



RESEARCH ARTICLE

Evolution of Online Assessment in Higher Education: A Bibliometric Analysis

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| ARTICLE INFO | ABSTRACT |
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| Received: Apr 24, 2024 Accepted: Aug 1, 2024 | This study examines the progression of online assessment in higher education over the last decade (2014-2023) through a bibliometric analysis. Using the SCOPUS database, we identified 907 relevant articles that explore various facets of online, digital, and remote assessment methods, including e-assessment, online testing, remote proctoring, and online grading. Our analysis elucidates key trends, influential publications, prolific authors, and dominant research themes in the field. The findings reveal a significant increase in research activity, especially during the COVID-19 pandemic, which accelerated the adoption of online learning environments. We investigate the impact of online assessment on student performance, engagement, and academic integrity, alongside the challenges and opportunities posed by digital assessment tools. By mapping the intellectual landscape and identifying gaps in the current literature, this study provides valuable insights for educators, policymakers, and researchers. The results emphasize the pivotal role of technological innovation in shaping the future of educational assessment and highlight the necessity for ongoing research to tackle emerging challenges and optimize assessment practices in digital learning environments |
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INTRODUCTION

With the Covid-19 pandemic, distance education methods have become increasingly widespread and have become an inevitable option for higher education in the future (Radha, Mahalakshmi, Kumar, and Saravanakumar, 2020). However, it has been revealed that being prepared for distance education plays a major role in accelerating the education process during this period (Alqahtani and Rajkhan, 2020). At the same time, structural reforms and strategies are needed to ensure continuity in education, which has been directly and indirectly affected by Covid-19 (Bozkurt, 2020). With the impact of the pandemic, higher education institutions have faced a difficult turning point and digitalization has become an important basis in education during this process (Babaoğlu and Kulaç, 2021). The technology and digitalization transformation has also gained momentum in the Turkish higher education system with the Covid-19 pandemic. Universities have taken important steps towards digitalization by trying to integrate online and hybrid education methods. The most basic

tools used in distance education are online learning environments that have emerged through the adaptation of information technologies to learning and teaching processes (Naveh, Tubin, & Pliskin, 2010). Online learning can be carried out synchronously, asynchronously, or by following a mixed model where both are used. Synchronous online learning refers to teachers and students being online at the same time and participating in educational activities, while asynchronous online learning refers to teachers and students being online at different times or an environment where students can learn at their own pace (Horton, 2011). The Turkish higher education system aims to improve students' learning experience and enrich researchers' work options by making the most of the potential offered by technology. In this context, the use of technology has risen to a strategic level in higher education institutions, and this digital transformation has become a necessity that must be integrated into all academic and administrative activities (Güllü, 2021).

Within the scope of Turkey's 2023 Education Vision, higher education institutions adopt digitalization as a priority strategy and implement various projects in this direction (Karaca and Karaca, 2021). These projects include important steps such as digitalization of educational materials, strengthening of distance education infrastructure and use of virtual laboratories (Taşkıran, 2017). Today, the e-learning model in distance education has become a part of the mainstream in education (Allen and Seaman, 2008). Learning contents can be presented effectively with constantly developing and self-updating technologies. However, many concerns are expressed in the relevant literature in the context of academic trust in e-learning processes (Alwi and Fan, 2010; Keskin and Güneş, 2015; Özen, 2016; Ramim and Levy, 2006). One of these concerns is that students' identities are often inadequate to verify in online exams conducted in e-learning processes (Flior and Kowalski, 2010). Studies show that learners believe that online exams can be cheated on (King, Guyette, & Piotrowski, 2009), tend to cheat on online exams (Chapman, Davis, Toy, & Wright, 2004), think that online exams can be cheated more easily (Hillier, 2014), and learners cheat more on online exams than on traditional exams (Lanier, 2006). Due to the academic irregularities mentioned above, academic insecurity is felt more in online assessment and evaluation processes than in face-to-face assessment and evaluation processes. The basis of this insecurity is the physical distance between the teacher and the learner and the thought that teachers cannot adequately provide the security element expected of them in assessment and evaluation processes such as e-exams (Jung & Yeom, 2009; Ramu & Arivoli, 2013). It can be argued that studies such as the production of content for distance education, the design of educational programs, improvements in measurement and evaluation processes, and the development of interaction opportunities will contribute to the quality of distance education (Adnan & Anwar, 2020; Lau, Yang, & Dasgupta, 2020). However, innovations and technological opportunities emerging in the field of distance education depend on the effective use of these and these learning environments by the learner. No matter how qualified the content presented in the learning process is, it cannot be said that this teaching process will be very efficient without the learner's efforts to internalize, repeat, and deepen the content presented to him/her (Cassidy, 2011; Heikkilä & Lonka, 2006; Roth, Ogrin & Schmitz, 2015). In other words, in the efficiency of distance education applications carried out during the pandemic, it is of great importance for individuals to manage their learning processes, engage themselves in the learning process, and strengthen the learning process by using different strategies in the learning process.

