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Exploring the Evolution of Inquisitiveness in Education: A Bibliometric Perspective Over the Last Decade

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ABSTRACT

This study performs a bibliometric analysis of research trends of inquisitiveness in learning over the past decade. The background of the research highlights the complexity of educational challenges in the era of technology and information, where the inquisitiveness of learners becomes crucial in shaping character, skills, and attitudes. For the research method, this study employed a bibliometric approach with data garnered from Dimension AI. The data collection process identified 157 publications in the form of articles and proceedings related to inquisitiveness in educational journals from 2015 to 2024. The results of data analysis using VOSviewer show a positive trend in inquisitiveness research interest. Citations from these studies show the complexity of relationships between studies, while the distribution of publications between countries forms clusters reflecting the level of international collaboration. The focus of research on the topic of inquisitiveness includes 1) experience and child, 2) factors and models, 3) critical thinking disposition and self-confidence, 4) curiosity and emotional intelligence, and 5) playfulness. Indicate the main conclusions or interpretations. This research provides in-depth insights into the development of scientific literature related to inquisitiveness in learning, providing a basis for the design of more effective learning strategies to increase the inquisitiveness of learners in the modern education era.

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1. INTRODUCTION

Education, as the main foundation for the formation of individuals and society, faces increasingly complex challenges in the era of rapid technological and informational advancement (Arora, 2022). The learning process is no longer solely focused on the transfer of knowledge, but also on the shaping of character, skills, and attitudes of learners (Leal et al., 2018). In this context, research plays a pivotal role

by enabling a deeper understanding of the dynamics of learning motivation and the psychological factors that influence the educational process (Pintrich & De Groot, 2003).

The modern educational landscape demands a holistic approach that integrates cognitive, emotional, social, and creative aspects of learning. One aspect that has received growing attention is inquisitiveness, which encompasses intellectual curiosity, a spirit of exploration, and the active involvement of learners in the learning process (Litman et al., 2017). Inquisitiveness, as an inquisitive attitude of learners, involves their ability to reflect on information received during learning (Jackson, 2015). This includes questioning the underlying assumptions and looking for interrelationships between the concepts being studied (Yilmaz, 2013). Thus, inquisitiveness creates a critical attitude towards knowledge, triggers deep thought processes, and encourages a desire to achieve a more comprehensive understanding (Fusaro & Smith, 2018; Hirose & Kotani, 2022).

The challenge of enhancing learners' inquisitiveness becomes evident when we consider the disconnect between conventional teaching methods and the diverse learning styles of today's learners (Reshmi & Balakrishnan, 2018; Siepong et al., 2021). Traditional pedagogical methods often fail to fully align with this diversity, resulting in obstacles that hinder the stimulation of curiosity (Lombardi et al., 2021). Some learners may respond better to exploratory learning techniques, while conventional methods may lack the flexibility to meet these needs. Additionally, limited resources and access to information present significant barriers. Learners with restricted access to literature, technology, or hands-on experiences may struggle to cultivate their inquisitiveness (Karcher et al., 2022; Umah, 2024). These limitations hinder deeper exploration and the formation of meaningful connections between concepts (Kalansooriya, 2023).

Previous research has made contributions in this field; however, several gaps remain. Many studies have lacked a holistic perspective or failed to capture the complexity of various learning contexts (Sjöberg et al., 2021). Furthermore, the overreliance on either qualitative or quantitative methods alone has created methodological limitations that need to be addressed.

A relevant initial step lies in the analysis of learners' internal factors. Personal interest, as an indicator of how engaged learners are with educational content, plays a central role in determining how actively they pursue knowledge. Critical thinking ability also proves to be a significant determinant of inquisitiveness, as it involves the skills needed to analyze information, draw conclusions, and formulate meaningful questions (Çelik & Özdemir, 2020). Moreover, learners' self-confidence influences their inquisitiveness (Akbari & Sahibzada, 2020; Hong et al., 2021). Confidence in generating new ideas or questions is crucial for active exploration and knowledge-seeking behavior.

