BIBLIOMETRIC ANALYSIS: THE URGENCY OF *METACOGNITIVE* OPTIMIZATION FOR EARLY CHILDHOOD

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ABSTRACT

Metacognition for early childhood is important to optimize. The aim of this research is to optimize metacognition in early childhood. The subjects in this research were early childhood within age 0-8 years. This research used is a qualitative method with analysis data Systematic Literature Review (SLR) by VOS Viewers. The data source from Google Scholar in last three years 2018-2023 then processed using Harzing's Publish or Perish (Pop) and VOSviewer which produced 20 articles. The research results show that there are 11 metacognitive clusters in early childhood. There is cluster 1 marked with the color red, containing 17 items. Cluster 2, marked with dark green, consisting of 15 items. Cluster 3, marked with dark blue, consisting of 14 items. Cluster 4, marked with yellow, consisting of 14 items. Cluster 5, marked with purple, consisting of 13 items. Cluster 6 marked with light blue, containing 12 items. Cluster 7 marked with orange, containing 10 items. Cluster 8 represented by the color brown, consisting of 9 items. Cluster 9 represented by the color pink, consisting of 9 items. Cluster 10 marked with the cream color, consisting of 7 items. Cluster 11 marked with the light green color, consisting of 6 items. Early childhood metacognitive optimization can be done with story-planning-evaluation and discussion of work results as well as parental motivation.

Keywords*: Metacognition in early childhood; Systematic literature review; VOSviewer.*

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INTRODUCTION

Optimizing the cognitive aspects of early childhood is crucial to support the Sustainable Development Goals (SDGs), particularly in achieving quality education. Metacognition stands out as one aspect that should be nurtured from an early age by both parents and educators. According to the National Association for the Education of Young Children (cited in Susanto 2020), early childhood refers to children aged 0-8 years, also known as the golden age. Hamel et al. (2023) highlight that all children undergo flexible and interconnected growth and development during this period. According Widjayatri et al. (2023) it is essential to optimize developmental aspects for young children. With metacognition being a key aspect during this early phase.

According to Tavakoli & Koosha (cited in Hendi et al. (2020)), Flavell first introduced the concept of metacognition, defining it as "knowledge about cognition and control of cognition.". Makhiyah & Watini (cited in Safitri et al. (2022)) state that cognitive development is essential for young children to grasp various mathematical concepts. This includes recognizing and categorizing geometric shapes, understanding measurements, spatial concepts, time, and patterns, enabling practical application in daily life.

According to Schraw (cited in Hendi et al. (2020)), metacognition is crucial for learning success. Individuals improve in managing cognition and identifying weaknesses, allowing them to enhance their skills through new thinking abilities. Rosdiana (2021) suggests that through metacognition, children can solve problems and make appropriate decisions when faced with various challenges.

Based on the existing definitions, it can be concluded that metacognition is knowledge about cognition, which is a crucial component of learning success. According to Vrugt et al. (cited in Novebrita (2021)), metacognition consists of three parts: metacognition knowledge, metacognition regulation, and metacognition experience. Optimizing metacognition in young children undoubtedly requires collaboration involving both parents and educators.

According to Ruli (2020), parents bear the responsibility of educating, nurturing, and guiding their children to reach specific milestones, as a significant portion of a child's time is spent in the family environment, especially during early childhood. Leen et al. (cited in Lubis (2020)) emphasize the teacher's role in optimizing metacognition through education and learning, creating enjoyable, engaging, creative, friendly, and flexible learning environments for young children. Rosdiana (2021) suggests that optimizing metacognition in early childhood can begin as early as age 3 for young children.

Based on the explanation provided, this research emphasizes **"The Urgency of Metacognitive Optimization for Early Childhood"** to analyze the issue more comprehensively.

