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IMPLEMENTATION OF CYBERNETIC-BASED INDEPENDENT CURRICULUM IN EARLY CHILDHOOD EDUCATION INSTITUTIONS IN BANTEN PROVINCE

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Abstract : In the Indonesian context, the Independent Curriculum offers flexibility in the learning process, but its implementation in ECE faces challenges, especially related to technology and infrastructure. This study aims to explore the implementation of the cybernetic-based Independent Curriculum in ECE institutions in Banten Province, with a focus on the readiness of institutions, educators, and access to technology. A qualitative method with a case study design was used to explore the conditions in three ECE institutions. The results of the study show that although Condrodimuko Kindergarten has successfully implemented this curriculum, challenges such as lack of teachers' digital literacy and parental support still exist. At Nur Amila Kindergarten, teachers are trying to adapt, but limited network access hinders the use of technology. Meanwhile, Al-Mumtaz Islamic Kindergarten has not implemented a cybernetic approach because it is still using the center learning method. This research is expected to provide recommendations for improving the quality of early childhood education in Banten and support government policies in realizing an inclusive and adaptive Independent Curriculum.

Keywords: Independent Curriculum; Cybernetic Approach; Early Childhood Education

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INTRODUCTION

Early childhood education (PAUD) is an important stage in a child's development, where the foundations of personality, cognitive, social, and emotional are formed (Mustadi et al., 2021). In Indonesia, attention to PAUD is increasing with the issuance of various government policies and regulations that support improving the quality of education from an early age. One of the latest policies that is the basis for the development of education in Indonesia is the Independent Curriculum. This curriculum offers flexibility in the learning process that allows educational institutions to adjust teaching materials to the needs and potential of students. The implementation of the Independent Curriculum at the PAUD level is very important, considering the characteristics of early childhood

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which requires a child-centered learning approach and utilizes exploration and direct experience as a means of learning (Arzaqi & Diana, 2019). This curriculum is expected to provide space for students to explore according to their speed and interests, thereby encouraging the growth of critical thinking skills and creativity. However, the implementation of the Independent Curriculum in PAUD institutions faces various challenges, especially in the context of the use of technology and modern learning approaches. Such as the lack of technological infrastructure, such as internet access and supporting devices (laptops, computers, tablets) in educational institutions, especially in remote areas (Chonitsa et al., 2023). This is a major obstacle in the implementation of modern technology-based learning in accordance with the principles of the Independent Curriculum. Strengthened by a survey by the Indonesian Ministry of Education and Culture (Pajar Alhabibi et al., 2023), around 42% of schools in Indonesia in 2020 did not have adequate internet access, this is especially felt in areas outside Java, such as Banten, which has limited access to technological infrastructure in several areas. In addition, educators, especially at the PAUD level, are not fully ready to integrate technology into learning. PAUD teachers need special training in using digital tools and implementing learning approaches that utilize technology effectively. As a study by the Central Statistics Agency (BPS) shows that in 2022 around 60% of teachers in PAUD do not have adequate digital competence to utilize technology in the learning process (Zunaidah et al., 2023).

The cybernetic approach in education, which emphasizes the dynamic interaction between human components, technology, and the learning environment, can be one solution to improve learning effectiveness (Riska et al., 2023). This approach allows for continuous feedback that helps children understand and integrate information through direct experience. The cybernetic approach is also very relevant to the Independent Curriculum, which emphasizes independent, collaborative, and project-based learning. The cybernetic approach emphasizes the importance of interaction between various components in the learning process, namely students, teachers, and the environment (Rahayu & Setiasih, 2022b). In the context of the Independent Curriculum, this interaction allows children to explore, collaborate, and get real-time feedback, which is very important in developing their social and emotional skills. Cybernetics also provides a system that can adapt quickly to change. In the Independent Curriculum, which gives teachers the freedom to adjust learning methods and materials, this approach allows teachers to respond to children's needs and interests more effectively. This is especially beneficial for young children who have different learning styles. In addition, the cybernetic approach encourages the use of technology as a tool to enhance the learning experience (Arzaqi & Romadona, 2021). In the Independent Curriculum, technology can be used to create an interactive learning environment, where children can use digital devices for exploration, experimentation, and collaboration on interesting and relevant projects.

Cybernetics emphasizes the importance of feedback in the learning process. By providing constructive feedback, both from teachers and peers, children can develop their critical thinking skills and creativity (Wahyuna & Usmaidar, 2023). The Independent Curriculum, which encourages project-based learning, is very much in line with this principle, as children can reflect on their experiences and explore innovative solutions. The cybernetic approach allows for the integration of problem-based learning into the