Metacognitive processes are related to students' ability to create plans, programs, or goals to monitor or evaluate their progress in learning. Motivational strategies indicate that students are self-motivated and are willing to take responsibility for their success or failure (Abrami, Bernard, Bures, Borokhovski, & Tamim, 2012).

Distance learning is an interdisciplinary field that feeds on the philosophy of openness in education, which sees knowledge as a common production of humanity and therefore a common value of humanity, beyond its educational definitions. Distance learning, with the philosophy of openness in education that shapes its conceptual character (Baker, 2017); has implemented many applications

that are guided by universal values in the processes of knowledge, learning, and teaching, and as a result, have the philosophy of openness in education at their core (Bozkurt, 2019b).

High student success and motivation are among the main goals of educational institutions that provide distance education services. Determining the extent to which the desired qualifications have been achieved is possible through the evaluation of the student. Evaluation is defined as a decision-making process about the measured characteristics of individuals or objects by comparing measurement results with a criterion or set of criteria (Atılğan, 2009).

With the use of distance education environments, the use of e-evaluation techniques in education and training processes is increasing. E-evaluation, in general, covers the use of computers in evaluation. In other words, it creates a wide range of activities that include a complex series of activities with digital tools of varying capacities (Tomas et al., 2015).

In fact, e-evaluation includes traditional evaluation techniques. Evaluation techniques used in traditional teaching environments can be easily applied to e-learning processes. The effective use of technology is one of the superior aspects of e-evaluation. Technology-supported evaluation and feedback have many benefits (JISC, 2010). Jordan (2013) explained the importance of e-evaluation with the following items: i) The quality of feedback provided on time in evaluations is the key to students' progress. ii) Even mass exams are evaluated in a short time. iii) Resources can be used repeatedly at any time. iv) Online assessment can motivate students and help them study faster. v) Multiple choice tests are powerful in assessing broad content. vi) Students can access more tests in a computer environment. Although distance education studies in higher education are progressing at an increasing pace, e-assessment is progressing slower than expected (Tomas et al., 2015).

Significant studies are being conducted to make distance education effective and efficient. However, there are deficiencies in studies on e-assessment, which is one of the sub-components of distance education. In this context, it is thought that the research conducted will contribute to both institutions providing distance education and the elimination of important deficiencies in terms of academic staff.

When past studies examining students' experiences with measurement and evaluation processes in distance education are examined, it is seen that there are many studies on the effectiveness of measurement tools and evaluation methods used in evaluating student achievement and providing feedback on teaching processes in open and distance education (Chang, F. C., 2002; Chaudhary and Dey, 2013; Hatzipanagos and Warburton, 2009; Turner and Briggs, 2018), however, it is seen that the number of studies that have sought learner opinions on the effectiveness of these methods and approaches is quite limited. One of these, the study conducted by Ogange, Agak, Okelo and Kiprotich (2018), was conducted to reveal student opinions on different types of formative assessment used in online learning environments.

This study aims to map the intellectual landscape of online education in higher education institutions over the last decade and to identify gaps in the existing literature, thus providing valuable insights that will guide educators, policy makers and researchers on how to further increase the effectiveness and reliability of online assessments in higher education, in which areas there are gaps in online education and in which areas of online education need development.

METHODOLOGY

Research Method

This study aims to delineate the advancements in online assessment in higher education, employing bibliometric analysis to guide the research. Aria and Cuccurullo (2017) have noted that bibliometrics serve to address three significant questions. Firstly, they define the fundamental knowledge and intellectual structure within a research domain; secondly, they explore the forefront or conceptual

framework of the field; and lastly, they map the social network structure of the relevant scientific community.

