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Local Potential-Based Sustainable Curriculum In Vocational Education: A Bibliometric Analysis

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ABSTRACT

The Sustainable Development Goals (SDGs) concept focuses on poverty eradication, gender equality, reducing child mortality, and environmental protection. Education plays a central role in achieving these goals, by providing quality and inclusive learning opportunities for all, including non-traditional groups and people with disabilities. In this context, quality vocational education aims to develop skills relevant to global issues, such as digitalization and renewable energy, and shape awareness of social change, the environment and sustainable development. Sustainable curricula, which integrate local potential, are an important part of supporting sustainable development. This study aims to analyze trends, roles, and research developments in vocational education related to local potential-based sustainable curriculum through a bibliometric approach. Data was collected using keywords related to sustainable curriculum and local potential, which resulted in 594 documents from 1972 to 2025. The study also identified publication trends and the most productive countries in local potential-based sustainable curriculum research, as well as dominant authors and keywords. Results show a significant increase in publications since 2004, although there was a decline in the period 2020-2022 due to the COVID-19 pandemic. The research also shows the importance of sustainable curriculum in facing global education challenges, with a focus on the relevance of education policy to social and global change.

Introduction

The concept of sustainable development or Sustainable Development Goals (SDGs) aims to eradicate poverty and hunger globally, achieve gender equality, reduce child mortality, and reduce social and economic disparities, while maintaining environmental sustainability. To achieve this, the role of education is very important, given that the provision of quality, inclusive and equitable

education is one of the goals of the SDGs themselves. Education has the ability to provide opportunities for individuals to learn throughout life which serves as a foundation for personal growth and intergenerational relationships (Khalifa et al., 2023) (Cheng, 2024) (Hidaka et al., 2024). In addition, education is not only easily accessible to urban communities, but continues to be promoted to be accessible to non-traditional communities (Chan et al., 2023). Furthermore, education plays an active role in the development of a new skilled workforce and creates a sense of individual responsibility towards an environment that is constantly changing due to global influences and technological advances (Badawi & Dragoicea, 2023) (Muhamad Noor et al., 2024) (Recica Skender, 2024). Even education pays special attention to people with disabilities, by providing the knowledge and skills necessary for them to obtain and maintain employment (Lee et al., 2023) (Sadyrtdinov, 2023).

Quality education aims to foster knowledge and skills, both technical skills and professional skills, which are important to prepare for the future in dealing with global issues (Y. Chen et al., 2023) (Gavin & Audrin, 2023). One important aspect is increasing knowledge in the use of digitalization in the industrial world (Aranda-Jiménez et al., 2023) as well as the use of renewable energy to protect the environment and reduce air pollution (Bieda et al., 2023) (Yuan & Jiang, 2023). This knowledge and skills are acquired through learning time (Sakdapat, 2024), as well as experiences gained during the learning process (Fang et al., 2024). In addition, involvement in collective assessment is essential to deal with global changes (Walidayni et al., 2023), as well as participating in voluntary services in the field of employment (L. Chen et al., 2023). The role of career guidance and counseling is also indispensable to help design a sustainable and inclusive life (Santilli et al., 2023). Thus, education is a crucial component in preparing learners' competencies for the world of work (Yang & Tabasa, 2024) (Beagon & Bowe, 2023), and supporting the reorientation of education to focus on sustainable development (Selby, 2006).

Sustainable curriculum is an approach to educational development that aims to create a learning process that not only focuses on knowledge or skills that are relevant at the time, but also takes into account aspects of sustainability and has a long-term impact (Gertz et al., 2024). The curriculum itself is prescriptive (El-Astal, 2023), and has been at the center of all educational reforms (Estrela, 2024), and serves as a guideline in development and implementation in schools (Mikser et al., 2023). Therefore, it is necessary to consider and implement an effective sustainable curriculum (Barth & Rieckmann, 2012) (Rieckmann, 2012), to produce sustainable human resources (Gavinolla et al., 2022). This curriculum can also increase knowledge and foster adaptive attitudes and behaviors in

the face of socio-cultural influences (Sanjeev et al., 2024), and deepen understanding and perception of socio-economic, environmental and community justice (Michel et al., 2024) (Stewart, 2024). In addition, sustainable curriculum encourages critical thinking and environmental awareness (Medina Valderrama et al., 2023) (Park & Savelyeva, 2022). Thus, sustainable curriculum plays an important role in facing complex sustainability challenges and contributes to creating better solutions (Aramburuzabala & Cerrillo, 2023).