In addition, inquisitiveness also reflects the willingness of learners to face intellectual challenges as growth opportunities (Kashdan et al., 2018). They are not satisfied with easy-to-answer questions but rather motivated to explore more complex and in-depth questions. This process not only improves critical thinking skills but also stimulates creativity in addressing more challenging intellectual aspects.

As an intrinsic motivation, inquisitiveness does not simply turn learners into passive recipients of information (Chang et al., 2016). On the contrary, inquisitiveness encourages learners to be actively involved in the learning process. They become active participants who create questions, share views, and contribute to class discussions (Sormunen et al., 2020). Thus, inquisitiveness is not only an individual attitude but also a driver for interactive, dynamic, and centered learning on the development of learners' overall potential (Bakir, 2015).

On the external side, educational methods that stimulate curiosity such as project-based learning, group discussions, and hands-on experiments create environments that support the exploration of new ideas. The integration of technology also enhances learners' access to diverse information sources, promoting deeper inquiry and discovery (McKnight et al., 2016). The role of teachers becomes highly significant in this context. Teachers not only provide academic guidance but also foster a classroom

climate that encourages curiosity by posing challenging and thought-provoking questions. Cultural and environmental influences further contribute to shaping inquisitiveness (Manalo et al., 2013). A learning culture that supports curiosity and provides access to relevant resources, such as literature, laboratories, and information, amplifies the development of inquisitive learners (Ciardelli et al., 2013).

Inquisitiveness has high relevance in learning contexts because it provides encouragement to develop critical thinking, creativity, and problem-solving skills (Suhirman & Ghazali, 2022). Learners who have high levels of inquisitiveness tend to be more open to new knowledge, better able to cope with learning challenges, and more motivated to seek answers to their own questions (Chin, 2004). Inquisitiveness also stimulates processes of exploration and discovery, forming the basis for the development of a positive attitude towards learning throughout life (Iurino et al., 2018).

Within the learning sphere, inquisitiveness creates a dynamic environment in which learners not only receive information but are also actively engaged in understanding and applying knowledge (Watson, 2015, 2018, 2019). This goes hand in hand with a more holistic approach to learning, which not only emphasizes knowledge transfer but also stimulates a spirit of exploration and a willingness to continue learning. Therefore, understanding the concept of inquisitiveness and embracing it in a learning approach can open doors for the development of learners who are not only academically competent but also have a strong passion for learning and critical thinking skills needed to face future challenges (Iurino et al., 2018).

Through comprehensive analysis of both internal and external factors, this study aims to provide a more in depth understanding of the dynamics of inquisitiveness within the learning process (Chen et al., 2024). The findings are expected to serve as a foundation for designing more effective learning strategies to foster inquisitiveness among students ultimately shaping a creative, critical, and active generation of learners (Bardone & Secchi, 2017).

Using bibliometric methods, this research offers a meaningful contribution to the development of an adaptive and inclusive education system. With a clearer understanding of existing challenges and limitations, the research is geared toward designing effective instructional strategies, encouraging exploration of new ideas, and fostering learners who are not only intellectually capable but also driven by curiosity and a lifelong love for learning (Levens, 2017).

This study aims to identify an overview of research regarding inquisitiveness in learning in the last decade. The research questions discussed in this study are: 1) What are the current research publication trends related to inquisitiveness in learning?; 2) What are the trends in research citations related to inquisitiveness in learning?; 3) How is the distribution of publications and relationships between countries mapped in research related to inquisitiveness in learning? and 4) What is the focus of research on inquisitiveness in learning?

2. METHODS

Study Design

This study adopted a bibliometric approach to detail and analyze literature related to inquisitiveness in learning. A bibliometric approach is an analytical method that uses bibliographic data and metrics to measure, evaluate, and understand the impact or pattern of scientific communication in a particular field of research or discipline. Data was obtained from the Dimension AI database using the keyword "inquisitiveness". The identification process begins with a full counting technique, followed by screening to limit the range of years and types of publications. Furthermore, the process of eligibility was used to filter data originating from educational journals, ensuring relevance to the context of the study.

