Al-Ishlah: Jurnal Pendidikan
Vol.16, 1 (March, 2024), pp. 145-157
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v16i1.4211

Bibliometric Mapping: Development of Pedagogical Competency Research in Community Education

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ARTICLE INFO

Keywords:

bibliometrics research;
community education;
pedagogical competence

Article history:

Received 2023-06-08
Revised 2023-09-05
Accepted 2024-02-18

ABSTRACT

The need to grasp the newest trends and improvements in education necessitates examining the development of pedagogical competency studies in community education. The aim of this research is to describe the development of studies on pedagogical competence in community education. This study employs bibliometric analysis with Vosviewer for network visualisation, overlay, and density analysis. This study technique is suitable for extensively examining the evolution of studies on pedagogical competency from 2014 to 2023. The bibliometric mapping results using Vosviewer showed varying advances in research publications on pedagogical competency in community education from 2014 to 2023. Only 253 of the total publications indexed by Google Scholar, or 508 documents, fulfilled the criterion. The year with the largest publishing growth development was 2018, with 38 publications (15.0%), and the year with the lowest publication growth development was 2022, with 14 publications (5.5%). The study of pedagogical competencies in community education is essential to keep up with the latest trends and improvements in education. In addition, a more in-depth analysis highlighted the themes that appeared most frequently in the publications during the research period. This research provides insight into trends and patterns in the study of pedagogical competence in community education, which can help guide efforts to develop pedagogical competence in this area.

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1. INTRODUCTION

Education is a critical component of community development. A high-quality education is dependent not only on the curriculum and materials used, but also on the pedagogical qualities of educators. Pedagogical competence refers to the abilities and knowledge required by educators in order to organize lessons (Jarupongputtana et al., 2022), implement, and evaluate the learning process to be effective and efficient. Over the previous few decades, there has been considerable growth in the development of pedagogical competency studies in community education. Globalization and improvements in information technology have presented educators with a number of new issues that affect how they carry out instructional responsibilities. Educators must learn how to deal with these

changes and incorporate technology and innovation into their teaching practice (Sevgi et al., 2023). The need to grasp the newest trends and advancements in education necessitates an examination of the development of pedagogical competency studies in community education. Information and communication technology advancement has altered how individuals study, share knowledge, and access information (Dziubaniuk et al., 2023). Educators must build pedagogical competencies related to this growth in order to tackle obstacles and capitalize on available opportunities.

Furthermore, community education is a focal point in the development of pedagogical competencies. Education is no longer limited to the formal context of schools; it now includes the entire community. Educators must be able to communicate with communities, recognize educational needs, and devise learning practices that are acceptable for a variety of social and cultural contexts. In this context, an examination of the evolution of pedagogical competency studies in community education will provide educators, researchers, and education policymakers with useful insights. We can identify shortcomings and issues that need to be addressed, as well as chances for the development of pedagogical competencies, by knowing the newest trends and changes. This study can also yield practical recommendations and guidance for educators to improve community education quality and accomplish the aims of sustainable education development (Gibson et al., 2023).The growth of pedagogical competency studies in community education has resulted in various new approaches and concepts emphasizing the significance of tailoring pedagogy to the needs and features of the community served (Kovalenko et al., 2023). The social context-based learning approach is one concept that is gaining support.

This approach acknowledges that a society's social, cultural, and economic backdrop can influence the learning and teaching process. Educators must have a thorough awareness of society's cultural background and beliefs in order to construct relevant and effective learning methodologies (Keenan et al., 2023). This involves collaborating with local communities, integrating community knowledge and experiences into the learning process, and creating learning environments that are inclusive and responsive to the needs of all learners (Fikri et al., 2021; Scogin et al., 2023). The development of pedagogical competence studies, in addition to the social context-based approach, recognizes the importance of digital literacy in community education. The advancement of information and communication technologies has increased access to information and educational resources. To fully realize the potential of modern technology, educators must have digital competencies such as comprehending the usage of technical equipment, evaluating digital materials, and being able to teach online or incorporate technology into face-to-face teaching (Dalimunthe & Suranto, 2022; Mutia et al., 2021). Furthermore, the advancement of pedagogical competency studies emphasizes the significance of a learner-centered learning strategy. Educators must be able to assess individual students' needs, interests, and learning styles and utilize appropriate differentiation tactics. This method acknowledges student diversity and places them as active agents in the learning process, allowing them to develop critical thinking, creativity, and collaborative abilities (Gibson et al., 2023).