Research related to sustainable curriculum based on local potential with bibliometric analysis has been conducted by (Unal & Teskereci, 2022) which examines evidence-based practices from 1995 to 2021. The use of literature review analysis in educational research related to learning is also widely done, such as by (Aley et al., 2024) regarding project-based learning (PjBL), and (Wang & Wu, 2023) who examines critical thinking in the East Asian cultural context. In addition, (Kazeminia et al., 2022) investigated classroom effectiveness, while (Topping et al., 2015) discussed simulation-based learning. Research on current teaching and learning techniques in bariatric surgical procedures has also been conducted by (Kaijser et al., 2018), while (Holmström & Ahonen, 2016) examined radiography. Researchers have also analyzed various aspects of education and training, such as (Guruge et al., 2021) on course recommendations, and (Sobhan et al., 2004) on residency training in public psychiatry. Other studies include health professions practice by (Zaccagnini et al., 2023), digital education in dentistry by (Zitzmann et al., 2020) and education for clinical information by (Hashemian et al., 2020). In addition, (Karume et al., 2022) examined the practice of climate-smart agriculture. Other research was also conducted to analyze employees' sense of corporate social responsibility, as done by (Ar et al., 2024), as well as examining the benefits of primary trauma care courses in low- and middle-income countries by (Kadhum et al., 2020). Moreover, for the development of faculty programs in entrepreneurship education, a literature review was conducted by (Giersch et al., 2014).

Based on the available information and by taking into account the updating of problems in education in the era of Sustainable Development Goals (SDGs), a bibliometric analysis of local potential-based sustainable curriculum is needed. This study aims to identify the role, trends, and development of research in vocational education related to local potential-based sustainable curriculum. Bibliometric analysis related to this topic is very useful to identify gaps in research (Husaeni et al., 2022), as well as to explore studies on the development and implementation of a sustainable curriculum based on local potential that can improve the quality of education and overcome existing problems in the world of vocational education. This bibliometric analysis was

conducted with the help of MS.Exel and VOSviewer. The research questions in this research are as follows:

1. RQ1: What is the trend of research publications related to sustainable curriculum based on local potential from year to year?
2. RQ2: Which countries have the highest number of publications in local potential-based sustainable curriculum research?
3. RQ3: Who are the most influential authors in local potential-based sustainable curriculum research, in terms of number of citations?
4. RQ4: What are the keywords that appear most frequently in research related to local potential-based sustainable curriculum?

Method

Data Source

This bibliometric analysis uses data from the Scopus database. Data collection was done automatically on Thursday, January 9, 2025, by entering relevant keywords based on article titles, abstracts, and keywords. This research used the first keyword "sustainab* curricul*" OR curricul*. Based on this keyword, 414,496 documents related to sustainable curriculum were found. Furthermore, the second keyword used was "local potential" OR "local resources" OR "local conditions" OR "regional resources" OR "based knowledge". A search using the second keyword yielded 594 documents published between 1972 and 2025. The types of documents found consisted of articles, books, book chapters, conference papers, conference reviews, editorial notes, reviews, and short surveys. These documents are high-quality databases and have gone through a rigorous review process (Baas et al., 2020). The documents were then downloaded and analyzed using Microsoft Excel and VOSviewer applications. The OR operator was used to enter the equivalents or synonyms of the keywords to be searched, while the AND operator was used to search for associations between the main keywords and additional relevant keywords (Saputra et al., 2023).

Analysis.

Tools VOSviewer is used to analyze bibliometric networks and visualize them (van Eck & Waltman, 2010). Visualizations that can be displayed from the software such as co-authorship and bibliographic coupling (Perianes-Rodriguez et al., 2016). Other visualizations include co-authorship, co-occurrence, and citation (Hamidah et al., 2020) (Hirawan et al., 2022). VOSviewer depicts the network in the form of nodes connected by lines between nodes (Luckyardi et al., 2022). The size of

nodes and fonts will be larger for keywords that appear frequently, indicating that the keywords are widely used by researchers (Zhang & Yuan, 2019). In addition, the smaller the distance between the nodes, the stronger the correlation between the keywords (Morocco et al., 2023). Furthermore, to answer the questions in the proposed research, co-authorship, co-occurance, and citation analysis were conducted.