METHODS

The research methodology employed includes qualitative methode and Systematic Literature Review (SLR) using bibliometric analysis. The data sources use by Harzing's Publish or Perish (Pop) application, along with VOSviewer. This study emphasizes literature review by utilizing library sources to gather research data. The subjects of this research are young children within the age range of 0-8 years. In this study, the researcher utilizes relevant sources related to the urgency of metacognitive optimization for early childhood. The sources used in this research are primarily from Google Scholar covering the years 2018-2023.

According to Triandini et al. (2019), the systematic literature review method is a research methodology involving a systematic development to collect and evaluate studies related to a particular subject. Sastypratiwi & Nyoto (2020) state that the systematic literature review method can search, assess, and organize all relevant empirical evidence to provide a complete

interpretation of research results. Several steps are involved in using the systematic literature review method, as illustrated in Picture 1.

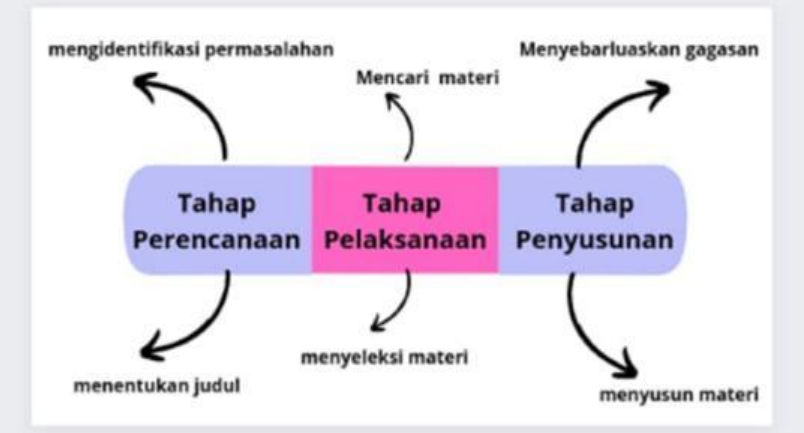
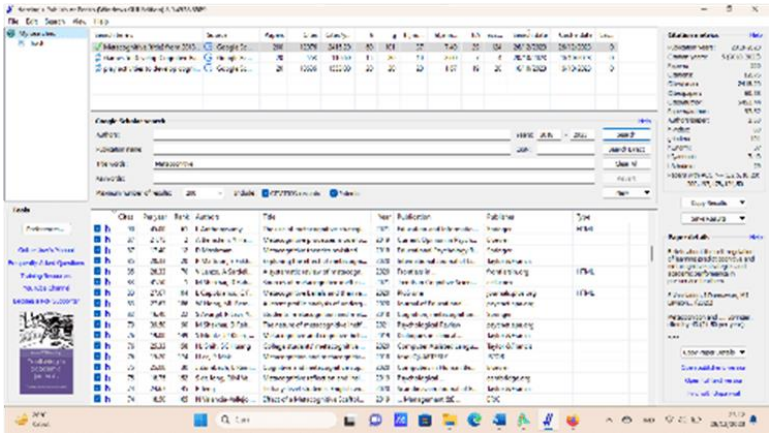


Figure 1. Steps In Carrying Out A Systematic Literature Review Method

In Picture 1, the depicted stages outline the overarching steps carried out in utilizing the SLR method. According to Amam & Rusdiana (2022) in general, the strages of the SLR method are namely the initial planning stage, the execution phase, and the article compilation stage. An SLR study is conducted with the aim of identifying, reviewing, evaluating, and interpreting all research relevant to an interesting and pertinent subject.

Bibliometric analysis, as defined by Tupan et al. (2018), is a study involving the bibliographic analysis of scholarly activities based on the assumption that researchers conduct research and communicate their findings to peers. According to Sanusi et al. (2023), bibliometric analysis employs both evaluative and descriptive approaches to represent research and characteristics of publications. The steps for conducting bibliometric analysis are illustrated in Picture 2.