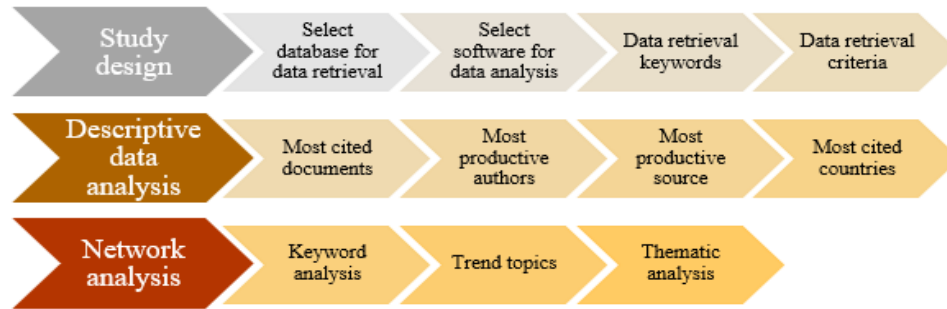


Figure 1. Study design

As illustrated in Figure 1, the chosen methodology has facilitated the identification of key elements within the field: the most highly cited documents, the most prolific authors, emerging trend keywords, and both the driving forces and dimensions of artificial intelligence usage in human resource management. The implementation of the methodology is divided into five critical stages according to the bibliometric mapping standards established by Zupic and Čater (2015): study design, data collection, data analysis, data visualization, and interpretation.

Study design

The study design phase is crucial in shaping the research framework, as it involves formulating the research questions that will guide the study and selecting appropriate methodologies to address these questions (Aria & Cuccurullo, 2017). This phase also requires making strategic decisions regarding various elements of the research process. These decisions include determining the time frame within which the study will be conducted, selecting the keywords that will guide the literature review, choosing the databases for locating relevant literature, and selecting the software tools necessary for data analysis. Each of these decisions aims to develop an approach that effectively meets the study's objectives.

Data Collection

Data collection for this study was conducted using the Scopus database, which is recognized for its broad coverage and frequent adoption in bibliometric studies (Mongeon & Paul-Hus, 2016). Harzing & Alakangas, (2016) noted that while other databases such as PubMed, Web of Science and Google Scholar offer unique advantages, Scopus was chosen for its comprehensiveness and large repository of digital peer-reviewed publications. The literature search was performed using specific keywords relevant to the study's focus: (("Online Assessment" OR "Digital Assessment" OR "E-Assessment" OR "Electronic Assessment" OR "Online Testing" OR "Remote Assessment" OR "Online Exam*" OR "Online Grading")) AND ("Higher Education" OR "Universit*"). These keywords were searched in the titles, abstracts, or keyword sections of publications. To effectively capture the latest developments, the time frame for the literature search was set to 2014-2023.

Since journals typically publish the most up-to-date research findings and are more detailed compared to other types of publications such as conference proceedings, which were more affected by postponements and cancellations due to the COVID-19 pandemic, the study considered only journal articles to ensure the data's currency and rigor (Jin et al., 2018). The initial search yielded 2167 documents, which were then filtered by year range, article type, and language to reduce the number to 907 relevant articles.

Data Analysis

In the field of bibliometric studies, numerous software options are available for data analysis (Cobo et al., 2011). In this study, Biblioshiny was employed to comprehensively analyze the collected data. Designed for users without coding expertise, Biblioshiny is a user-friendly, web-based interface primarily used for descriptive data analysis. It is an extension of the Bibliometrix tool, which was specifically developed to provide a more accessible approach to bibliometric analysis (Aria & Cuccurullo, 2017). The design of Biblioshiny makes it an ideal choice for processing and analyzing the descriptive aspects of bibliometric data, and it supports data from major databases such as Scopus, Web of Science, Dimensions, PubMed, and the Cochrane Library (Moral-Muñoz et al., 2020).