The difficulties in building pedagogical competencies in community education cannot be overlooked. Rapid changes in the social, economic, and technological environments necessitate educators being current on new advances and consistently improve their competencies (Dziubaniuk et al., 2023). It requires support from educational institutions, relevant professional training, and a learning environment that supports collaboration and reflection (Markey et al., 2023). To overcome this obstacle, educators, researchers, and educational policymakers must work together. More research on pedagogical competencies is needed to understand the elements that drive pedagogical competency development, the efficiency of various learning modalities, and their impact on accomplishing community education goals (Jarupongputtana et al., 2022). Moreover, there is also a need for coordination between educational institutions, local communities, and other stakeholders to create synergies in developing pedagogical competencies that are relevant and responsive to community needs (Sevgi et al., 2023).

In the future, there are opportunities to strengthen the development of pedagogical competency studies in community education (Markey et al., 2023; Marsen et al., 2021; Sarmadan & Hali, 2021; Supardi & Hakim, 2021). To begin, formal and non-formal education must complement and work with one another. Formal education can make use of community resources and knowledge, but non-formal education can provide an opportunity for people to continue learning and developing their skills. Second, the use of technology in public education must be improved on a regular basis. Educators must have adequate digital abilities in order to integrate technology into the learning process. Furthermore, efforts to improve technical infrastructure in rural and isolated places must be prioritized so that education is not limited to urban areas (Dalimunthe & Suranto, 2022; Markey et al., 2023; Mugford, 2021).

Third, it is vital to continue fostering curriculum development that is relevant and responsive to community needs. The curriculum needs to accommodate changes in society, pay attention to the needs of the labor market, and consider local values and community culture (Sidorkin, 2022). Educators must be allowed to create learning practices that are acceptable for a variety of social and cultural circumstances. Finally, consider the significance of ongoing review and assessment of educational competency. Holistic and ongoing evaluation can offer educators feedback to help them enhance the quality of their students' learning. Furthermore, in order to monitor improvement in pedagogical competence effectively, it is vital to focus on the development of appropriate and accurate assessment instruments (Mugford, 2021).

To address these obstacles and maximize this potential for improvement, educators, educational institutions, researchers, and the government must work together. In order to attain educational goals that are of high quality and relevant to the needs of the community, the development of pedagogical competence in community education is an ongoing effort that requires cooperation from a variety of stakeholders. We can acquire a better knowledge of trends, problems, and prospective improvements in pedagogical competency development by examining advancements in pedagogical competency studies in community education. Community education is supposed to become a driving force for sustained social and economic development via collaborative efforts and the adoption of relevant techniques. This essay will examine the evolution of pedagogical competency studies in community education, highlighting recent trends, obstacles encountered, and opportunities for future advancement (Kumar, 2015).

The following questions were utilized as a guide in this investigation:

1) How is research publications in the field of community education pedagogy competence being developed?
2) What is the map of the development of public education pedagogical competency research publication based on the author (co-authorship)?
3) How is the development map of information architecture research publication based on keywords (co-occurrence)?

2. METHODS

This study used a descriptive bibliometric analysis of published data on the issue of community education pedagogical competence from 2014 to 2023, with a limit of 508 papers. This was done in order to focus the search for areas of community education pedagogy competency. The data was gathered by scanning Google Scholar-indexed papers with the "Publish or Perish" program.