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Independent Curriculum. Through real situations that are relevant to everyday life, children can engage in problem-solving processes that require collaboration and communication (Rahayu et al., 2022). This not only improves conceptual understanding but also prepares them for real-world challenges. Cybernetics also facilitates independent learning, where children are given the opportunity to explore their own interests. In the Independent Curriculum, this approach is very important to help children learn independently, explore topics they are interested in, and develop a deep sense of curiosity. Banten Province, as one of the regions that continues to develop in the education sector, has shown a commitment to adopting the Cybernetic-based Independent Curriculum in PAUD institutions (Rahayu & Setiasih, 2022a). However, there are several obstacles in implementing the cybernetic-based approach in PAUD institutions in this region, especially related to the readiness of infrastructure, human resources, and access to supporting technology. PAUD teachers in Banten still face challenges in understanding cybernetic concepts and applying them in teaching and learning activities (Setiawan et al., 2023). In addition, not all PAUD institutions have adequate access to the information technology needed to support optimal cybernetic implementation. Many PAUD institutions in Banten still have inadequate physical facilities to support cybernetic-based learning. Classrooms that are not large enough or do not have a special area for interactive activities can limit the implementation of methods that require space to move. Although several areas in Banten already have internet access, the quality and speed of the internet connection are often inadequate (Setiasih et al., 2023). Connection disruptions can hinder the use of digital platforms and applications needed for cybernetic learning, reducing the effectiveness of these learning methods.

Research on the independent curriculum and the cybernetic approach has been widely conducted, but most of the research on the cybernetic approach still focuses on higher levels of education, such as secondary education or tertiary education (Nurâ, 2022). Research on how this approach can be effectively applied to PAUD, especially in the context of the Independent Curriculum, is still minimal. There is a gap in the in-depth literature on how cybernetic technology and feedback can be used to support early childhood development. In addition, research on the readiness of PAUD institutions in Banten Province to adopt a cybernetic-based approach is still very limited. Several studies have indeed identified common constraints (Telaumbanua et al., 2023; Fauziah & Nugraha, 2023; Wahyuna & Usmaidar, 2023) such as limited infrastructure and human resources, but no research has specifically explored these conditions in Banten and how they affect the implementation of the Independent Curriculum.

Other studies have also discussed the general challenges in implementing the Independent Curriculum, (Mutalib & Syahfitri, 2024) studies that focus on the role of PAUD teachers in implementing the cybernetic approach are still rare. So this study aims to explore the implementation of the cybernetic-based Independent Curriculum in PAUD institutions in Banten Province by providing an overview of the readiness of institutions, educators, and infrastructure in adopting this approach. Thus, the results of this study are expected to provide relevant recommendations for improving the quality of early childhood education in Banten, as well as supporting government policies in realizing a more inclusive and adaptive Independent Curriculum to technological developments.

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METHOD

This study uses a qualitative method with a case study design. Case studies are chosen because they are a type of in-depth and comprehensive qualitative research on a particular case or phenomenon in a real context (Syaodih, 2012). This study focuses on the implementation of the Cybernetic-based Independent Curriculum in optimizing the achievement of the development of basic literacy, science, technology, engineering, art, and mathematics in early childhood in Banten Province. Case studies allow researchers to explore and understand phenomena in depth in a real context, namely early childhood education institutions in Banten Province, collecting data from various sources, such as observations, interviews, and documentation studies, to obtain a comprehensive picture of the implementation of the Cybernetic-based Independent Curriculum, Case studies also allow for the exploration of supporting and inhibiting factors in curriculum implementation, as well as their impact on early childhood development achievements (Arzaqi et al., 2022). Then the data was analyzed using interactive data analysis models including (Miles, 1994): data reduction, data presentation and drawing conclusions. Further research stages can be seen in Figure 1.

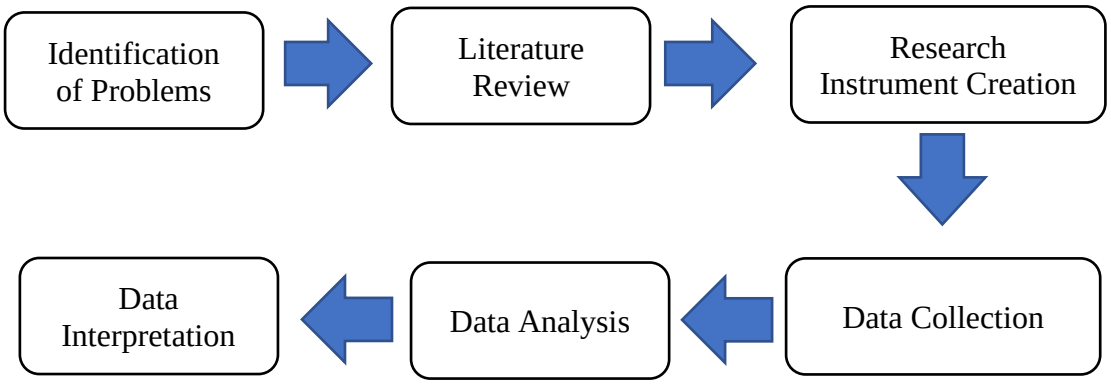

Figure 1. Research Stages

Participants in this study were three PAUD institutions, including: Condrodimuko Kindergarten located at PLN Lebakgede Complex, Pulomerak District - Cilegon City, Banten Province; Nuramila Kindergarten, Kubang Barat Village 11/04 Pejamben, Carita District, Pandeglang Regency, Banten Province and Al-Mumtaz Kindergarten, Daar El Qolam Islamic Boarding School, Pabuaran Village, Gintung Pasir Gintung, Jayanti District, Tangerang Regency, Banten Province. The three schools were chosen because they could provide variations in research results because in addition to their distant locations, there were also differences in the curriculum from each school. Schools one and two have implemented the independent curriculum with a cybernetic approach while the third school has not implemented it. In seeing the differences in the results of the study, the instruments used can be seen in Table 1.