We used Bibliometrix for strategic mapping. The strategy map was used to detect and visualize conceptual sub-areas using common word and h-index indicators to create a thematic map in a two-dimensional strategy diagram. This map illustrates a set of research themes (Aria, Misuraca, and Spano 2020). Initially, keyword networks are created. Keywords that frequently appear together form a high-density network. The software then calculates the relationships between these networks and distributes the themes according to centrality and density, grouping them by topic areas. Centrality measures the level of interaction of a keyword network with other networks, while density measures the internal strength and closeness of words within the network. Themes can be classified into four groups according to centrality and density (Cobo et al., 2015):

Motor Themes: These are well-developed and important themes that structure the research area and appear in the upper right quadrant of the strategic map.

Niche Themes: These are highly specialized and peripheral themes and appear in the upper left quadrant.

Rising or Falling Themes: These low-intensity and low-centrality themes represent emerging or declining areas of research and appear in the lower left quadrant.

Core Themes: These important but underdeveloped themes are general and transversal to the research area and are located in the lower right quadrant.

RESULTS

The results section provides a comprehensive overview of the research landscape in online assessment, highlighting trends, key sources, and significant contributions. The dataset exhibits a significant annual growth rate of 19.89%, reflecting the increasing interest and research output in this field over the past decade. The average age of the documents is 3.66 years, indicating that the body of literature is relatively recent. On average, each document has been cited 14.59 times, demonstrating their impact and relevance in academic circles. Collectively, these articles reference a total of 34,953 sources, highlighting the extensive research and breadth of knowledge that has been integrated into this study.

Table-1 Main Information About the Articles

| Description | Results |
|--------------------------------|-----------|
| MAIN INFORMATION ABOUT DATA | |
| Timespan | 2014:2023 |
| Sources (Journals, Books, etc) | 496 |
| Documents | 907 |
| Annual Growth Rate % | 19,89 |
| Document Average Age | 3,66 |

| | |
|---------------------------------|-------|
| Average citations per doc | 14,59 |
| References | 34953 |
| DOCUMENT CONTENTS | |
| Keywords Plus (ID) | 2658 |
| Author's Keywords (DE) | 2433 |
| AUTHORS | |
| Authors | 3182 |
| Authors of single-authored docs | 114 |
| AUTHORS COLLABORATION | |
| Single-authored docs | 116 |
| Co-Authors per Doc | 3,74 |
| International co-authorships % | 17,75 |
| DOCUMENT TYPES | |
| Article | 872 |
| Review | 35 |

The content analysis of these documents reveals a rich set of keywords, diverse authorship, and significant collaboration among researchers. Keywords Plus, which are frequently occurring terms in the titles and abstracts of the articles, provide insights into the main themes and topics explored in the literature.

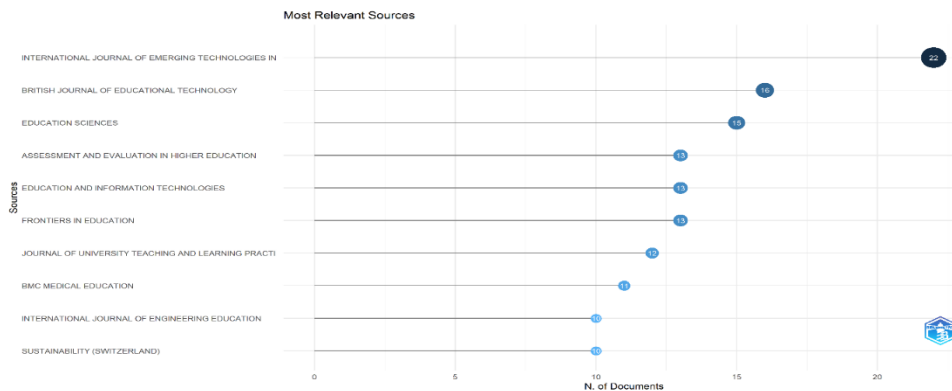


Figure2- Most Relevant Sources

As shown Figure-2, the most relevant resources in the field of online assessment in higher education include the “International Journal of Emerging Technologies” with 22 articles, followed by the “British Journal of Educational Technology” with 16 articles. Other significant sources are *Education Sciences* with 15 articles, “Assessment and Evaluation in Higher Education” and “Education and Information Technologies” both with 13 articles, and “Frontiers in Education” also with 13 articles. Additionally, the “Journal of University Teaching and Learning Practice” is noted for its contributions, showcasing the breadth and diversity of research in this area.