Source: https://www.vosviewer.com/ (Application VOSviewer)

Figure 2. Bibliometric Analysis Steps

In Picture 2. the outlined steps are as follows: first, identifying questions and issues related to the urgency of optimizing metacognition in early childhood; second, downloading Harzing's Publish or Perish (PoP) and VOSviewer applications; third, conducting a search on Harzing's Publish or Perish (PoP) within the 2018-2023 timeframe on Google Scholar, using the search term "metacognitive early childhood"; fourth, the researcher extracting literature from 200 available journals to gather information; fifth, narrowing down the analysis to 20

selected articles; sixth, intensively examining and reviewing the chosen articles' discussion and research findings to ensure valid results.

RESULTS AND DISCUSSION

This study examines 20 articles retrieved from Google Scholar within the period of 2018 to 2023. These articles discuss the urgency of metacognitive optimization for early childhood. Using Harzing's Publish or Perish (PoP) application, a total of 200 articles related to metacognition in early childhood were identified. Out of these, 5 articles with the highest citations are presented in Table 1.

Tabel 1. Articles with the Most Quotes Range 2018-2023

No	Title	Writer	Year	Number of Citations
1.	Metacognitive confidence can increase but also decrease performance in academic settings	Moreno et al.	2022	200
2.	Metacognitive failure in constructing proof and how to scaffold it	Wulan et al.	2021	199
3.	Contested science: Individuals with higher metacognitive insight into interpretation of evidence are less likely to polarize	Said et al.	2021	198
4.	Beliefs about the self-regulation of learning predict cognitive and metacognitive strategies and academic performance in pre-service teachers	Vosniadou et al.	2021	197
5.	Metacognition and metacognitive skills: intellectual skills development technology	Valeyeva et al.	2019	196

Table 1. provides insights into metacognition in early childhood based on the highest number of citations within the 2018-2023 timeframe. The highest number of citations is obtained by Moreno et al. (2022) with 200 citations, followed by the second-highest citations obtained by Bulan et al., with 199 citations, and the third-highest by Said et al. (2021), with 198 citations.

Metacognition begins to be optimized at the age of 3, according to Rosdiana (2021). At this age, children already grasp that the mind is an internal mental event that is pleasurable, referential, and unique to humans. The VOSviewer results depicting the mapping of metacognition in early childhood are illustrated in Picture 3.



Source: https://www.vosviewer.com/ (Application VOSviewer)

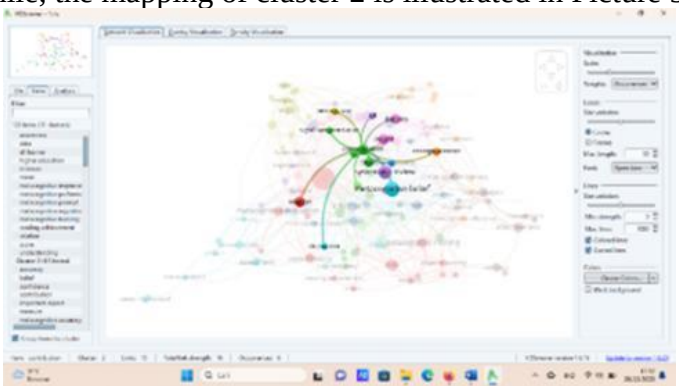
Figure 3. Early Childhood Metacognitive Mapping

Picture 3. depicts the mapping of metacognitive skills in early childhood, divided into 11 clusters with 126 items. Each cluster is distinguished by a different color. Cluster 1 is in red, cluster 2 in dark green, cluster 3 in dark blue, cluster 4 in yellow, cluster 5 in purple, cluster 6 in light blue, cluster 7 in orange, cluster 8 in brown, cluster 9 in pink, cluster 10 in cream, and cluster 11 in light green. In cluster 1, various items are mapped as illustrated in Picture 4.



Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 4. Mapping of Items in Cluster 1

In Picture 4. there is cluster 1 marked with the color red, containing 17 items. Including absence, adaptive training, awareness, data, elf learner, higher education, increase, mean, metacognitive improvement, metacognitive performance, metacognitive prompt, metacognitive regulation, metacognitive training, reading achievement, relation, score, and understanding. Meanwhile, the mapping of cluster 2 is illustrated in Picture 5.



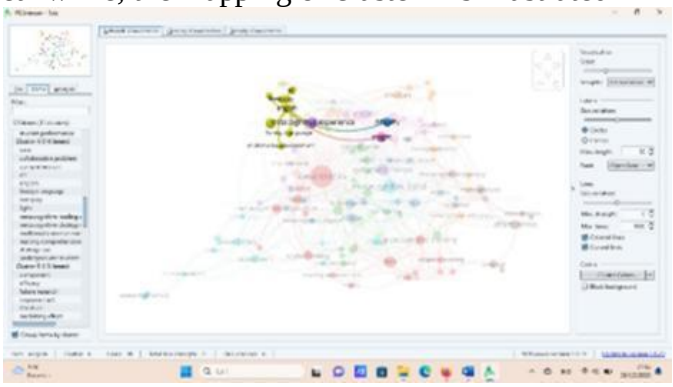
Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 5. Mapping of Items in Cluster 2

In Picture 5. there is cluster 2, marked with dark green, comprising 15 items. These items include accuracy, belief, confidence, contribution, important aspect, measure, metacognitive accuracy, metacognitive failure, metacognitive inefficiency, metacognitive judgment, nature, participant, pre-service teacher, present research, and significant correlation. Meanwhile, the mapping of cluster 3 is illustrated in Picture 6.



Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 6. Mapping of Items in Cluster 3

In Picture 6. there is cluster 3, marked with dark blue, comprising 14 items. These items include age, article, computer, difficulty, field, information, interest, metacognitive activity, metacognitive aspect, metacognitive evaluation, metacognitive tool, source, special issue, and student performance. Meanwhile, the mapping of cluster 4 is illustrated in Picture 7.



Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 7. Mapping of Items in Cluster 4

In Picture 7. there is cluster 4, marked with yellow, comprising 14 items. These items include case, collaboration problem, comprehension, EFL (English as a Foreign Language), english, foreign language, interplay, light, metacognitive reading start, metacognitive strategy use, multimedia environment, reading comprehension, strategy use, and undergraduate student. Meanwhile, the mapping of cluster 5 is illustrated in Picture 8.



Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 8. Mapping of Items in Cluster 5

In Picture 8. there is cluster 5, marked with purple, comprising 13 items. These items include component, efficacy, future research, improvement, literature, mediating effect, metacognitive components, metacognitive experience, metacognitive self-regulation, planning, SLR (Systematic Literature Review), student metacognitive skill, and systematic review. Meanwhile, the mapping of cluster 6 is illustrated in Picture 9.



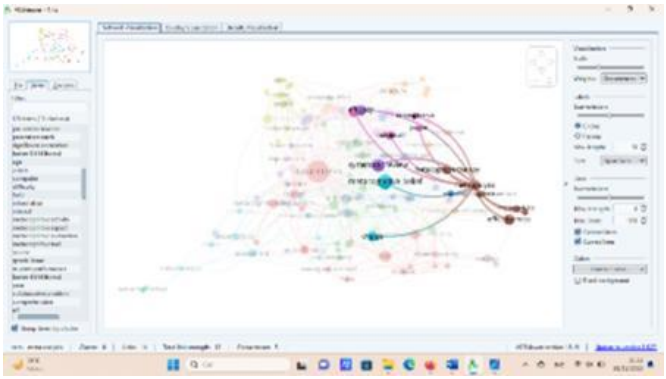
Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 9. Mapping of Items in Cluster 6

In Picture 9. there is cluster 6 marked with light blue, containing 12 items. Including assessment, chang, course, critical analysis, critical thinking skill, depression, e-learning, metacognitive belief, present study, project, quality, and senior high school. Meanwhile, the mapping of cluster 7 is illustrated in Picture 10.



Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 10. Mapping of Items in Cluster 7

In Picture 10. there is cluster 7 marked with orange, containing 10 items. Including addition, comparison, conceptualization, connecting, estimate, metacognitive efficiency, metacognitive group strategy, metacognitive modeling competency, positive relationship, and structure. Meanwhile, the mapping of Cluster 8 is illustrated in Picture 11.



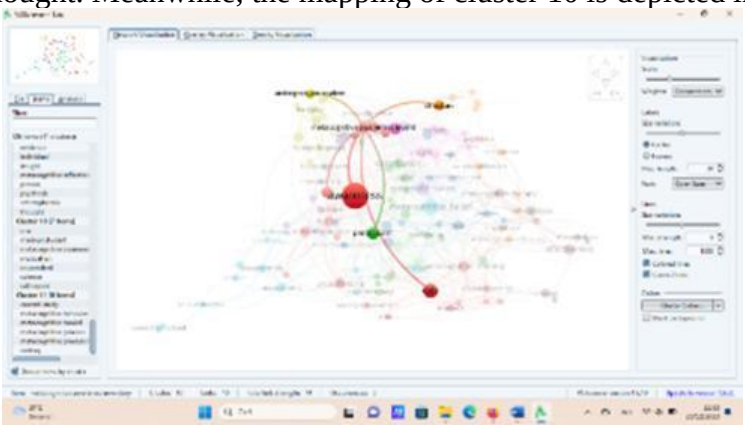
Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 11. Mapping of Items in Cluster 8

In Picture 11. there is cluster 8 represented by the color brown, consisting of 9 items. These items are concept, effectiveness, implications, meta-analysis, metaanalysis, metacognitive international, metacognitive therapy, pedagogical intervention, and transfer. Meanwhile, the mapping of cluster 9 is depicted in Picture 12.



Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 12. Mapping of Items in Cluster 9

In Picture 12. there is cluster 9 represented by the color pink, consisting of 9 items. These items are domain, evidence, individual, insight, metacognitive reflection, person, psychosis, schizophrenia, and thought. Meanwhile, the mapping of cluster 10 is depicted in Picture 13.



Source: https://www.vosviewer.com/ (Application VOSviewer)
Figure 13. Mapping of Items in Cluster 10

In Picture 13. there is cluster 10 marked with the cream color, comprising 7 items. These items include mai, medical student, metacognitive awareness, motivation, respondents, science, and self-report. Meanwhile, the mapping of cluster 11 is depicted in Picture 14.



Source: https://www.vosviewer.com/ (Application VOSviewer)

Figure 14. Mapping of Items in Cluster 11

In Picture 14. there is cluster 11 marked with the light green color, comprising 6 items. These items include current study, metacognitive behavior, metacognitive model, metacognitive process, metacognitive processing, and writing.

To optimize metacognition in young children, there are several methods that can be employed. Based on the findings of a systematic literature review conducted by previous researchers regarding ways to optimize metacognition in young children, as explained in Table 2.

Tabel 2. Ways to Optimize Early Childhood Metacognition

How to Optimize Cognition	Journal Title	Writer	Research result
Story-Plan-Evaluation and Discussion of the work	Developing Metacognitive Knowledge in Early Childhood through the Evaluation of Story-Plan-Evaluation Activities and Discussion of Artistic Works	Novebrita	Eleven children (36.6% of the total respondents) answered at least five questions, while 5 students (16.6% of the total respondents) were able to answer fewer than five questions. Out of the 30 children who participated as respondents, two children were unable to answer questions metacognitively. In this study, it was found that children with special needs (students with mild ADHD and children with speech delays) demonstrated a higher level of metacognitive knowledge compared to other children.
Parental motivation	The Relationship Between Parental Motivation and Ability	Nurlaely	Based on the correlation calculation, which is 5% (0.05), the obtained critical value (r table) is 0.159. It