Data Collection

The study population includes all literature related to inquisitiveness in learning within the Dimension AI database. The sample was selected based on the year of publication, focusing on the last 10 years, and was limited to literature in the category of educational journals. The data collection process began with the identification stage using the keyword "inquisitiveness." A total of 780 data were found, and after the screening phase based on year and type of publication, the analyzed data was reduced to 386. Furthermore, through the eligibility stage, only data derived from educational journals were considered, resulting in 157 data entering the conclusion stage to be analyzed with VOSviewer. This data was garnered on January 4, 2024. Figure 1 shows the series of data collection processes.

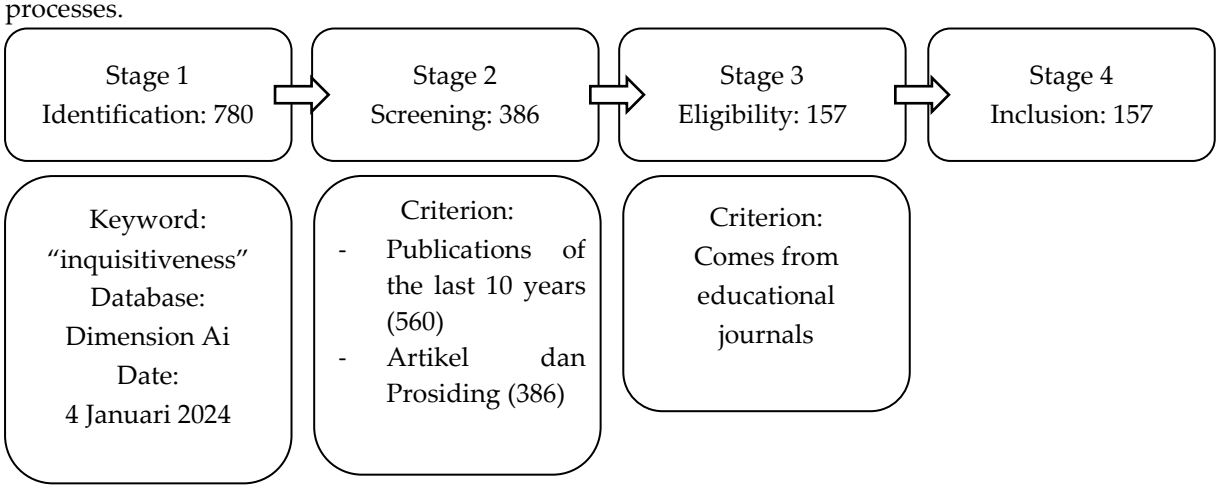

Figure 1. Stages of Data Collection

The independent variable in this study was the inquisitiveness-related literature found in the Dimension AI database. Dependent variables include the results of bibliometric analysis involving mapping research trends, research contributions, and collaborative networks of researchers.

Data Analysis Method

Data analysis was carried out qualitatively using a bibliometric approach. The data analysis tool used was VOSviewer, which could extract and visualize information from 157 filtered data. VOSviewer allows analysis of relationships between studies and generates linkage maps between keywords.

VOSviewer analysis provides visualization of the researchers' collaboration network, describes keyword frequency, and provides insight into research trends of inquisitiveness in learning. The results of this analysis will serve as the foundation for understanding the contribution of related literature and compiling a deep conceptual framework, providing guidance for future research in the development of inquisitiveness in the context of learning.

3. FINDINGS AND DISCUSSION

Findings

The number of publications obtained at the inclusion stage was 157 selected publications in the last decade, from 2015 to 2024. Data sources were articles (97.45%) and proceedings (2.55%).