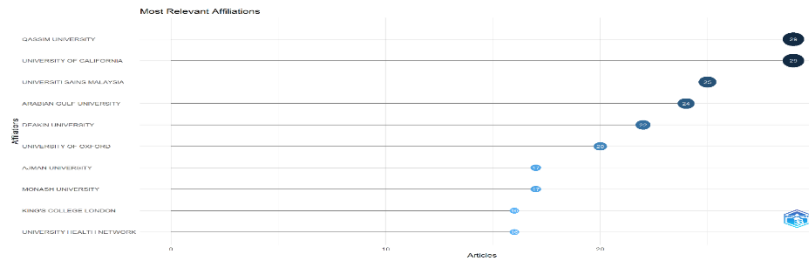


Figure-3 Most Relevant Affiliations

The most relevant affiliations in the field of online assessment in higher education include Qassim University and the University of California, each contributing 29 articles. The University of Sains Malaysia follows closely with 25 articles, while Arabian Gulf University has 24 articles. Deakin University is also notable with 22 articles, and the University of Oxford has made significant contributions with 20 articles. These institutions play a crucial role in advancing research and development in online assessment methodologies and technologies.

Table-2 Most Relevant Countries

| Country | Articles | Articles % | SCP | MCP | MCP % |
|----------------------|----------|------------|-----|-----|-------|
| USA | 73 | 8 | 69 | 4 | 5,5 |
| UNITED KINGDOM | 55 | 6,1 | 39 | 16 | 29,1 |
| AUSTRALIA | 49 | 5,4 | 40 | 9 | 18,4 |
| CHINA | 37 | 4,1 | 32 | 5 | 13,5 |
| SAUDI ARABIA | 35 | 3,9 | 30 | 5 | 14,3 |
| SPAIN | 32 | 3,5 | 26 | 6 | 18,8 |
| INDIA | 28 | 3,1 | 23 | 5 | 17,9 |
| SOUTH AFRICA | 24 | 2,6 | 20 | 4 | 16,7 |
| CANADA | 22 | 2,4 | 16 | 6 | 27,3 |
| GERMANY | 21 | 2,3 | 16 | 5 | 23,8 |
| MALAYSIA | 21 | 2,3 | 16 | 5 | 23,8 |
| TURKEY | 21 | 2,3 | 18 | 3 | 14,3 |
| PORTUGAL | 13 | 1,4 | 11 | 2 | 15,4 |
| UNITED ARAB EMIRATES | 13 | 1,4 | 8 | 5 | 38,5 |
| JORDAN | 10 | 1,1 | 8 | 2 | 20 |

Table 2 provides an overview of the most relevant countries contributing to the literature on online assessment in higher education. The USA leads with 73 articles (8% of total), predominantly single-country publications (SCP), and a small proportion of multi-country publications (MCP) at 5.5%. The United Kingdom and Australia follow, with significant MCP percentages of 29.1% and 18.4%, respectively, indicating a higher level of international collaboration. Other notable contributors include China, Saudi Arabia, Spain, and India, each with varying balances of SCP and MCP, reflecting diverse engagement levels in collaborative research.

