Keyword Survey and Thematic Focuses in Educational Research: A Review of 2023

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Abstract: Education is constantly evolving as a field that shapes the future of societies, so identifying the key topics and prominent studies of educational research in 2023 will help move in the right direction. This study aims to identify the most important and current topics in the field of education through a bibliometric analysis of articles published on education in 2023. In the search in the Web of Science database, 2917 articles on the subject published in 2023 were reached. The articles obtained were evaluated by bibliometric analysis methods. When the frequency distribution of keywords was analyzed, it was seen that keywords such as "higher education", "education", and "teacher education" stood out. In addition, with thematic cluster analysis, the keywords were divided into four different regions, which reflect the thematic foci in the field of education. The study also analyzed the top 10 most cited articles among the articles published on education in 2023. These articles had a wide impact on the field of education and focused on various topics. In the analyzed studies, especially topics such as "diversity in education, learning approaches, and artificial intelligence" played an important role. This study provides essential information for researchers and practitioners in the field of education to help them identify thematic foci in education and important cited studies.

Keywords: Education, Trending Topics, Thematic clusters, Bibliometric analysis, Citation analysis

Introduction

Education is a fundamental factor in shaping the future of societies. New trends in education have become a significant focus for educators and researchers today. These trends aim to respond to the changing needs of education and the evolving needs of students. In this context, it can be said that a wide range of educational issues ranging from parental stress to educational robotics applications, from problem-solving skills to social studies education are among the trending topics (Ünüvar, 2022). These themes serve as roadmaps to help broaden the perspectives of educators and researchers by addressing current developments and approaches in education. For example, mobile and analytics technologies have been a consistent trend throughout the period, there was a trend toward maker technologies and gaming in the early part of the last decade, and emerging technologies such as virtual reality and artificial intelligence are predicted to be trending in the future (Dubé & Wen, 2022).

Looking back at developments in education and technology, the 1990s stand out as a remarkable turning point (Reiser, 2001). When we look at those years, the use of Internet technology in education stands out. This situation has allowed the spread of multimedia tools in education. The last two decades have witnessed the adoption of the constructivist approach to education, the use of Learning Management Systems (LMS), Web 2.0 technologies, and the proliferation of MOOC-like courses thanks to Internet-based communication (Martin Weller, 2020). This situation shows that educational research focuses on different topics and is renewed every day.

The introduction of artificial intelligence technology in education has been another milestone for studies in this field. In these studies, intelligent tutoring systems, natural language processing for language education, educational robots for artificial intelligence training, educational data mining for performance prediction, discourse analysis in computer-supported collaborative learning, neural networks for instructional evaluation, affective computing for student emotion detection, and recommender systems for personalized learning stand out (Chen et al., 2022). With the use of the Internet in education and the widespread use of online education, student records in learning management systems have begun to generate a large pile of data. The development of technology research applications based on big data makes it easier for researchers to see the potential and problems of individual students. Based on this data, researchers can monitor and evaluate students, teachers, materials, and learners (Lutfiani & Meria, 2022).

Knowledge and learning have social, economic, and cultural impacts. As such, developments in the field of education are crucial. Today, advancements in technology have greatly accelerated progress in education. Thus, this study seeks to identify the topics that are currently trending in educational articles published in 2023. The objective is to understand and highlight the most urgent issues in the field of education.

Educational research must be responsive to the needs of the knowledge society. In this regard, the significance

of this study is amplified. Abbreviations for technical terms must be explained upon their initial usage. Avoid biased, emotional, figurative, or ornamental language, and stick to standard language with consistent technical terms. Keep the language formal, and avoid contractions, colloquial words, informal expressions, and unnecessary jargon. The positions on subjects should be clear but should also be hedged.

Furthermore, aim for grammatical correctness, and use precise vocabulary to convey meaning whenever possible. Researchers and decision-makers in the education field are focused on complex issues, including digitalization, the transformation of learning methods, student achievement, educational policies, and teaching methods. Clear causal connections between statements should be established to ensure a logical flow of information.