Result and Discussion

Trends in research publications

The results of the documents found related to the subject of this study are very important to see the publication trends and can adequately reflect the research process in the field (Su et al., 2021). Figure 1 shows the number of documents found per year from collecting data using the keywords "sustainab* curricul*" OR curricul* AND "local potential" OR "local resources" OR "local conditions" OR "regional resources" OR "based knowledge". From the figure, it can be seen that in general, the number of documents on sustainable curriculum based on local potential has increased every year. The documents generated from data mining totaled 594 documents. These documents are not only articles, but also include document types such as books, conferences and reviews. This shows that this topic is very interesting to discuss both individually and in groups. The types of documents obtained were then grouped into two categories, namely articles as much as 62.46% and non-articles as much as 37.54%.

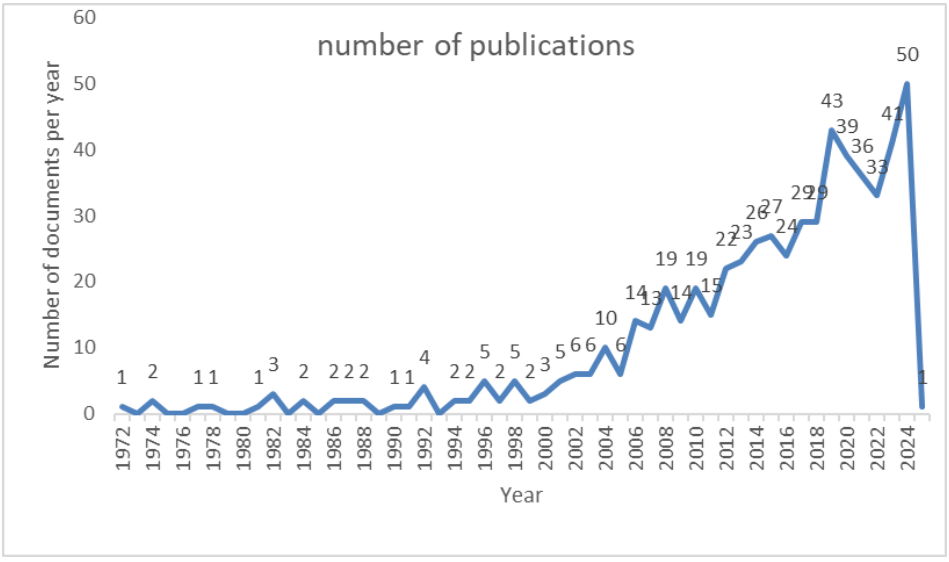

Fig 1: Publication trends per year

Figure 1 also shows that research on sustainable curriculum based on local potential was first published in 1972 by a physiologist named Kostyo JL. He conducted research in high schools and colleges with the aim of improving the teaching of human physiology as a national resource center. Since then, similar research on local potential-based curriculum has continued to be studied by researchers, as evidenced by the increasing number of publications each year. A significant increase occurred in 2004, with the number of publications reaching 10 articles, while in previous years the number only ranged from 1 to 6 articles. The number of articles on the research continued to increase and reached 43 articles in 2019. However, there was a decrease in the number of publications in 2020 to 2022, which was caused by the COVID-19 virus outbreak, thus affecting daily human life activities and activities (Meyer et al., 2024). However, the highest number of publications was recorded in 2024, with 50 articles. Although the number of articles continues to grow, the total publications from the first year of publication until 2024 have not reached the 100 step per year. This shows that there are still considerable opportunities for further research on the topic of sustainable curriculum based on local potential.

The graph in Figure 1 also shows that research and publications can be influenced by changing times. The changing times can shift policies in the world of education. As a result, these policy changes can affect the education system globally. Where globalization has changed education policies in developing countries (Al'abri, 2011). In this context, policies in education can be divided into five periods, shown in Table 1.