After obtaining and storing the information in the form of a RIS (Research Information Systems) citation file, the file was entered into the Vosviewer application with the goal of visualizing network patterns or bibliometric associations into three types, which included network visualization, overlay visualization, and density visualization. The visualization network aimed to show whether or not the network or ties are strong in terms of research. The overlay visualization aimed to show historical traces from the year the research was published, and the density visualization aimed to show the density or

compression of the research group. The use of statistical and mathematical processes to literature such as novels, magazines, online announcements, and other forms of communication is known as bibliometric analysis (Kamariah, 2013). Vosviewer's mapping can then be used as a reference for comprehensive content analysis based on the year of release and the manner of community learning teacher competence studies. The author's involvement in research on competency components of teacher training in community learning was examined using bibliometric analysis in this study, as well as bibliometric ties based on key terms (co-occurrence).

3. FINDINGS AND DISCUSSION

3.1 Development of Research Publications in the Field of Community Education Pedagogy Competence

The results of research data on pedagogical competence in community education in Google-indexed journals collected 508 deeds through the "Publish or Perish" program. To obtain results that were consistent with knowledge, we tried filters that can cover the information architecture field, specifically with the limits of the terms pedagogy, competence, community, education, and educator.

The increase of publications on the topic of pedagogical competency in public education retrieved from the Google Scholar database using the program "Publish or Perish" in the 2014-2023 timeframe demonstrated inconsistent progress. Only 253 of the 508 publications indexed by Google Scholar met the requirements for analysis, and as many as 255 publishing papers did not match the standards based on keywords, abstracts, and the subject of the study. The greatest increase in the number of publications on pedagogical competence in community education happened in 2018, with 38 publications (15%). Meanwhile, the lowest publication rate was in 2022, with 14 articles, or 5.58%. In 2023, there will be only one document because data collecting on the Publish or Perish database will take place in May 2023. This signified that it had not yet arrived at the end of the year, and there was still room for more publications in this field.

Table 1. The development of research publications in the field of community education pedagogical competence

Publication Year	Total Documents	Percentage
2023	1	0,4%
2022	14	5,5%
2021	27	10,7%
2020	37	14,6%
2019	32	12,6%
2018	38	15,0%
2017	28	11,1%
2016	25	9,9%
2015	22	8,7%
2014	29	11,5%

The number of publications decreased from the previous year to 22 (8.7%) in 2015, but increased somewhat in 2016 to 25 (9.9%). Furthermore, from 2017 to 2021, there was a fluctuating increase and drop. It will then fall to half by 2022. Even though it had diminished in recent years, the quantity of research on the subject of pedagogical competency in community education demonstrated that this was still a topic of considerable interest, and continued to expand globally year after year. Figure 2 below depicts the increase in publications indexed by Google Scholar in the field of pedagogical competency in community education.

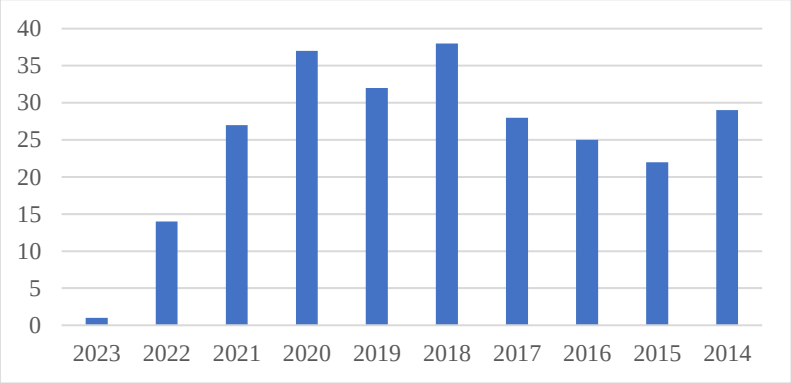

Figure 2. Graph of the development of research publications in the field of community education pedagogy competencies indexed by Google Scholar