The purpose of this study is to use bibliometric analysis to identify the key and contemporary topics in education. Only articles indexed in the 2023 Web of Science database will be examined. The study aims to help scholars, policymakers in education, and educational practitioners with research in the field. Additionally, it will provide a foundation for future educational research and policymaking processes. To accomplish this, the following research questions were established:

1. What are the most frequently used keywords in articles on education published in 2023 and how is the thematic distribution of keywords shaped?
2. What are the most cited studies in these articles and which topics do they emphasize?

Method

This paper applies bibliometric analysis to identify education-related article trends in 2023. Bibliometric analysis is a scientific study, publication, and citation review method that was employed to examine literature in the education field (Aria & Cuccurullo, 2017). The study features descriptive statistics which encompass the number of articles, author keywords, citations by WOS, and thematic clusters (Hood & Wilson, 2001).

Data Collection

The data collection process was conducted utilizing the Web of Science database. Relevant articles were identified through queries and subsequently filtered as necessary. Figure 1 displays the methods employed during data collection and the steps taken in selecting the data.

An initial query of the Web of Science using the keyword "education" retrieved 1,466,768 studies. The filters of WoS categories: "Education Educational Research", citation topic meso: "6.11 Education & Educational Research", document type: "Article" and language: "English" resulted in 2,917 articles.

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Data Analysis

Articles related to the subject and bibliometric data of these articles were obtained through queries on the Web of Science database. The gathered data underwent bibliometric analysis, including frequency of keywords, identification of the most cited studies, and thematic cluster analysis. Technical term abbreviations are explained upon first use. Bibliometric analysis aided in the identification of critical and current issues within the field of education.
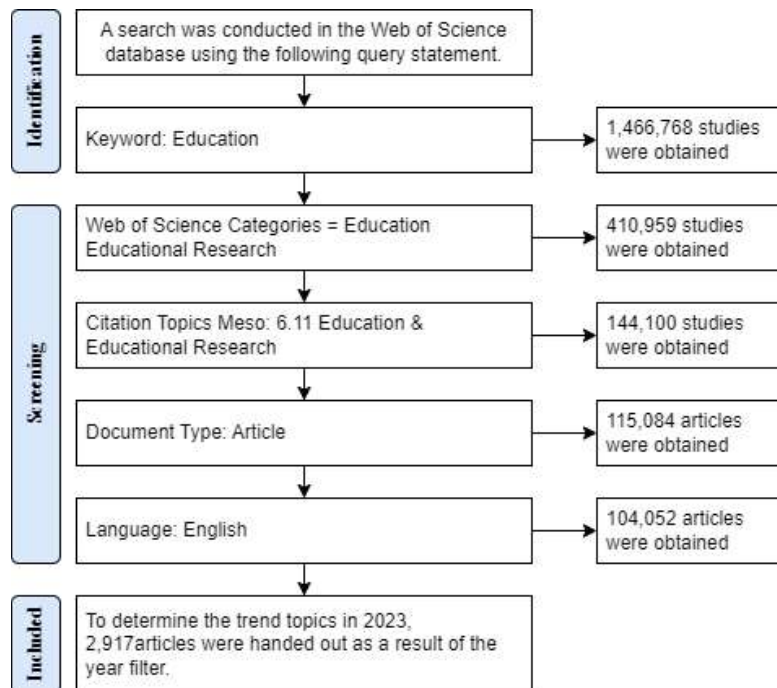
Figure 21. PRISMA Chart of Data Collection Process

Results

In 2023, a bibliometric analysis of education-related articles indexed in the Web of Science database was conducted, yielding crucial data to determine current and prominent topics in education. This data provides insight into trends and priorities within the field. The distribution of keywords in relevant articles, an analysis of the most cited studies, and a detailed examination of notable topics in education are presented below.