Table 1. Education policy from the perspective of global change

Year	***Period***	***Number of Publications***	***Policy in education***
1972-1980	Washington Pre-Consensus	5 articles	Focuses on addressing basic needs, but funding is inadequate resulting in negative educational outcomes (Rose, 2003).
1980-1990	Washington Consensus Period	13 articles	Reduced national autonomy in education policy (Bonal, 2002)
1990-2000	After the Washington Consensus	26 articles	Emphasizing and empowering local leaders in education funding management and bureaucratic reform and student-centeredness (Burke, 2011)
2000-2015	Millennium Development Goals (MGDs)	225 articles	Achieving universal primary education and promoting sustainable human development (Bhat, 2013)
2015-2030	Sustainable Developmet Goals (SDGs)	325 articles	Aligning skills and lifelong learning (Webb et al., 2022)

Countries and Research Institutions

Many problems that arise in the learning and learning process make sustainable curriculum a solution to overcome them. Sustainable curriculum is designed to create a learning process that is not only relevant to current conditions, but also able to anticipate complex sustainable challenges (Aramburuzabala & Cerrillo, 2023). Analysis of articles published in various countries is an important step to understand the direction of future research (Slamet Nugraha, 2017) (Nordin, 2022). Through the analysis, we can identify research trends, global challenges and each country's contribution to knowledge development. In addition, this analysis allows us to see the relationship between different countries in local potential-based sustainable curriculum research. Thus, this research can provide greater insight and encourage cross-country collaboration in improving the effectiveness of sustainable curriculum to address future education challenges.

Based on the analysis using VOSviewer, there are 107 countries that have published articles on sustainable curricula based on local potential. Table 2 shows the top 10 countries that are most productive in publishing sustainable curriculum articles based on local potential, where the ranking is taken based on data processed using VOSviewer. Data processing is carried out by filtering the minimum number of articles published by a country, which is as many as 3 articles. The results of VOSviewer's analysis show that the United States ranks first as the most productive country in publishing articles on sustainable curriculum based on local potential, with a total of 208 articles covering 35.02% of the total number of articles on the local potential-based sustainable curriculum and 2,004 citations (31.80%) from 1972 to 2025. United Kindom country occupies the second position with 44 articles (7.41%) published and 693 citations (11.00%). The third position is occupied by China with a total of 40 articles (6.73%) and 106 citations (1.68%). Meanwhile, Indonesia is listed in the top 10 with the seventh position, recording 15 articles (2.36%) and 83 citations (1.32%).

Table 2. Top 10 most productive countries in research publications 1972-2025

Rank	***Country***	***Number of Documents (The minimum number of documents of a country is 3)***	***Number of Citations (The minimum number of citations of a country is 1)***
1	United States	208	2004
2	United Kindom	44	693
3	China	40	106
4	Canada	34	534
5	Australia	30	532
6	Germany	25	197
7	India	18	111
8	Indonesia	15	83
9	Finland	14	202
10	South Africa	13	79

The involvement and cooperation between countries in the publication of sustainable curriculum articles based on local potential can be seen in Figure 2. There are a total of 107 countries that have published articles on sustainable curriculum based on local potential, of which 20 countries meet the criteria by publishing more than 6 article documents. The node in Figure 2 depicts countries that publish articles on sustainable curriculum based on local potential, with the larger size of the node indicating that the country is more productive in publishing articles. Figure 2 also shows the four countries with the largest node sizes, namely the United States, United Kindom, China and Canada, each of which publishes more than 35 articles. The countries that have the most cooperation in the publication of article documents are the United States, United Kindom, Australia and Canada, with more than 5 collaborations each. Countries within the same continent tend to have a lot of collaborations (Su et al., 2021). The closeness of cooperation between countries is depicted by the thickness of the line connecting each node.

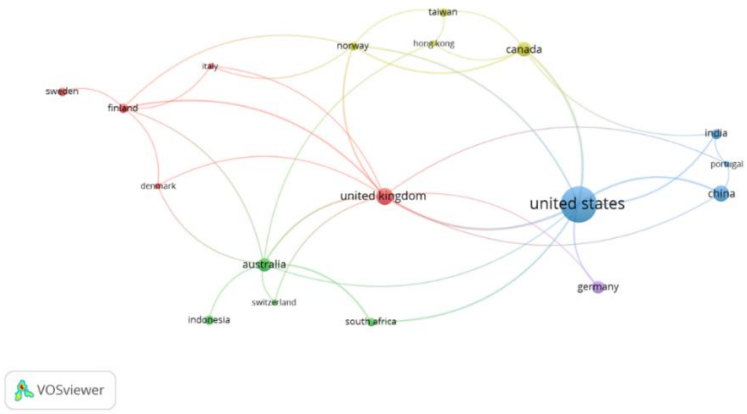

Fig 2: Cooperation network between research countries.