3.2 Development Map of Community Education Pedagogy Competency Research Publication Based on Author (Co-authorship)

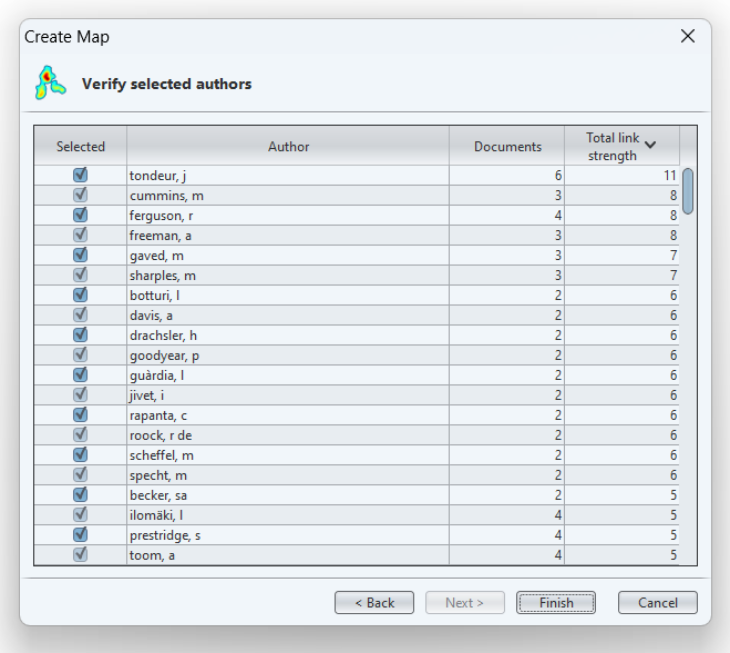

Figure 3. List of research authors in the field of pedagogical competence in community education on Vosviewer

Following the placement of the dataset in the RIS (Research Information Systems) type using the "Publish or Perish" metadata, the dataset was analyzed using the Vosviewer application by sorting out the alternative "create a map based on bibliographic information." The approach chosen to partition the dataset was full counting, with the goal of carrying out the computations as researchers who had stated teacher competency values in community learning in their research had done. According to Figure 3, the minimum value of the certificate for each author was set at two documents, and the mapping shown only included researchers who had relationships to other researchers.

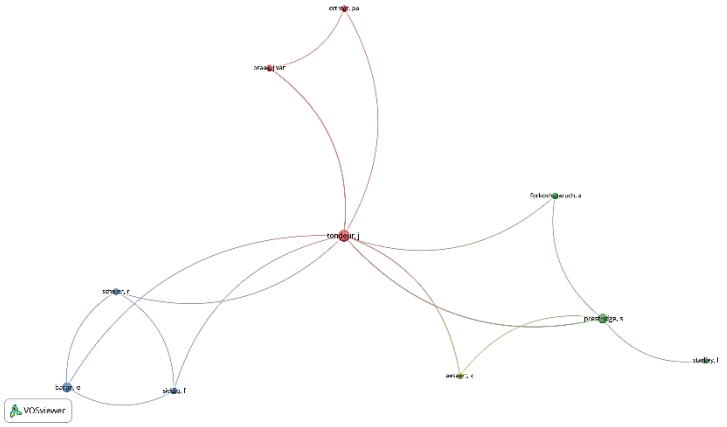

Figure 4. Network visualization on co-authorship
Source: Vosviewer (2023)

Figure 4 exhibits a co-authorship visualization network, which is shown by the existence of nodes (circles) representing authors or researchers and edges (networks) reflecting co-authors or researchers' ties. A cluster of nodes with edges implies that there was a relationship or bond that can help researchers investigate characteristics of pedagogical competency in community education. Bibliometric analysis of Jo Tondeur, Johan van Braak, Peggy A. Ertmer, and Anne Ottenbreit-Leftwich's article "Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence" published in the Journal of Educational Technology Research and Development volume 65, pages 555-575 (2017) (Tondeur et al., 2017). The network proved that there was an author's bond or collaboration, a kind of network (edge) that connected the author Jo Tondeur with 8 other authors which included Baran, E., Scherer, R., Siddiq, F., Prrstidge, S., Forkosh-Baruch, A., Ertmer Pa, Braak J. Van., dan Aesaert, K.