Keyword Distribution and Thematic Cluster Analysis

The articles published in 2023 on education were analyzed and important findings were reached by determining the thematic distribution of keywords. A frequency analysis was performed to identify the most commonly used keywords in the articles, and Figure 2 presents a word cloud that indicates the frequency of usage.
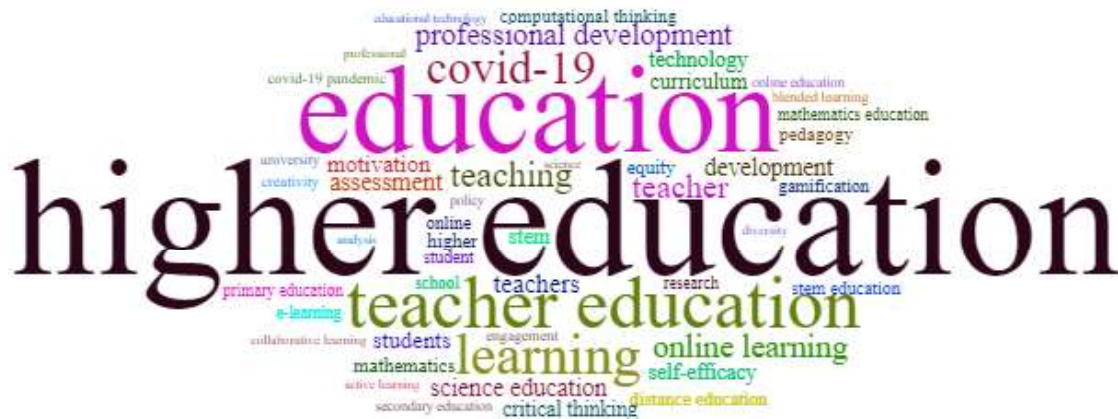
Figure 22. Word Cloud on the Frequency of Keywords in Articles

In 2023, the frequency distribution of keywords of education-related articles is one of the main findings of this study. Analysis of Figure 2 reveals the most frequent keywords used in these articles, which help identify the current focus topics and trends in education. The top three keywords are "higher education," "education," and "teacher education," indicating prominent themes. Other commonly used keywords include "learning," "covid-19," "teaching," and "online learning."
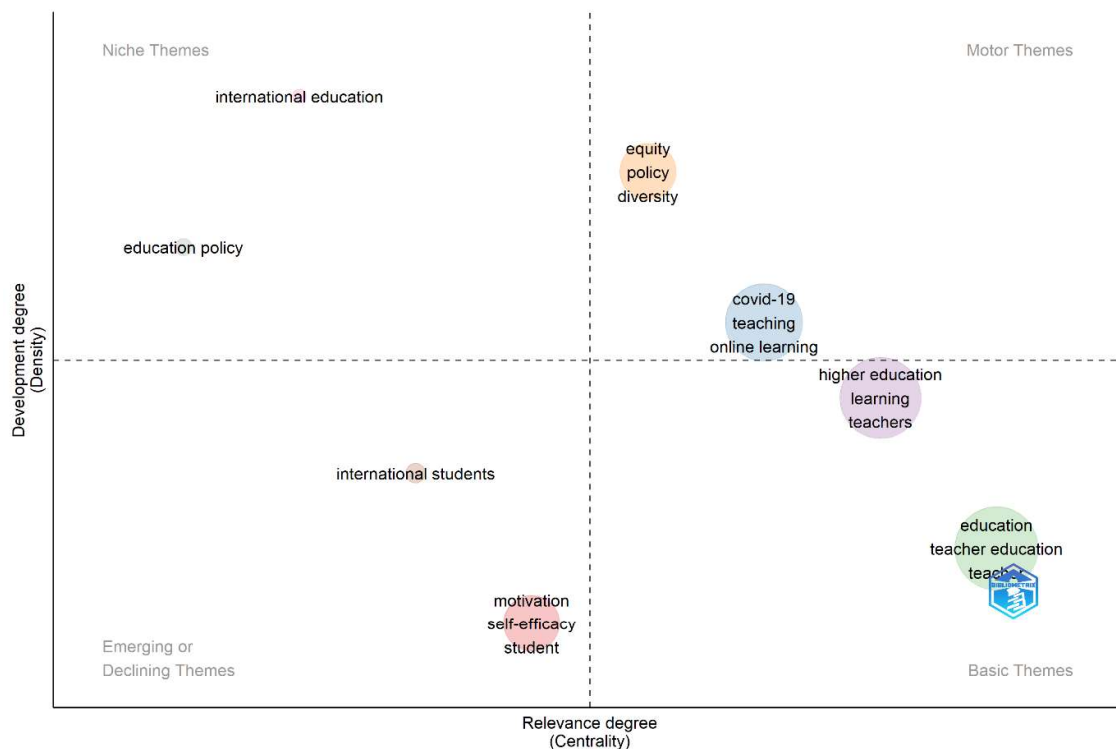