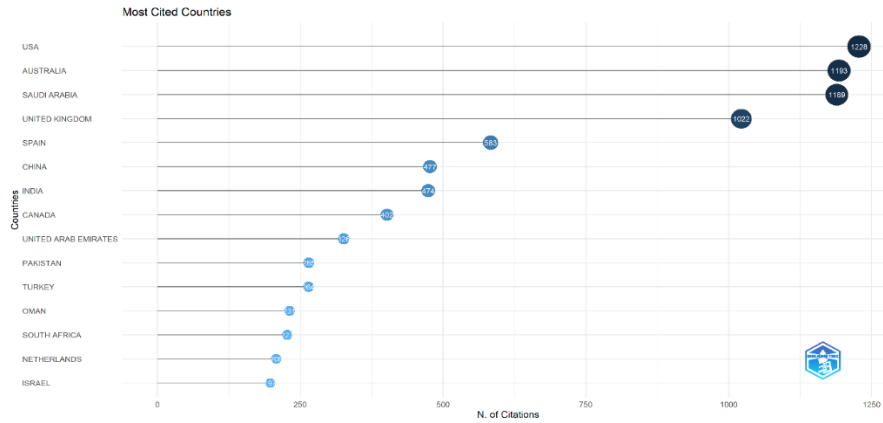


Figure-4 Most Cited Countries

The most cited countries in online assessment research can be grouped based on their citation impact. The first group includes the USA, Australia, and Saudi Arabia, each with over 1100 citations, highlighting their leading roles in this research field. The second group comprises the United Kingdom, Spain, China, India, and Canada, with citations ranging from 402 to 1022, indicating significant but slightly less dominant contributions. The third group includes the United Arab Emirates, Pakistan, Turkey, Oman, South Africa, the Netherlands, and Israel, with citations between 92 and 326, showing emerging or focused research efforts in online assessment. These groups reflect the varying levels of influence and research activity across different countries.

Table-3 Most Global Cited Documents

| Paper | DOI | Total Citations | TC per Year |
|---|-------------------------------|-----------------|-------------|
| KHALIL R, 2020, BMC MED EDUC | 10.1186/s12909-020-02208-z | 473 | 94,60 |
| FREEMAN D, 2017, LANCET PSYCHIATRY | 10.1016/S2215-0366(17)30328-0 | 429 | 53,63 |
| GARCÍA-PEÑALVO FJ, 2020, EDUC KNOWL SOC | 10.14201/eks.23013 | 359 | 71,80 |
| CONDON DM, 2014, INTELLIGENCE | 10.1016/j.intell.2014.01.004 | 251 | 22,82 |
| GUANGUL FM, 2020, EDUC ASSESS EVAL ACCOUNT | 10.1007/s11092-020-09340-w | 195 | 39,00 |
| ALMUSHARRAF NM, 2020, INT J EMERG TECHNOL LEARN | 10.3991/ijet.v15i21.15647 | 174 | 34,80 |
| ELZAINY A, 2020, J TAIBAH UNIV MED SCI | 10.1016/j.jtumed.2020.09.005 | 158 | 31,60 |
| LANCASTER T, 2021, INT J EDUC INTEGR | 10.1007/s40979-021-00070-0 | 137 | 34,25 |
| BUTLER-HENDERSON K, 2020, COMPUT EDUC | 10.1016/j.compedu.2020.104024 | 128 | 25,60 |
| FAROOQ F, 2020, J COLL PHYS SURG PAK | 10.29271/jcpsp.2020.Supp1.S67 | 120 | 24,00 |

Table 3 highlights the most globally cited documents related to online assessment in higher education. Khalil's 2020 paper in BMC Medical Education leads with 473 total citations, averaging 94.60 citations per year. Freeman's 2017 paper in Lancet Psychiatry and García-Peñalvo's 2020 article in Education in the Knowledge Society follow with 429 and 359 total citations, respectively, showcasing the significant impact of their research. Other notable works include studies by Condon

(2014), Guangul (2020), and Almusharraf (2020), each contributing substantially to the field, with high citation counts and annual citation rates.