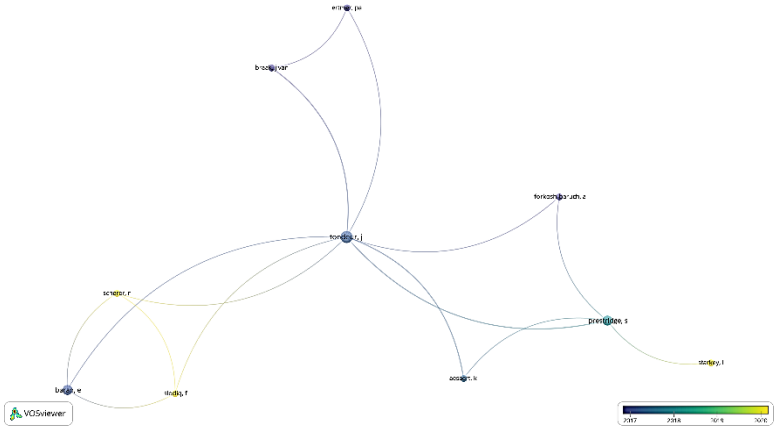

Figure 5. Visualization Overlay on co-authorship
Source: Vosviewer (2023)

Figure 5 displays the Overlay Visualization, which depicts the author's historical footprint in research on the element of teacher competence in community learning. This mapping is indicated by the existence of nodes of various colors, as well as edges connecting one researcher to another. The black tint of the nodes reflects research that has been attempted over a long period of time. The darkest node color (purple) in the picture indicates 2017 and the lightest (yellow) reflects 2020. In this analysis, it can be explained that the article entitled "Understanding the Relationship between teachers'

pedagogical beliefs and technology use in Education: a systematic review of qualitative evidence" was written by Jo Tondeur together with, Johan van Braak, Peggy A. Ertmer & Anne Ottenbreit -Leftwich published September 14, 2016, in the Journal of Educational Technology Research and Development (Tondeur et al., 2017) cited by Sarah J. Prestridge in the article entitled "Examining the Shaping of Teachers' Pedagogical Orientation for the Use of Technology" published on January 9, 2017 (Prestridge, 2017), and re-cited in the next article co-authored with Ronny Scherer, Evrim Baran, Fazilat Siddiq, Teemu Valtonen, Erkko Sointu (Tondeur et al., 2019).

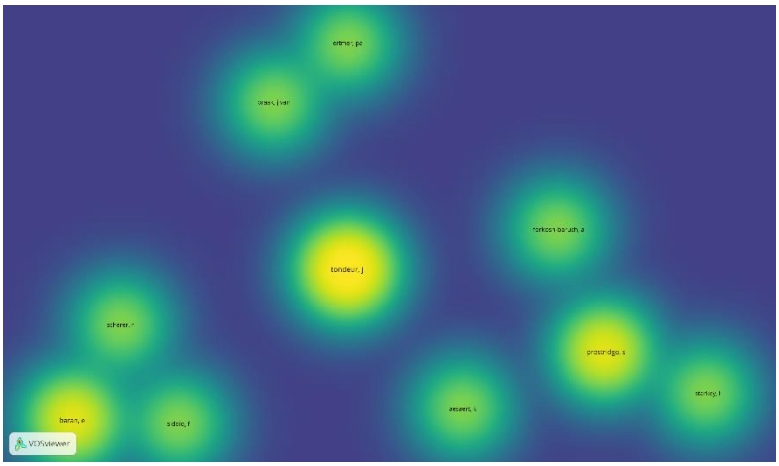

Figure 6. Density visualization on co-authorship
Source: Vosviewer (2023)

The density visualization results in Figure 6 revealed that there was a density or emphasis on the nodes, indicating that the group of scholars exploring pedagogical competence in community education had a relationship with one another. Furthermore, the number of research incorporating other studies by referring to the author indicated the extent of node saturation in density visualization. As demonstrated by Jo Tondeur's research, which depicted the color of the nodes at the highest density, the author performed research by citing various works with him as a kind of research partnership in the field of pedagogical competency in community education.

3.3 Information Architecture Research Publication Development Map Based on Keywords (Co-Occurrence)

Following the placement of the dataset in the RIS (Study Information Systems) type using the "Publish or Perish" metadata, the dataset was analyzed using the Vosviewer application by selecting alternative information 'creating a map based on text information', with the goal of generating a network or term bond (designation), generated from reading information. The aspects of the terms (designations) or extracted terms were based on essays and abstracts, and the method used to divide the dataset was full counting with the goal of carrying out the calculations as was, according to research on aspects of teacher competence in community learning that had been carried out. A designation required a minimum of three arrivals, resulting in 1,658 ties (bonds) with a total link strength of 2,492.