Figure 23. Thematic Cluster Analysis Result

Thematic cluster analysis categorized education-related keywords into four distinct regions. Each region corresponds to particular themes and subtopics. The positioning of the keywords within these regions enables us to comprehend their interrelationships and trends. Additionally, the findings from this analysis can aid in pinpointing high-priority research areas within the education field and offer direction for upcoming studies. Figure 3 displays the various regions and associated keywords resulting from the analysis of four distinct regions.

Region 1: Motor Themes (Top Right)

The keywords in this region appear to address innovative and essential concerns in the field of education. Phrases like "equity," "policy," and "diversity" may pertain to topics concerning fairness, policies, and variety in education. The placement of these phrases towards the center-left area of the region could suggest that these themes indicate a particular field of knowledge and hold significant significance.

Region 2: Basic Themes (Bottom Right)

The keywords in this section appear to be the foundation of the field of education, with terms like "higher education," "learning," and "teachers" suggesting themes of higher education, learning, and teaching. The proximity of these terms to the upper middle edge hints at their association with motor themes (Region 1) and a particular level of expertise. The terms "education," "teacher education," and "teacher" may refer to general education and teacher training. The fact that these terms appear on the middle right side may suggest that core subjects receive less attention compared to other areas.

Region 3: International Students and Motivation (Lower Left)

The keywords in this section suggest that international students and their motivations are significant topics in the field of education. "International students" refers to the experiences of students from different countries. The terms "motivation," "self-efficacy," and "student" reflect student motivation and self-efficacy. The terms in the bottom right corner may indicate a peripheral connection to central subjects and represent a particular area of expertise.

Region 4: International Education and Education Policy (Top Left)

The keywords in this section appear to pertain to international education and education policies. "International education" can refer to programs or experiences aimed at providing a global perspective. "Education policy" refers to policies governing education. The positioning of "education policy" in the bottom left corner suggests that this topic is foundational but may require some level of expertise.

Most Cited Articles

Within the scope of this study, we analyzed the top 10 cited studies among education articles published in 2023. These articles have a great impact on the education field, as the number of citations indicates their effectiveness and value for educational researchers and practitioners. We found each article, which focuses on various education issues and approaches, worthy of detailed review. This review aims to familiarize educational researchers and practitioners with significant works. Table 1 provides the authors, titles, keywords, and total citation counts of these articles.

Table 4. Most Cited Articles

Author	Title	Keywords	Total Citations
Burt, et al.	STEM validation among underrepresented students: Leveraging insights from a STEM diversity program to broaden participation	undergraduate research experiences (UREs), underrepresented students, STEM, broadening participation, validation	12
Mclean & Attardi	Sage or guide? Student perceptions of the role of the instructor in a flipped classroom	active learning, flipped classroom, guide, instructor, peer interaction	11
Cooper, G.	Examining Science Education in ChatGPT: An Exploratory Study of Generative Artificial Intelligence	Generative artificial intelligence and science education, Large language models, ChatGPT, Digital technologies	9
Liu, et al.	Toward a model of informal digital learning of English and intercultural competence: a large-scale structural equation modeling approach	Informal Digital Learning of English, Intercultural competence, Language learning beyond the classroom, Ecological CALL	6
Troehler, D.	Comparative education or epistemological power games for world domination	Comparative education, epistemology, globalisation, world power, imperialism	6
Vazquez-Parra, et al.	Social Entrepreneurship and Complex Thinking: Validation of SEL4C Methodology for Scaling the Perception of Achieved Competency	professional education; educational innovation; future of education; complex thinking; social entrepreneurship; higher	5