The study also analyzed the involvement of institutions researching local potential-based sustainable curricula, with a total of 1,266 institutions researching the topic. We re-selected these institutions based on the criteria of a minimum number of documents of 2 and a document citation in a country of at least 2. The results of the study show that there are only 18 countries that meet the qualification. Figure 3 shows the institutions with the highest citations, with the University of Sheffield ranking first with 96 citations (34.53%). The second place was placed by the University of Jyväskylä with 19 citations (6.83%), while the third to eighth positions each had the same number of citations, namely 17 citations (6.12%). In addition, each document issued by institutions in the 18 countries has the same number, namely 2 documents.

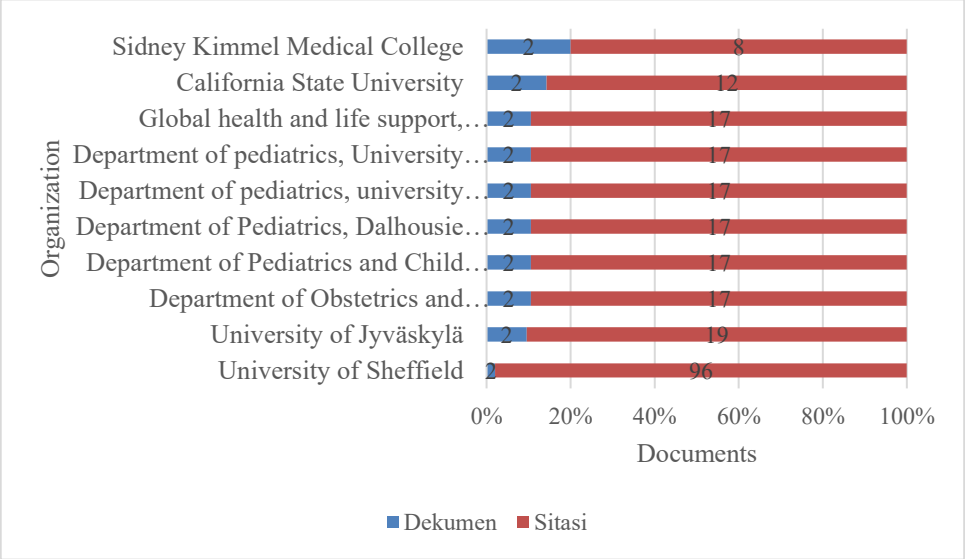

Fig 3: Institutions with the highest citations

Analysis of the most influential authors

The analysis of the linkages in co-authorship can open up wider opportunities for cooperation in terms of information exchange related to research networks, study theories, and co-authorship among authors (Ragadhita et al., 2021) (Riandi et al., 2022). This study shows that there are 583 authors out of a total of 594 documents analyzed. In conducting a screening related to co-authorship, this study sets the minimum criteria, namely that an author must have at least one published document, and each document must get a minimum of 25 citations. Of the total authors, only 62 authors met the criteria.

The most cited document by the researchers was an article written by Snively G and Corsiglia J with 309 citations (9.58%). This article was published in 2001 and discusses indigenous knowledge to be implicated in modern scientific education. The research is a driving force for researchers to dig deeper, considering that local knowledge is often ignored and considered irrelevant to modern education. First, local research can make a great contribution to science, environmental understanding and sustainability (Snively & Corsiglia, 2001). The next most cited document is an article written by Clandinin D.J and Connelly F.M with 146 citations (4.57%). Of the 62 authors who influenced the researchers, we only show the 10 authors with the most citations, which are presented in Table 3.