Bibliometric analysis was performed by creating descriptions in the form of networks, overlays, and densities, with the goal of identifying bibliometric networks between postings or electronic announcements based on the downloaded metadata. The bibliometric network was made up of nodes shaped like spheres or roundabouts that represented keynotes, and edges or network linkages that reflected bonds between companion nodes. Mapping and clustering in bibliometric analysis using the Vosviewer program were complementary in nature, which means they complete each other. This mapping can be used to acquire a full description of a bibliometric network's shape. Clustering was also used to provide insight into bibliometric grouping.

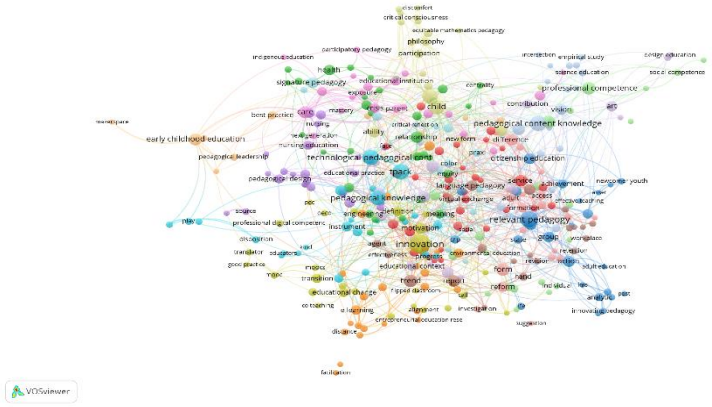

Figure 7. Network visualization on co-occurrence

Figure 7 represents a network of co-occurrence visualization that summarized the network or linkages from one phrase to another in research on characteristics of pedagogical competence in community education from 2014 to 2023. The 366 article keywords were divided into 16 clusters, which can be identified by the color of each keyword's node.

Cluster 1 (red) contained 33 keywords related to the field of pedagogical competence in community education that have been researched, such as educational programs, experiential learning, emotional competencies, foreign language education, innovative pedagogy, professional identity, service learning, heutagogy, teaching skills, pre-service teacher, and online learning. Cluster 1 keywords examined the impact of the teacher competency development program and the POL (Project-oriented learning) approach on competence, beliefs, and teaching practice (Albareda-Tiana et al., 2018; Andrews et al., 2019; Byker & Putman, 2019; He et al., 2017).

Cluster 2 (green) had 32 keywords, including community education, curriculum development, education research, gifted education, pedagogical belief, pedagogical support, professional education, relationship, and responsive teaching. The dominating keyword, relationship with 18 links, identified the pattern in this cluster. It was recognized that there was a link between educational principles and the use of technology as a support in teaching practice. However, instructors' views are frequently a barrier to employment of the technology (Bishop et al., 2014; Jääskelä et al., 2017; Neumann et al., 2019; Özgür, 2020; Wald, 2015).

Cluster 3 (blue) consisted of 26 keywords, including adult education, citizenship education, community education, educational goals, effective pedagogy, effective teaching inclusive pedagogy, innovating pedagogy, multicultural education, and relevant pedagogy with 18 links as the most keywords in the cluster. There were several strategies and resources that teachers used to facilitate students' socio-cultural understanding. However, there were also mediating factors that influenced the application of pedagogy. The curriculum provides opportunities for students to become transformative intellectuals (demonstrating complex thinking about science and social justice issues, and to develop students' commitment to their communities and cultures of origin) (Allen et al., 2017; Durden et al., 2015; Howard & Rodriguez-Minkoff, 2017; Ladson-Billings, 2014, 2021; Morales-Doyle, 2017).