Author	Title	Keywords	Total Citations
		education	
Cruz-Sandoval, et al.	Student Perception of the Level of Development of Complex Thinking: An Approach Involving University Women in Mexico	Professional education, educational innovation, future of education, complex thinking, educational gender gap, higher education	5
Campol, et al.	Methodologies for Fostering Critical Thinking Skills from University Students' Points of View	methodology; critical thinking; thinking skills; students' conception; higher education	4
Zerai, et al.	The meanings of differentiated instruction in the narratives of Eritrean teachers	Differentiated instruction, individualisation, inclusive education, teacher, narrative analysis, Eritrea	4
Dai & Hardy	Pursuing doctoral research in an emerging knowledge hub: An exploration of international students' experiences in China	International doctoral student, Chinese university, Bourdieu, learning experience, imbrication	4

Table 1 illustrates that the top 10 most cited articles concentrate on diverse educational topics. These articles focus on various topics, including diversity in education, approaches to learning, and artificial intelligence. Nevertheless, a shared characteristic of these studies is their contribution to prioritized issues in education.

The highest cited article is "STEM validation among underrepresented students." One article, which draws on a STEM diversity program, aims to broaden the participation of underrepresented students in STEM fields. The second most cited article, "Sage or guide? Student perceptions of the role of the instructor in a flipped classroom," challenges the conventional role of instructors in flipped classrooms by examining student perspectives. The third article, "Examining Science Education in ChatGPT," analyzes science education in ChatGPT. An Exploratory Study of Generative Artificial Intelligence examines the potential of artificial intelligence models, such as ChatGPT, in science education.

Discussion

The frequency distribution of keywords enables an understanding of priorities and focal points in the education field. The frequently used "higher education," "education," and "teacher education" keywords reflect emphasis on these topics in education. This suggests that the cornerstones of education - higher education, general

education, and teacher education - remain essential. Studies on these topics demonstrate society's ongoing interest in the education system. However, despite the frequent use of keywords such as "COVID-19" and "online learning," it is evident that the COVID-19 pandemic has brought about significant changes to the field of education globally. This exceptional period has required swift adjustments to distance learning, e-learning technologies, and teaching methods, resulting in a surge of interest in these topics. Moreover, the frequent use of terms like "STEM" and "technology" underscores the significance of science, technology, engineering, and mathematics education as well as digital technologies for students' future success. These fields represent sought-after skills in the job market and reflect ongoing research and development in these areas. Similar to our study, Valtonen et al. (2022) found that "online learning," "e-learning," and "higher education" were among the most commonly used keywords. Granić (2022), in his systematic review of technology adoption in education, focused on different technology types and found that e-learning is the most widely accepted delivery method, followed by m-learning, Learning Management Systems (LMSs), and social media platforms.

The results of the thematic analysis demonstrate that research in the realm of education in 2023 encompasses diverse themes. Specifically, keywords in the initial section, labeled as "motor themes", highlight pivotal and foundational concerns in the field of education. Phrases like "fairness," "policies," and "variety" reveal significant topics pertaining to equity, policy, and diversity in education. The positioning of these terms towards the center-left edge of the zone implies a potential focus and depth of expertise. The core themes reside within the second zone, which includes fundamental concepts in education such as "higher education," "learning," and "teachers." Despite this, their proximity to the motor themes in Zone 1 suggests their significance and potential specialization. The third quadrant suggests that the topic of international students and their motivation is significant in the field of education. However, its positioning in the lower right corner suggests that it may have less of a connection to core issues and may instead represent a specific area of specialization. The fourth quadrant appears to pertain to international education and education policy. The appearance of the phrase "education policy" in the lower left corner suggests that this topic may be fundamental but may necessitate a certain level of expertise. A research study that examined publications during the COVID-19 pandemic period determined that the content analyzed could be categorized into three primary areas: teaching and learning, policy and administration matters, and students' mental health (Valtonen et al., 2022). In a comparable investigation, the concepts of educational technology (EdTech), distance learning (DL), and instructional design stood out (Zawacki-Richter & Bozkurt, 2022).