Table 3. Authors with the highest number of citations

Author	Citations	Year of Publication	title
Snively G and Corsiglia J	306	2001	Discovering indigenous science: Implications for science education
Clandinin D.J and Connelly F.M	146	1998	Stories to live by: Narrative understandings of school reform
Baroody A.J and Dowker A	141	2003	The development of arithmetic concepts and skills: Constructing adaptive expertise
Henderson C and Dancy M.H	128	2015	Physics faculty and educational researchers: Divergent expectations as barriers to the diffusion of innovations
Zitzmann N.U et al.,	124	2020	Digital undergraduate education in dentistry: A systematic review
Hayes D.N.A	122	2007	ICT and learning: Lessons from Australian classrooms
Evans K, et al	89	2010	Putting knowledge to work: A new approach
Martino W et al.,	84	2004	Issues in boys' education: A question of teacher threshold knowledges?
Tseng J.J et al.,	76	2019	How pre-service English teachers enact TPACK in the context of web-conferencing teaching: A design thinking approach
Premakumara et al.,	65	2014	Policy implementation of the Republic Act (RA) No. 9003 in the Philippines: A case study of Cebu city

The results of the analysis show that the most influential authors are also obtained by a network of co-authors. However, of the 62 authors with the criteria of one document with 25 citations, there is only one network of co-authoring networks, which consists of one to two authors. The group involved authors Bilderback et al., and Marino, whose publication was published in 2008. In addition, other writers act as independent writers, where their writings do not show correlation or agreement with other writers. The results of the co-authoring analysis are presented in Figure 4.

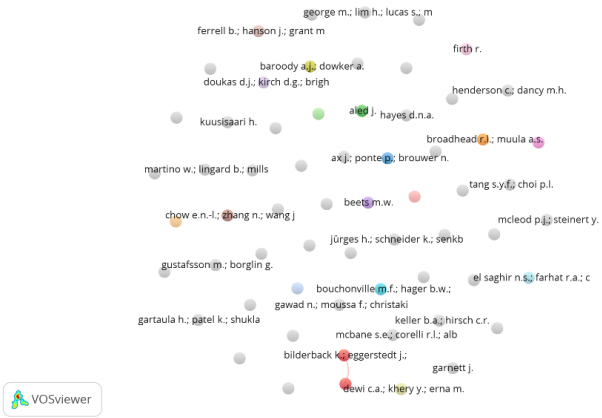

Fig 4: Co-authoring network between researchers

Keyword analysis

This study also analyzes keywords using VOSviewer to identify the actions of words that appear frequently or repeatedly. Where the keywords of the results of bibliometric analysis can provide an overview of trending research topics (Wirzal & Putra, 2022) (Solehuddin & Muktiarni, 2022), as well as help researchers to find research gaps that are still rarely researched (Misbah et al., 2022) (Husain et al., 2023), which can provide new opportunities for researchers. In addition, the results of keyword analysis also open up a buoyancy for researchers, and can show the limitations of research disciplines based on certain classes or groups (Sudarjat, 2023) (Sahidin et al., 2023). The results of the analysis using VOSviewer are presented in the form of a network visualization shown in Figure 5. where VOSviewer will read all the existing data keywords.

The visualization of the keyword analysis network displayed has been filtered by selecting keywords that have a minimum occurrence of two times. Out of a total of 1,622 keywords that appeared, only 189 keywords met this criterion. Nevertheless, among the keywords that met the criteria, there are 167 keyword items that are interconnected, while 22 other keyword items are independent. Independent keywords are those that do not have any relationship or connection with other keywords in the network. This indicates a separation between keywords that function within the context of the network and keywords that stand alone. This condition can be more clearly seen in Figure 5, which shows a visual representation of the relationships between these keywords.