Cluster 4 (Lime) had 26 keywords, with inventive having the most with 42 links. The main focus of learning innovation in this fourth cluster must be on the theory and application of guiding practice, as well as on students, parents, community, citizens, and culture. Technology application necessitates a solid abstract foundation based on intentional systemic research as well as new teacher science. The ability to pay and the duration of learning are two essential characteristics of the research and innovation (Ilomäki & Lakkala, 2019; Portuguez Castro & Gómez Zermeño, 2020; R. & R., 2016; Serdyukov, 2017).

Cluster 5 (Purple) contained 25 keywords, which included educational use, information, professor, simulation, source, university student, and instructional design. The keyword with the most connectedness was confidence (11 links). Clusters 6 (blue aqua/cyan), 7 (orange), and 8 (brown) all had the same number of keywords, namely 24. Cluster 6, with pedagogical knowledge as the keyword, had the most connectedness, with 28 links. STEM education was the most common keyword in Cluster 7 (10 links). Whereas in cluster 8, the trend was a keyword with 23 links as the most frequently appearing.

Cluster 9 (pink) consisted of keywords such as critical thinking, cultural competency, educational institutions, indigenous education, mastery, next generation, participatory pedagogy, student engagement, and social work. The keyword that has the most relationships in this cluster is care with 20 links that examine social exchange between educators and early childhood (White et al., 2015).

Cluster 10 (salmon red) consisted of keywords including educational equity, emotional learning, future teacher, pedagogical education, pedagogical theory, and difference (26 links). Higher education needs to create more opportunities for students to engage in various dialogues about differences (Cook-Sather, 2015). Next, cluster 11 (light green). Pedagogical competence, character competence, reliable competence and social competence had a significant impact in increasing educational ability. Participation of all teacher competence simultaneously is claimed to have an important influence on improving the quality of abilities in the learning process (Hakim, 2015).

Cluster 12 (light purple), cluster 13 (yellow gold), and cluster 14 (purple amethyst), all of these clusters consist of 20 keywords. The keyword 'content knowledge' was found the most with 15 links in cluster 12. In cluster 13, there was medical education (22 links), and in cluster 14, most of the keywords were related to intercultural competence (19 links).

Cluster 15 (light blue), consisted of 16 keywords, including critical reflection, field education, lesson study, pedagogical orientation, pedagogical understanding, signature pedagogy, and social work education. The most keyword was 'dialogue' with the acquisition of 19 links. This model provides a structural framework for comprehending poverty, homelessness, and bureaucratic care systems as critical to knowledge, awareness, and skills development for social justice advocacy on social class and economic inequality. Difficult dialogue is included during the pre-service, engagement, and experiential training stages as a means of promoting best practices for social justice training in counseling psychology (Toporek & Worthington, 2014).

Lastly, cluster 16 (light orange), comprised 10 keywords, with early childhood education being the most keywords (19 links). There is a relationship between pedagogical processes in early childhood care and education and outcomes in two academic areas (language and literacy and mathematics) (Ulferts et al., 2019).

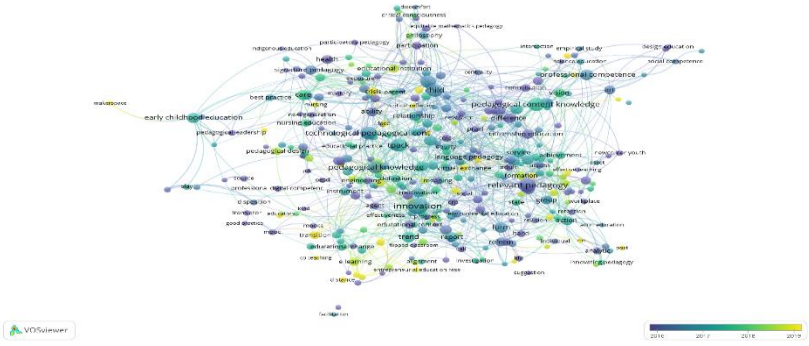

Figure 8. Overlay Visualization on co-occurrence
Source: Vosviewer (2023)

After identifying the mapping and clustering of teacher competence aspects in community learning using a visualization network, the following step was to map and cluster research styles of

teacher competency aspects in community learning based on historical traces or research output years. The data acquired from the results of the visualization overlay on Painting 8 can be used to identify the state of the art from research on aspects of teacher training competence in community learning that would be carried out in 2014-2023.