Publication Trends Related to Inquisitiveness in Learning

The distribution of publications on the topic of inquisitiveness in learning over the past 10 years can be seen in Figure 2. The topic of inquisitiveness in learning has not been widely explored in the past decade, specifically during the period of 2015 to 2019. This can be seen from the number of publications that were still low in that period. Only 23 publications over 4 years were recorded out of 157

publications identified. Meanwhile, 2016 was recorded as the year with the lowest number of publications, which was only 6 publications.

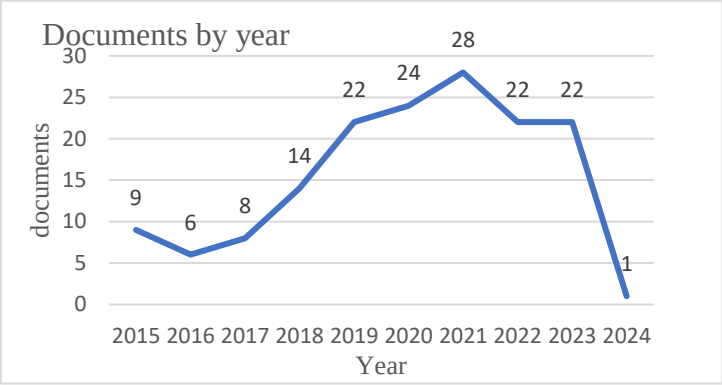

Figure 2. Research Publication Trends

The surge in publications occurred in 2021, with a record high of 28 publications that year on the topic of inquisitiveness in learning. The positive trend continues for the last 2 years which is still stable at 22 publications each year. Starting 2024 until the end of data collection process, there has been 1 publication on the topic of inquisitiveness in learning.

Trends in Research Citations Related to Inquisitiveness in Learning

The trend of research citations related to inquisitiveness in learning obtained from VOSviewer is shown in Figure 3. In Figure 3, there is a lot of color distribution that indicates the number of clusters. The increasing number of clusters suggests a minimal relationship between the research studies. Out of the 157 data collected, only 23 met the criterion of being cited at least 10 times. Thresholds are used to ensure data quality. The 23 data points were divided into 20 clusters, with only 3 being interconnected. The clusters related to the topic are highlighted in red. This relationship indicates that the three studies are interconnected in quotations or often cited together on the topic of inquisitiveness in learning.

Figure 3. Research Citation Trends

One of the most frequently cited articles is an article by Hadi & Maharani (2022) entitled "Analysis of Prospective Elementary School Teachers' Inquisitiveness in Solving Mathematics Problems"(Hadi & Maharani, 2022). In addition, there are also articles by Hirose & Kotani (2022) entitled "How does inquisitiveness matter for generativity and happiness?". Articles titled "Student's Creativity in an Educational Environment: Revelation and Inquisitiveness" by Mehrad & Mehrad (2023) also attract attention with an increased frequency of citations.

Publications and Relationships Between Countries Mapped in Research Related to Inquisitiveness in Learning

A bibliographic analysis of interstate coupling on the topic of inquisitiveness in learning is presented in Figure 4. This image comes from an analysis of 157 data conducted using the full counting method and bibliographic coupling analysis. In this analysis, a minimum threshold of 1 document owned by a country and at least 1 time is cited together. Although 40 countries were detected, only 34 met the threshold, and of these, only 25 connected countries formed 6 clusters.