The most cited articles on education published in 2023 were analyzed to determine the topics they focused on. It is possible to list the topics that the top 10 most cited articles focus on as follows:

- Increasing the participation of underrepresented students in STEM education
- Flipped classroom practices and student perceptions
- Artificial intelligence and science education
- English language learning and cultural competence

- Comparative education and globalization
- Complex thinking skills and education
- Develop critical thinking skills
- Differentiated instruction and teacher perceptions
- Experiences of international students
- Important and far-reaching issues in education

These articles addressed a variety of topics in the field of education and each of them ranked among the top cited articles in terms of their focus. Although each article has a different contribution and importance, the information and approaches provided by these studies are considered very valuable for educational researchers and practitioners. One of the reasons for this may be that they addressed essential issues in the field of education. For example, an article that addresses the important issue of increasing the participation of underrepresented students in STEM education may receive wide attention. Another aspect is that they may have used innovative research methods or presented essential findings. Educational researchers and practitioners may want to further understand and adopt such approaches and findings. Furthermore, these articles may have been written to provide guidance to educational practitioners. Teachers, administrators, and policymakers need such guidance. Finally, these articles may be focused on a broad area of research. For example, articles that deal with big topics such as artificial intelligence and education receive a lot of attention. A study that examined studies on education and listed the topics in the most cited articles concluded that topics such as the effects of technology on educational processes, the impact of technology on learning, student motivation, and learning outcomes (Valtonen et al., 2022).

Conclusion and Recommendations

This study reached important findings by examining the frequency distribution and thematic cluster analysis of the keywords of articles published on education in 2023. The most frequently used keywords are "higher education," "education," and "teacher education". These keywords reflect the prominent themes of education-related studies. In addition, thematic cluster analysis was used to categorize the keywords into four different regions. These regions represent different themes by grouping thematic keywords in the field of education. In particular, in the "Engine Themes" region, issues such as justice, policy, and diversity are prominent. The "Core Themes" zone reflects core topics such as higher education, learning, and teaching. The "emerging or Declining Themes" zone includes studies on the experiences of international students and student motivation. Finally, the "Niche Themes" zone focuses on international education and education policy issues.

This study also analyzed the top 10 most cited education-related articles in 2023. These articles have had a wide impact on the field of education and have become important resources for educational researchers and practitioners. Each article focused on different topics and approaches in education. For example, it was concluded that these articles focused on various topics such as diversity in education, approaches to learning,

and artificial intelligence. Each article stood out by contributing to a specific problem in the field of education.

These findings provide guidance to educational researchers, practitioners, and policy makers in identifying and focusing on important issues in the field of education. This study highlights issues such as diversity in education, approaches to learning, artificial intelligence, international students' experiences, and student motivation, which may influence the future research and practice directions of the field of education. Therefore, these findings are of great importance for all those working in the field of education and this study can help to make further progress in education.

Based on the results above, the following recommendations can be made:

- According to the results of the study, keywords such as "equity," "diversity," and "policy" represent important issues in the field of education. It is suggested that educational institutions and researchers should focus more on diversity and equity issues to create a more equitable and inclusive environment in the education system.
- According to the research results, keywords such as "learning" and "online learning" emphasize the importance of learning approaches. Educators are advised to consider various learning methods and technologies to support students to learn more effectively.
- Artificial intelligence models such as ChatGPT demonstrate the potential in education. Educators and researchers should explore ways to use AI and digital technologies as more effective learning tools.
- Keywords such as "international education" and "education policy" emphasize the importance of international education and education policy. Collaboration and knowledge sharing between countries are important to foster developments in the field of education.
- Finally, researchers are advised to carefully examine the most cited articles and see why these studies are so influential and the priority issues in the field of education.

References

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/J.JOI.2017.08.007

Chen, X., Zou, D., Xie, H., Cheng, G., & Liu, C. (2022). Two decades of artificial intelligence in education: Contributors, collaborations, research topics, challenges, and future directions. *Technology & Society*, *25*(1), 28–47.

Dubé, A. K., & Wen, R. (2022). Identification and evaluation of technology trends in K-12 education from 2011 to 2021. *Education and Information Technologies*, *27*(2), 1929–1958. https://doi.org/10.1007/S10639-021-10689-8/TABLES/4

Granić, A. (2022). Educational Technology Adoption: A systematic review. *Education and Information Technologies*, *27*(7), 9725–9744. https://doi.org/10.1007/S10639-022-10951-7/TABLES/2

Hood, W. W., & Wilson, C. S. (2001). The literature of bibliometrics, scientometrics, and informetrics. *Scientometrics*, *52*(2), 291–314. https://doi.org/10.1023/A:1017919924342

Martin Weller. (2020). *25 Years of Ed Tech*. Athabasca University Press.