Most Frequent Words

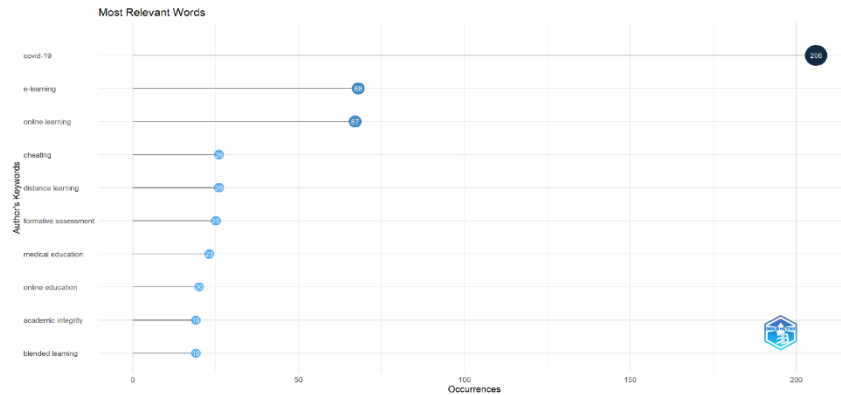


Figure 5- Most Relevant Words

Figure 5 shows that the most relevant words in online assessment research reflect current trends and key focus areas. The term "covid 19" appears most frequently, with 206 mentions, indicating the significant impact of the pandemic on online education. Following this, "e-learning" and "online learning" are prominently used, with 68 and 67 mentions respectively, highlighting the shift towards digital education platforms. Other notable terms include "cheating" and "distance learning," each mentioned 26 times, pointing to concerns about academic integrity and the increasing prevalence of remote education. Additionally, "formative assessment" (25 mentions) and "medical education" (23 mentions) suggest a focus on evaluating student performance and specialized educational fields. "Online education" and "academic integrity," each with 19 mentions, along with "blended learning" (19 mentions), further emphasize the importance of maintaining ethical standards and combining traditional and digital teaching methods in the evolving landscape of education.

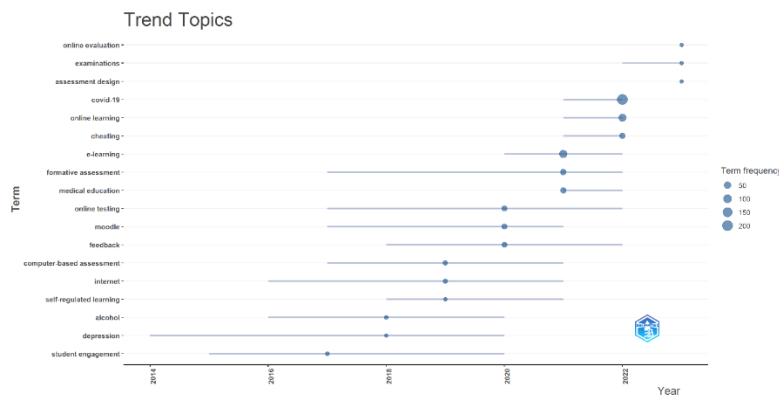


Figure-5 Trend Topics

Figure 5 illustrates the evolution of research trends in online assessment over distinct periods. Between 2014 and 2018, key topics included "internet," "self-regulated learning," "depression," and "student engagement." This period saw a focus on foundational technologies and psychological aspects of learning, highlighting how learners manage their own learning processes and the impact of mental health on educational outcomes. From 2018 to 2020, research shifted towards "online testing," "Moodle," "computer-based assessment," and "feedback." This phase marked an increased interest in technological tools and methodologies for assessing student performance, with a

particular emphasis on platforms like Moodle and the importance of feedback in the assessment process. After 2020, the COVID-19 pandemic significantly influenced research trends. The most prominent topics during this period were "online evaluation," "examinations," "assessment design," "COVID-19," "online learning," "cheating," "e-learning," and "formative assessment." The pandemic accelerated the adoption and refinement of online assessment methods, addressing challenges such as maintaining academic integrity and adapting assessment designs to remote learning environments.

Overall, the most trending topics are "COVID-19," followed by "e-learning" and "online testing." The pandemic has undeniably driven the focus towards online evaluation practices and adapting assessment strategies to new realities, reflecting the urgent need to address the unique challenges posed by remote education.

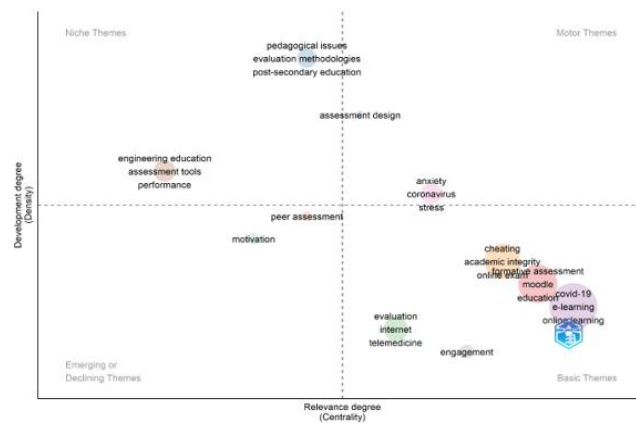


Figure-6 Thematic Map

The thematic map offers a detailed analysis of the research landscape in online assessment by categorizing various themes into Niche, Motor, Emerging, Declining, and Basic Themes.