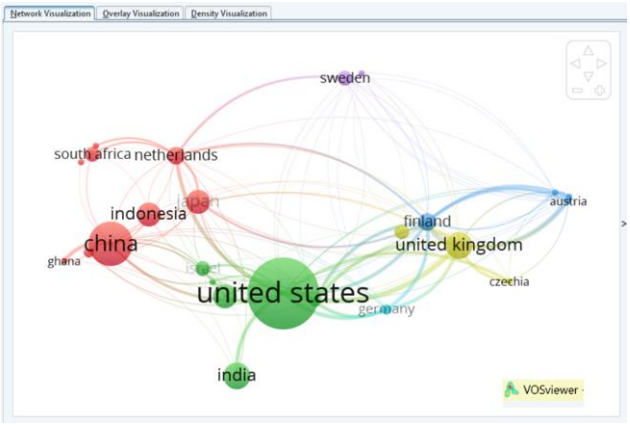

Figure 4. Relationship Between Countries

In the first cluster in red, there are relations between Belgium, China, Cyprus, Ghana, Indonesia, Japan, the Netherlands, Pakistan, and South Africa. The second cluster shows the relationship between Australia, Canada, India, Spain, and the United States. The next cluster, the cluster in blue, shows the relationship between four countries, namely Austria, Finland, Italy, and Switzerland. The fourth cluster in yellow depicts the relationship between Czechia, Norway, and the United Kingdom. The fifth cluster involves two countries, namely Ireland and Sweden, while the last cluster consists of only one country, namely Germany.

Focus of Research on Inquisitiveness in Learning

The focus of research on the topic of inquisitiveness in learning is visualized in Figure 5. Figure 5 depicts the results of a full counting analysis by VOSviewer involving 157 publication data. The visualization illustrates 5 interconnected clusters. The clusters are presented in different colors, namely red, green, blue, yellow, and purple. Each cluster has a different number of keywords that are interconnected. Each cluster has a research focus, observed from the most related keyword in the cluster.

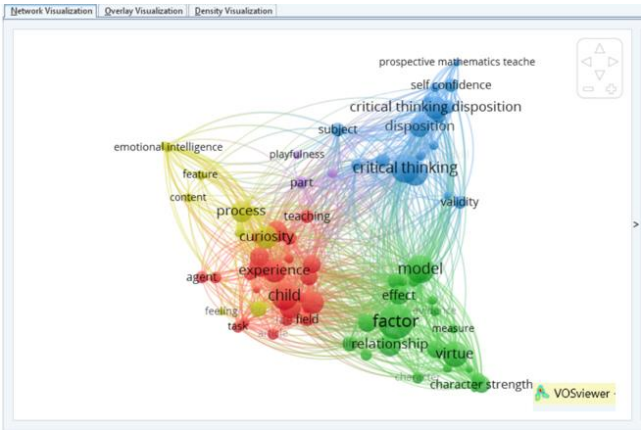

Figure 5. Research Focus

The largest cluster is visualized in red with 25 relevant keywords. In this cluster, the keywords "experience" and "child" stand out with the largest circle diameter. This indicates these two keywords as the focus of research on this cluster. Furthermore, Figure 6 shows the relationship between the keyword "experience" and other keywords in different clusters to see the relevance and current research topics.

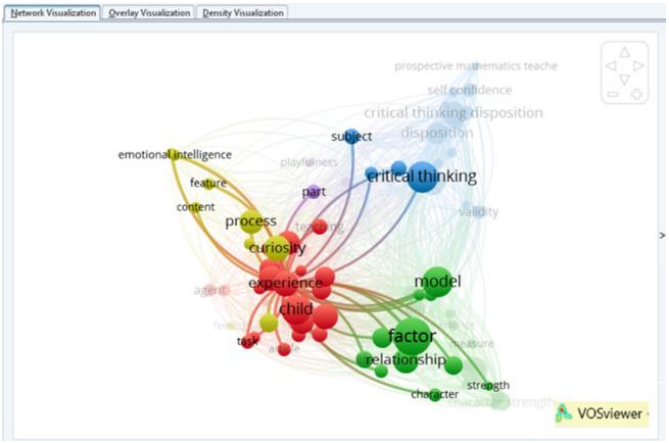

Figure 6. Keyword Linkage

As shown in Figure 6, "experience" is directly related to "emotional intelligence" in the yellow cluster, "critical thinking" in the blue color cluster, and "factor" in the green cluster. In this case, "experience," "emotional intelligence," and "critical thinking" are some of the factors that influence inquisitiveness in learning.

