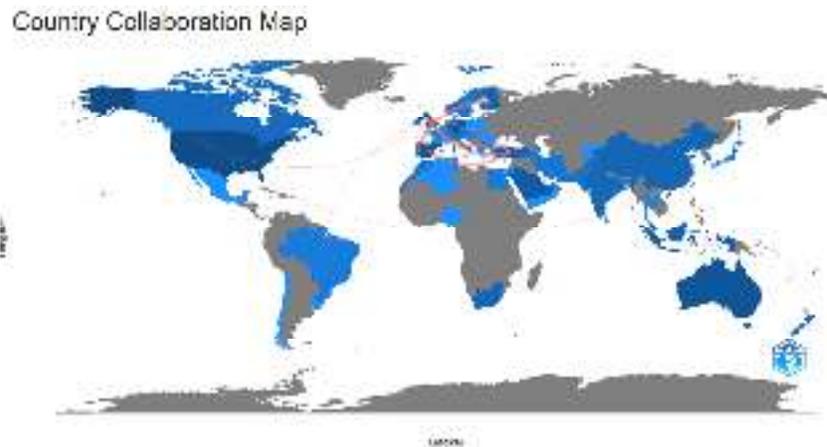


Figure 6. Result of Analyze Collaboration World Map in R Studio

Based on Figure 6, collaboration between countries on the topic of digital assessment is dominated by Finland and Portugal with 4 collaborations. Finland and Portugal, as developed countries, bring their own unique strengths and expertise to this collaboration. Finland, which is known as the world's technology center, has succeeded in creating a very effective education system, producing students who excel especially in the fields of Science and Mathematics (Federick, 2020). Meanwhile, Portugal experienced decentralization of education and gave autonomy to schools (Batista, 2011). It is believed that this collaboration will provide mutual benefits where Finland can provide insight into advanced educational technology, while Portugal can share experiences in implementing educational decentralization and school autonomy. With mutual benefits, this collaboration has the potential to increase mutual understanding, diversify research approaches, and produce sustainable innovation in the implementation of digital assessment in the world of education.

4. CONCLUSION

Digital assessment plays a crucial role in shaping the landscape of education, particularly within the context of ongoing research in Indonesia. Recognizing its significance, a thorough exploration was undertaken utilizing the PRISMA method combined with VOS-Viewer through Scopus data collection, scrutinizing a corpus of 302 articles. The evaluation encompassed a detailed analysis of various parameters, including the annual growth in the number of articles, the leading countries in publication output, prevalent research disciplines, key journals, and collaborative endeavors in the domain of digital assessment within the educational sphere. Co-occurrence mapping further facilitated the exploration of knowledge maps, shedding light on the interconnectedness of research themes. The research outcomes underscore a consistent upward trajectory in the number of articles published annually, with the United States emerging as the frontrunner in terms of prolific contributions. "Social Science" stood out as the predominant research discipline, while the "Journal of Dental Education" took center stage as the most prolific journal in disseminating research on digital assessment. Noteworthy collaborations between Finland and Portugal received acclaim as the most popular collaborative efforts. Furthermore, cluster analysis delineated three principal categories—e-assessment, human aspects, and education—that demonstrate close interrelatedness in the landscape of digital assessment research. This comprehensive exploration not only provides insights into current trends but also lays the groundwork for further advancements in educational practices and the ongoing evolution of digital assessment methodologies.



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