An overlay depiction was created using the results of bibliometric analysis imported into the Vosviewer application via the "Publish or Perish" metadata. The colors in the nodes in this representation indicated the keywords that carried the address of the incoming year. For example, the keyword 'innovation' had a green patterned node, which suggested publications that contained the keyword were published between 2017-2019.

Another example was the term 'relevant pedagogy,' which was regarded as having purple-colored nodes in overlay visualizations, indicating that the designation in research-related teacher competency in citizen learning was recently examined by researchers in 2016-2018. So far, the keyword of 'relevant pedagogy' in research was much earlier used by researchers working on information architecture.

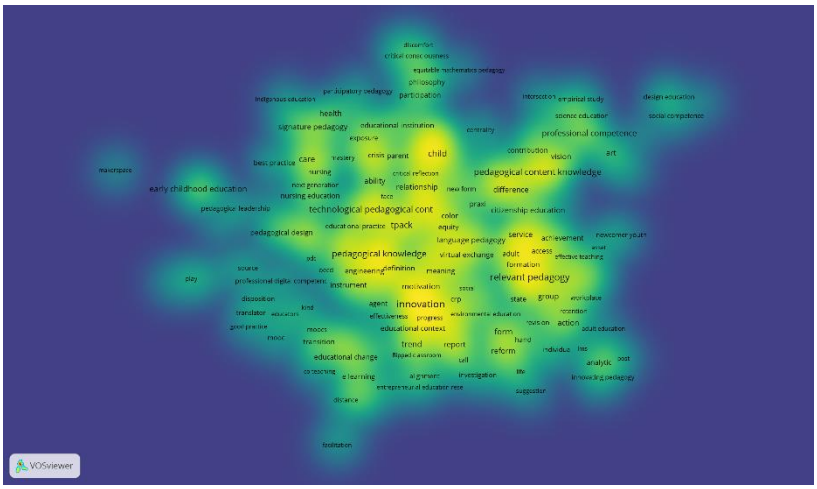

Figure 9. Density visualization on co-occurrence
Source: Vosviewer (2023)

The bibliometric analysis was then performed using density visualization. The portrayal findings in Painting 9 may be used to determine if there are dense regions or those that have a high density at one node with another node. The saturation level shown by the number of keywords highlighted in yellow indicated that the field had received a lot of attention and had been indexed by Google Scholar, for example, the terms innovation, pedagogical material, and relevant pedagogy. Nodes marked in black, on the other hand, indicated that these topics were not widely followed. This can increase the possibility of conducting studies or research on these topics.

4. CONCLUSION

Data Architecture is a discipline that Bibliotech and Data Science students are familiar with. A bibliometric study was tried using the Vosviewer program to detect research progress on pedagogic competency in citizen learning that comes from co-authorship (author) and originates from co-occurrence (keywords). Previously, the dataset was compiled using the "Publish or Perish" information, which was indexed by Google Scholar, and the number of online announcements was restricted to 500 deeds. Based on the findings of bibliometric mapping using Vosviewer employing network visualization, overlay, and density, it is possible to deduce that observations on pedagogical competency in citizen learning were experiencing unstable progress in research announcements between 2014 and 2023. There were 508 certificates among the total announcements listed by Google

Scholar, with just 253 meeting the standards. The highest publication growth development occurred in 2018 with 38 publications (15.0%), while the lowest publication occurred in 2022, with 14 publications (5.5%). The direction of research on pedagogic competence in community education is consistent with new findings on pedagogic competence in community education. The body of knowledge about pedagogical competence in community education is developing. Bibliometric mapping identifies authors who collaborate on the theme of pedagogic competency areas in community education. These collaborations can lead to a deeper understanding of the subject and potentially more impactful research outcomes. By analyzing these trends, researchers can identify gaps in knowledge and areas for future exploration in the field of pedagogic competence in community education.

Conflicts of Interest: "The authors declare no conflict of interest."

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