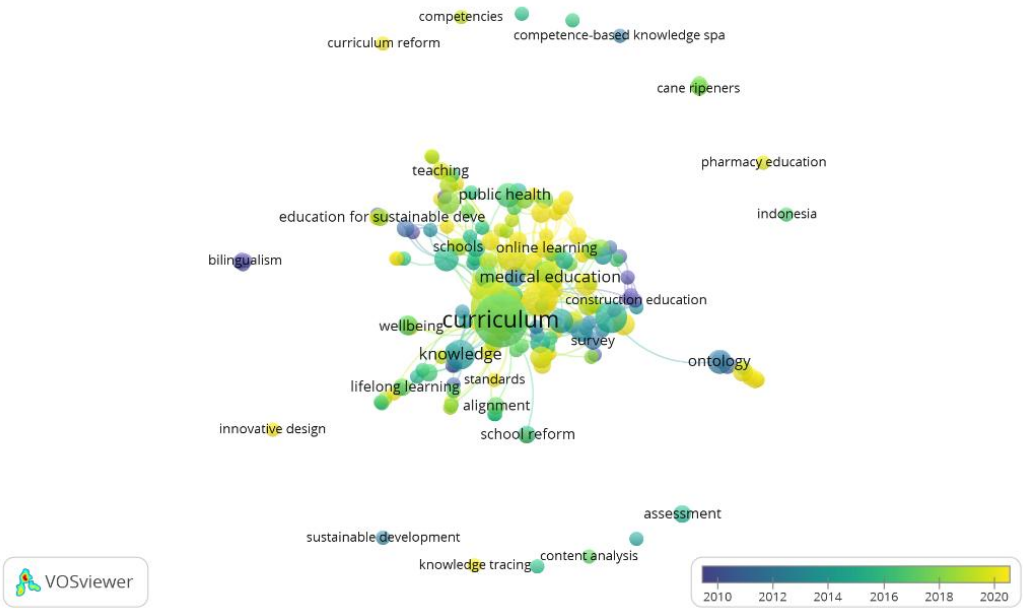

Fig 5: Research keyword analysis

The results of keyword visualization show that the word "curriculum" is a word that appears frequently, with a frequency of 28 occurrences and a total network consisting of 40 items. The next keyword "education" appears 26 times and has a network of 40 items. Meanwhile, the word "higher education" appears 12 times and is connected to a network consisting of 8 items. It should be noted that the word "higher education" belongs to one of the "curriculum" keyword networks where the two words are interconnected in the same network. This relationship can be clearly seen in Figure 6, which illustrates the linkages between keywords in the network. This visualization provides a more in-depth picture of the most dominant topics and the relationship between existing keywords.

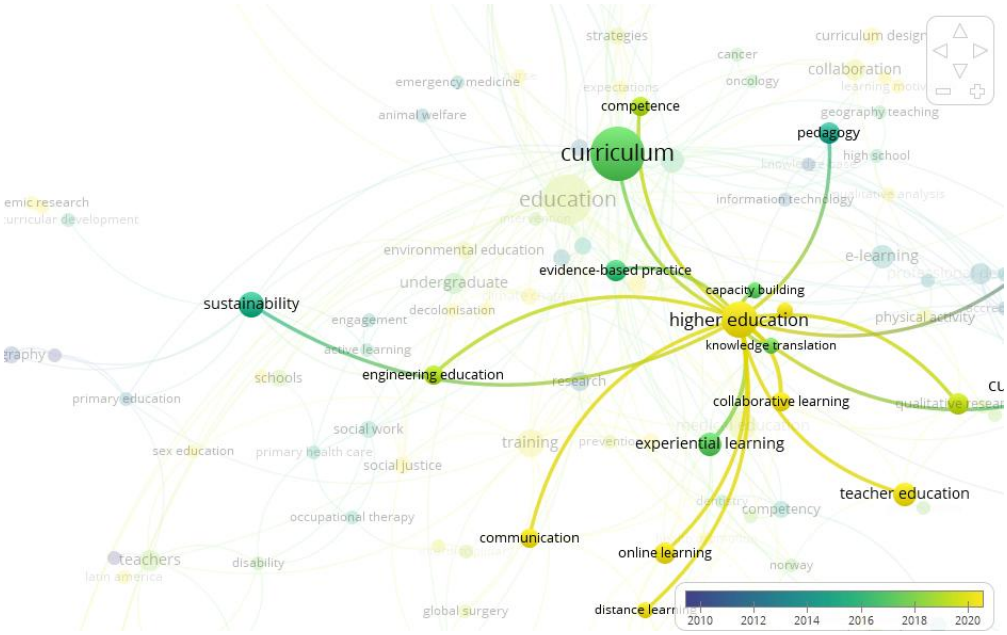

Fig 6: Interconnected keyword networks

The visualization of the keyword "higher education" has a network of keywords consisting of 18 items, one of which is the keyword "sustainability". The keyword "sustainability" is connected to another keyword, namely "curricul development", which is further related to the "evidence-based knowledge" keyword network. This keyword network describes the latest trending topics. To determine the results of keyword visualization as a reference for research trends, it can be seen through the color of the existing nodes. The lighter the color of the node, the newer the keyword is in the study, while the darker color indicates that the word is part of a research trend in previous years (Saputra et al., 2023). This color indicator can be seen in the lower right corner of Figure 7, which gives a clear picture of the current status of existing research trends.