How to Optimize Cognition	Journal Title	Writer	Research result
	Metakognisi Children Aged 5-6 Years in Bintaro Village in 2020		turns out that the calculated The correlation coefficient (r) is greater compared to the critical value (0.185 > 0.159), which means that the null hypothesis (Ho) is rejected, and the alternative hypothesis (Ha) is accepted. The coefficient of determination in the results indicates a significant relationship between parental motivation and metacognitive abilities in children aged 5-6 years in the Bintaro neighborhood in the year 2020, amounting to 3.4%.

To optimize early childhood metacognition, parents and educators play crucial roles. Parents can optimize early childhood metacognition in the home environment, while educators can optimize it in the school setting. According to Nurlaely (2020), a child's metacognition needs to be developed optimally. If the metacognition of young children is not optimized, it will have an impact on the child's future development.

Based on Table 2. there are two ways that teachers and parents can utilize to optimize the metacognition of young children, namely through story-planning-evaluation and discussing creative work results, as well as parental motivation. Optimizing the metacognition of young children is crucial for their proper growth and development. There are several ways that parents and educators can employ to optimize metacognition in young children. These include:

1. Story-Plan-Evaluation and Discussion of Creative Work

   Story-Plan-Evaluation is an activity conducted by both the child and the educator in the morning regarding the child's feelings. Once the child understands their emotions and current state, they are trained to set and articulate their goals for the day. The process concludes with the child recounting the activities they have completed and engaging in an evaluation discussion.

   Discussion of creative work is an activity that involves deliberating on a child's creative output. The best piece of work is chosen by the child. Subsequently, the child explains the reasons behind their selection, detailing the aspects that make it their best work. The child then narrates the process of creating the chosen piece. Both aspects aim to enhance the development of metacognitive knowledge in young children.

   Based on the research conducted by Novebrita (2021), there were 30 children who participated as research respondents. Out of these 30 children, 2 were unable to answer questions metacognitively. Interestingly, in this study, it was found that children with special needs (students with mild ADHD and children with speech delays) exhibited a higher level of metacognitive knowledge compared to other children.

2. Motivation of Parents

   The teaching and learning activities require motivation to unlock the potential within a child's cognitive development. According to Palittin et al. (2019), motivation is something that significantly influences a child's learning outcomes. Parental motivation is crucial for young children so that they can be enthusiastic in the learning process and strive to achieve

their goals. Parents play a vital role in the growth and development of children, shaping both their personalities and cognitive abilities in early childhood.

Based on the research findings by Nurlaely (2020), the correlation calculation was set at 5% (0.05), and the critical value (r table) obtained was 0.159. It turns out that the calculated correlation coefficient (r) is greater than the critical value (0.185 > 0.159), indicating the rejection of the null hypothesis (Ho) and acceptance of the alternative hypothesis (Ha). Therefore, it can be concluded that the coefficient of determination in the above results indicates a significant relationship between parental motivation and metacognitive abilities in children aged 5-6 years in the Bintaro neighborhood in 2020, amounting to 3.4%.

CONCLUSION

Metacognition is crucial to optimize, especially for young children. Based on the research results, 11 clusters were identified, comprising 126 items with various colors. This indicates thematic density, and the greater the scope of the study, the more clusters are identified. To enhance the metacognition of young children, methods such as story-plan-evaluation, discussion of creative work, and parental motivation can be employed.

The research findings indicate that in the story-plan-evaluation and discussion of creative work, out of 30 student respondents, only two were unable to answer any of the ten questions posed by the researcher metacognitively. Regarding parental motivation, the research shows a significant relationship between parental motivation and metacognitive abilities in children aged 5-6 years in the Bintaro neighborhood in 2020, amounting to 3.4%.

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