Niche Themes represent specialized areas within the field, including "pedagogical issues," "evaluation methodologies," and "post-secondary education." These topics, while important, are less prevalent and focus on specific aspects of online learning and assessment. Similarly, "engineering education," "assessment tools," and "performance" are specialized areas that contribute to a deeper understanding of online assessment in particular contexts. Motor Themes are central and highly prevalent in current research. "Anxiety," "coronavirus," and "stress" reflect the significant impact of the pandemic on learners and educators, highlighting the psychological challenges faced during online assessments. "Assessment design" is another key theme, emphasizing the development of effective assessment methods suited to online and remote environments. Emerging and Declining Themes reveal shifting research priorities. "Motivation" is an emerging theme, indicating a growing interest in understanding what drives learners to engage with online assessments. Conversely, "peer assessment" is identified as a declining theme, suggesting a reduced focus on this topic over time. Basic Themes cover a broad range of widely discussed and fundamental issues in online assessment. These include "COVID-19," "e-learning," and "online learning," which have become central due to their relevance during the pandemic. "Formative assessment," "Moodle," and "education" reflect foundational elements of online learning environments. Topics such as "cheating," "academic integrity," and "online exams" address critical concerns related to assessment practices. Additionally,

"evaluation," "internet," "telemedicine," and "engagement" further illustrate the diverse aspects of online assessment research.

Significant findings include the dominance of key sources such as the International Journal of Emerging Technologies and notable affiliations like Qassim University and the University of California. The data also highlight the leading roles of the USA, Australia, and Saudi Arabia in terms of citation impact. Current research trends, particularly influenced by the COVID-19 pandemic, reveal a shift towards online evaluation, e-learning, and assessment design. The thematic map further categorizes research into specialized, central, and evolving topics, demonstrating a focus on both foundational and emerging issues in online assessment. Overall, the results underscore the dynamic and expanding nature of research in this field, driven by recent global challenges and technological advancements.

DISCUSSION AND RESULTS

This study aims to map the intellectual landscape of online education in higher education institutions over the last decade and to identify gaps in the existing literature, and to provide valuable insights that will guide educators, policy makers and researchers on how to further increase the effectiveness and reliability of online assessments in higher education, where there are gaps in online education and which areas of online education need to be developed.

In particular, significant transformations have occurred in higher education institutions around the world over the last decade, driven by the developments in digital technologies and the increasing demand for flexible learning solutions. This study provides a comprehensive bibliometric analysis of online assessment in higher education over the last decade (2013-2023). Using the SCOPUS database, 857 relevant articles were identified and researched examining various aspects of online, digital and distance assessment methods, including e-assessment, online testing, remote proctoring and online grading.

Our analysis highlights key trends, influential publications, prolific authors and dominant research themes in the field. In light of the data obtained as a result of the research, it is revealed that there has been a significant increase in research activities, especially in response to the COVID-19 outbreak, which necessitated a rapid transition to online learning environments. In this context, according to the results of the research findings, it is understood that there is a significant need for more research and development in higher education institutions, especially on issues such as the impact of online assessments on student performance, participation and academic honesty. In addition, we can say that more in-depth research and technological developments for educators should be carried out in this regard by revealing the challenges and opportunities offered by digital assessment tools.

Within the scope of the results obtained in the research, the critical role of technological innovation in shaping the future of educational assessment can be underlined according to the results of this research. In addition, the need for ongoing research to address the emerging challenges and optimize assessment practices in digital learning environments is highlighted by this study. Although distance education studies in higher education are progressing at an increasing pace, e-assessment is progressing slower than expected. This result is similar to the results of Tomas (2015). Important studies are being carried out to make distance education effective and efficient. However, there are deficiencies in studies on e-assessment, which is one of the sub-components of distance education.

It is observed that academic insecurity is felt more in online assessment and evaluation processes compared to face-to-face assessment and evaluation processes. The basis of this insecurity is that teachers and learners are physically far from each other and that teachers cannot sufficiently provide the security element expected from them in assessment and evaluation processes such as e-exams.

Therefore, we can say that more research and technological developments are needed in e-exam evaluations. These results are consistent with the results obtained by Jung and Yeom (2009); Ramu and Arivoli (2013). We can say that studies such as the production of content for distance education, the design of educational programs, improvements in assessment and evaluation processes, and the development of interaction opportunities will contribute much more to the quality of distance education. These results are similar to the results of the studies of Adnan and Anwar (2020); Lau, Yang, and Dasgupta (2020).

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