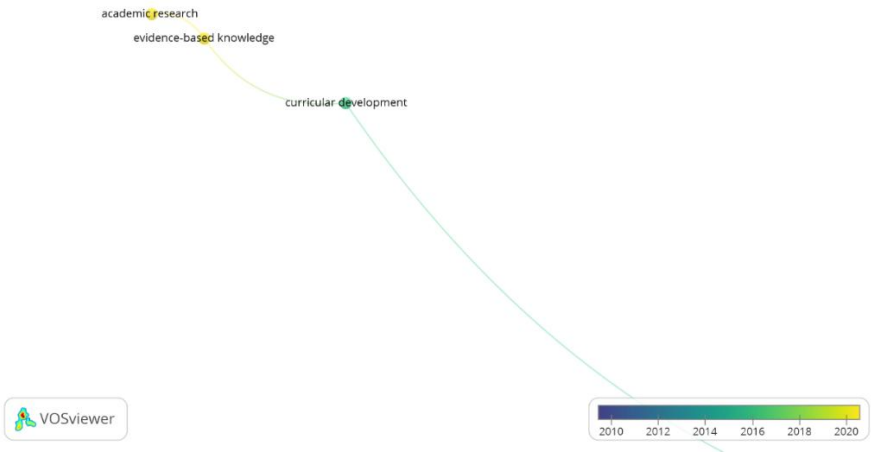

Fig 7: Keyword research trends

Figure 7 also shows emerging research trends among researchers. One of the most recent research that has received attention is the topic of "evidence-based knowledge" (EBK). EBK refers to the use of data or evidence obtained through a systematic process of research and observation, which is then used as a basis for faster decisions or actions. This application of evidence-based knowledge, together with relevant training, can be implemented in a scientific organization, work in translation (Jaffe et al., 2024) (Scheuer, 2023) (Sooknarine et al., 2024). Therefore, this evidence-based knowledge can be further developed and applied in vocational education, enabling more effective human resource development.

Vocational education plays an important role in preparing a skilled workforce that is ready to face the growing demands of the global market. Keyword analysis shows a close relationship between the concept of vocational education and current trending topics. One of the emerging concepts is evidence-based knowledge (EBK), which is particularly relevant to vocational education. EBK refers to the use of data and evidence from scientific research to improve educational practices, including in the formation of curricula that are more effective and in line with industry needs. It shows great potential for integrating evidence-based approaches in the vocational education system.

Implementing EBK in vocational education can enhance the relevance and application of education, not only for students, but also in supporting productivity and innovation in the world of work. Furthermore, the implementation of EBK opens up great opportunities for development in educational research and practice. By utilizing the latest research trends, educators and researchers

can explore new areas to find innovative solutions. It also creates opportunities for collaboration across disciplines, that strengthens the relationship between academia and industry. This collaboration is important to improve the quality of vocational education as well as the readiness of the future workforce. Thus, EBK is not only an evaluation tool, but also a key driver to improve the vocational education system, ensure graduates are ready to face the evolving global challenges, and make a significant contribution to the progress of the industrial sector.

Conclusion

This study shows that local potential-based sustainable curriculum is gaining more and more attention from researchers, with the number of publications increasing every year, especially since 2004. Changes in global education policy have also influenced the direction of this research, which is divided into five main policy periods, ranging from the Washington Pre-Consensus to the SDGs. Countries such as the United States, the United Kingdom and China are the main contributors to local potential-based sustainable curriculum publications, with significant cooperation between countries. Educational institutions such as the University of Sheffield and the University of Jyväskylä also dominated the research, with high citations. In addition, keyword analysis identified recent research trends such as evidence-based knowledge relevant for vocational education. Implementation of EBK can improve the relevance of education and support workforce readiness for global challenges. This research opens up opportunities for collaboration across disciplines to create innovative solutions in the education system.

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