Ninda Lutfiani, & Lista Meria. (2022). Utilization Of Big Data in Educational Technology Research. *International Transactions on Education Technology (ITEE)*, *1*(1), 73–83. https://doi.org/10.33050/itee.v1i1.198

Reiser, R. A. (2001). A history of instructional design and technology: Part I: A history of instructional media. *Educational Technology Research and Development*, *49*(1), 53–64. https://doi.org/10.1007/BF02504506

Ünüvar, P. (Ed.). (2022). *Eğitim bilimleri alanında yeni trendler II [New trends in educational sciences]*. Duvar Yayınları.

Valtonen, T., López-Pernas, S., Saqr, M., Vartiainen, H., Sointu, E. T., & Tedre, M. (2022). The nature and building blocks of educational technology research. *Computers in Human Behavior*, *128*, 107123. https://doi.org/10.1016/J.CHB.2021.107123

Zawacki-Richter, O., & Bozkurt, A. (2022). Research Trends in Open, Distance, and Digital Education. *Handbook of Open, Distance and Digital Education*, 1–23. https://doi.org/10.1007/978-981-19-0351-9_12-1

Burt, B. A., Stone, B. D., Motshubi, R., & Baber, L. D. (2023). STEM validation among underrepresented students: Leveraging insights from a STEM diversity program to broaden participation. *Journal of Diversity in Higher Education, 16*(1), 53–65. https://doi.org/10.1037/dhe0000300

Campo, L., Galindo-Domínguez, H., Bezanilla, M. J., Fernández-Nogueira, D., & Poblete, M. (2023). Methodologies for fostering critical thinking skills from university students' points of view. *Education Sciences, 13*(2), 132.

Cooper, G. (2023). Examining science education in chatgpt: An exploratory study of generative artificial intelligence. *Journal of Science Education and Technology*, *32*(3), 444-452.

Cruz-Sandoval, M., Vázquez-Parra, J. C., Carlos-Arroyo, M., & Amézquita-Zamora, J. A. (2023). Student Perception of the Level of Development of Complex Thinking: An Approach Involving University Women in Mexico. *Journal of Latinos and Education*, 1-13. https://doi.org/10.1080/15348431.2023.2180370

Dai, K., & Hardy, I. (2023). Pursuing doctoral research in an emerging knowledge hub: an exploration of international students' experiences in China. *Studies in Higher Education, 48*(6), 784-796. https://doi.org/10.1080/03075079.2023.2166917

Liu, G., Ma, C., Bao, J., & Liu, Z. (2023). Toward a model of informal digital learning of English and intercultural competence: a large-scale structural equation modeling approach. *Computer Assisted Language Learning*, 1-25. https://doi.org/10.1080/09588221.2023.2191652

McLean, S., & Attardi, S. M. (2023). Sage or guide? Student perceptions of the role of the instructor in a flipped classroom. Active learning in higher education, 24(1), 49-61. https://doi.org/10.1177/14697874187937

Tröhler, D. (2023). Comparative education or epistemological power games for world domination. *Comparative Education*, 1-17. https://doi.org/10.1080/03050068.2023.2185358

Vázquez-Parra, J. C., Carlos-Arroyo, M., & Cruz-Sandoval, M. (2023). Social Entrepreneurship and Complex Thinking: Validation of SEL4C Methodology for Scaling the Perception of Achieved Competency. *Education Sciences, 13*(2), 186, 1-17. https://doi.org/10.3390/educsci13020186

Zerai, D., Eskelä-Haapanen, S., Posti-Ahokas, H., & Vehkakoski, T. (2023). The meanings of differentiated instruction in the narratives of Eritrean teachers. *Pedagogy, Culture & Society*, 31(3), 419-437. https://doi.org/10.1080/14681366.2021.1914712