The next cluster is the green color cluster, which has 22 directly related keywords. In this cluster, as presented in Figure 5, the keywords "factor" and "model" stand out as the focus keywords of research in this cluster. The third cluster is in a blue color cluster with 17 related keywords. The focus of research in this cluster is "critical thinking," "critical thinking disposition," and "self-confidence." The fourth cluster is a yellow color cluster with 10 keywords. This cluster has a research focus on "curiosity" and "emotional intelligence." The last cluster is represented by purple, which has only 3 keywords related to the research focus of "playfulness."

Discussion

This research aims to elucidate the landscape of inquisitiveness in learning over the past decade. The following section addresses the research questions.

What are the current research publication trends related to inquisitiveness in learning?

Recent research publication trends related to inquisitiveness in learning show significant changes in research interest over the past 10 years. Initially, the 2015-2019 period recorded low interest, with only 23 publications out of a total of 157. Meanwhile, 2016 was a low point, with only six publications indicating a lack of focus on the topic at the time. However, a dramatic change occurred in 2021, recording the highest number of publications throughout the period, with 28 publications. This surge may reflect a shift in research interest or the emergence of findings that trigger a further desire to explore inquisitiveness in learning. The positive trend has continued in the last 2 years with a stable number of publications at 22 each year. This shows that the topic of inquisitiveness in learning still retains the interest of researchers and continues to be explored. The importance of this topic is reinforced by the existence of one publication that has been recorded in early 2024, indicating the continuity of research on inquisitiveness in learning, namely research by Chen et al. (2024). According to Wang & Chen (2024), the level of inquisitiveness of students in China has an effect on their critical thinking skills. Therefore, advanced research can focus on thematic changes, evolving research

methods, or practical applications of the concept of inquisitiveness in learning, particularly in the context of modern education (Karbowniczek, 2021; Watson, 2021). Thus, it can be expected that future research will provide deeper insights into the importance and implications of inquisitiveness in learning contexts (Gao & Bai, 2014).

What are the trends in research citations related to Inquisitiveness in learning?

Based on Figure 3 from VOSviewer, the trend analysis of research citations related to inquisitiveness in learning illustrates the complexity of the relationship between studies. Using a minimum threshold of 10 citations, out of 157 data collected, only 23 met the quality criteria. Of the 20 clusters produced, there are only 3 clusters that are interconnected, marked in red. This indicates that a number of studies are often cited together in the context of inquisitiveness in learning, suggesting a collective focus on certain aspects. One of the most frequently cited articles is "Analysis of Prospective Elementary School Teachers' Inquisitiveness in Solving Mathematics Problems" by Hadi & Maharani (2022) reflecting the significant impact of the article in the scientific literature. discusses that prospective elementary school teachers do not yet have a disposition for critical thinking, especially curiosity Spektor-Levy et al. (2013). Accordingly, there is a need to enhance teachers' educational learning to improve the skills and critical thinking dispositions of their students. Other articles of interest include "How does inquisitiveness matter for generativity and happiness?" by Hirose & Kotani (2022) and "Student's Creativity in an Educational Environment: Revelation and Inquisitiveness" by Mehrad & Mehrad (2023) which also steals the show with the increased frequency of quotation. Given the increasing trend of citations, especially in prominent articles, it can be concluded that interest in inquisitiveness in learning is growing, and this research contributes significantly to the understanding and advancement of the topic in the scientific literature.

How is the distribution of publications and relationships between countries mapped in research related to inquisitiveness in learning?

Bibliographic coupling analysis on the topic of inquisitiveness in learning, as shown in Figure 4, provides an overview of publication distribution and relations between countries. By involving 157 data and applying the full counting method, a minimum threshold of 1 document and at least 1 time of citation together is applied. Among the 40 countries detected, only 34 met the threshold, while, between these countries, only 25 connected countries formed 6 clusters.

The distribution of publications between countries is reflected in the clusters formed. The first cluster, marked in red, shows relations between countries such as Belgium, China, Cyprus, Ghana, Indonesia, Japan, the Netherlands, Pakistan, and South Africa. The second cluster, in green, reflects the relationship between Australia, Canada, India, Spain, and the United States. Other clusters, such as the third cluster in blue (Austria, Finland, Italy, Switzerland), the fourth cluster in yellow (Czechia, Norway, United Kingdom), the fifth cluster (Ireland, Sweden), and the last cluster involving only Germany, provide an overview of the linkages between countries in the context of inquisitiveness in learning research.

Thus, this analysis reflects the level of collaboration and interconnectedness between countries in the development of scientific literature related to inquisitiveness in learning, opening opportunities for knowledge exchange and international collaboration in the field.

What is the focus of research on inquisitiveness in learning?

Figure 5, the result of bibliographic coupling analysis on the topic of inquisitiveness in learning using the full counting method by VOSviewer involving 157 publication data, presents a visualization that identifies five interconnected research clusters. Each cluster, represented by different colors such

as red, green, blue, yellow, and purple, has a different number of keywords that reflect the focus of their research. The largest cluster, colored red, featured 25 keywords, with "experience" and "child" being the prominent research focus. Further visualization in Figure 6 shows that "experience" is closely connected to "emotional intelligence" in the yellow cluster, "critical thinking" in the blue cluster, and "factor" in the green cluster, indicating that understanding inquisitiveness in learning involves aspects of experience, emotional intelligence, and critical thinking. Other clusters, such as the green cluster with a focus on "factors" and "models," blue with an emphasis on "critical thinking" and "self-confidence," yellow with a focus on "curiosity" and "emotional intelligence," and purple with research focusing on "playfulness," show diversity and complexity in research approaches to inquisitiveness in learning.

The study grouped the findings into five interrelated focus clusters. The first cluster focuses on experience and learning, exploring the relationship between student experience and the level of inquisitiveness in learning (Wu et al., 2018). An in-depth analysis of how certain experiences can stimulate or inhibit curiosity provides insight into learning designs that can facilitate inquisitiveness. The second cluster highlights the role of children in learning, focusing on how to motivate children to develop inquisitiveness, as well as understand their perceptions and understanding of the learning process. Meanwhile, the third cluster explores teachers' perceptions of inquisitiveness, including an analysis of how their views affect teaching strategies and factors that influence the implementation of inquisitiveness practices in the classroom. The fourth cluster focuses on curriculum and inquisitiveness, evaluating the role of curriculum in stimulating learners' curiosity through evaluation, development, and identification of specific elements. Lastly, the fifth cluster explores the relationship of inquisitiveness to well-being and creativity, investigating its psychological aspects, its impact on mental well-being, and its contribution to learners' creative processes. Through this approach, this study seeks to provide a holistic understanding of the dynamics of inquisitiveness in the context of education.

4. CONCLUSION

In general, this study reveals the development of research trends related to inquisitiveness in learning over the past decade. Analysis of the publication shows that research interest was initially low but experienced a surge in 2021 and has remained stable in the past two years. Key findings highlight the importance of inquisitiveness in educational contexts, especially in improving students' critical thinking skills. Analysis of citation trends suggests a collective focus on some key research, such as articles discussing the critical thinking dispositions of prospective primary school teachers. The distribution of publications and linkages between countries reflect the level of international collaboration in the development of scientific literature on inquisitiveness in learning. Finally, five clusters of research focus were identified. The focus of research on the topic of inquisitiveness is 1) experience and child, 2) factors and models, 3) critical thinking disposition and self-confidence, 4) curiosity and emotional intelligence, and 5) playfulness. The research focus analysis identified five main clusters, highlighting experiences, children's roles, teacher perceptions, curriculum, and relationships with well-being as key aspects studied. Thus, this research provides deep insights into the complexity and relevance of inquisitiveness in the context of modern education, opening the door to further research that can provide a more holistic and applicable understanding of the inquisitiveness concept in learning.

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