Table 1. Research Instruments

Problem Formulation	Indicator	Question Number
Implementation of Cybernetic-Based Independent Curriculum (Pratama, D. 2021; Hidayat, N., & Azizah, F. 2022).	1. Curriculum	1-5
	2. Planning and Implementation	6-7
	3. Strategy and Methods	8-13
	4. Resources and Support	14
Supporting and inhibiting factors (Sari, D. P., & Sugiarti, E. 2020).	1. Challenges	15
	2. Supporting and Inhibiting Factors	16
	3. Solutions and Adjustments	17
The impact of implementing the cybernetic-based Independent Curriculum on the achievement of basic STEAM development (Sari, M., & Widodo, S. (2021)	1. Impact of implementation on STEAM child development achievements	18-21
	2. The role of teachers, parents, and other parties in implementing the curriculum	22-23
	3. Suggestions and input for improving implementation	24-26

RESULT AND DISCUSSION

Cybernetic-Based Curriculum Implementation Strategy in PAUD

The implementation of cybernetic-based curriculum in several PAUDs is carried out with various strategies. In Condrodimuko Kindergarten, the cybernetic-based independent curriculum has been implemented well through the STEAM approach (science, technology, engineering, art, and mathematics). Learning utilizes technological tools such as television, YouTube, and interactive applications to create collaborative activities. Children are invited to experiment, get to know technology safely, and develop critical thinking skills and creativity through collaborative projects. Teachers also use adaptive methods in compiling learning materials according to children's needs. In Nur Amila Kindergarten, the cybernetic-based curriculum is still in the adaptation stage. Teachers have started to use digital media such as screens and infocus to support simple experiments, such as food coloring experiments. The learning strategy in this school focuses on increasing children's interests and talents as well as exploration that supports creativity. Meanwhile, in Al Mumtaz Islamic Kindergarten, learning still uses a center approach which is carried out three times a week, such as cooking centers, natural materials, blocks, faith and piety, preparation, and dance. This approach allows children to explore various skills before moving on to implementing a cybernetic-based curriculum. The findings are evidenced by the following interview results.

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"As a principal, I feel that I have understood the concept of a cybernetic-based independent curriculum. However, our teachers still need time to really understand it, especially in terms of using technology." (excerpt from interview with the Principal of Condrodimuko Kindergarten, August 22, 2024)

"We try to use technology such as YouTube and interactive applications to make learning more interesting for children." (excerpt from interview with a Condrodimuko Kindergarten Teacher, August 22, 2024)

"The children look more enthusiastic when experimenting with simple tools. We try to utilize existing technology, but are often constrained by internet access." (excerpt from interview with Nur Amila Kindergarten Teacher, August 26, 2024)

"We still feel comfortable with the center learning method, but are interested in trying a new curriculum if there is adequate training." (excerpt from interview with an Al Mumtaz Islamic Kindergarten Teacher, August 30, 2024)

Based on the research results, it is stated that the implementation of a cybernetic-based independent curriculum in several kindergartens shows an effort to utilize technology in early childhood learning. In Condrodimuko Kindergarten, the implementation of this curriculum has succeeded in supporting children's development, such as independence, creativity, and discipline. Teachers utilize technology such as YouTube and interactive applications to support STEAM-based learning. This is in line with Fahmi's research (2024), which states that the use of appropriate technology can improve critical and creative thinking skills in early childhood. In addition, parental involvement in Condrodimuko Kindergarten also has a positive impact, although their level of understanding and support for technology still varies.

Barriers to Implementing Cybernetic-Based Curriculum in PAUD

Barriers to implementing cybernetic-based curriculum arise from various factors. In Condrodimuko Kindergarten, low teacher technological literacy is the main challenge, even though the principal has understood this curriculum well. In addition, not all children have the same access to technology at home, creating a gap in the learning experience. There is also concern that excessive use of technology can reduce social interaction between children and teachers. In Nur Amila Kindergarten, internet network constraints are the main obstacle in utilizing digital media during learning. Teachers are also still in the stage of learning and adapting to the cybernetic-based curriculum. Meanwhile, in Al Mumtaz Islamic Kindergarten, the lack of information and training for teachers is the main challenge, so that the implementation of this curriculum has not yet been implemented. In addition, parents in this school are not yet familiar with the concept of cybernetic-based curriculum, although they expressed their readiness to support if the curriculum is implemented. These findings are proven by the following interview results.

"We have difficulty understanding the technology used in learning. Our literacy about technology is still very low." (quote of interview with Kindergarten Teacher Condrodimuko, August 22, 2024)

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"We are still in the learning and adaptation stage with this curriculum. The biggest challenge is the internet network which is often unstable." (quote of interview with Kindergarten Teacher Nur Amila, August 26, 2024)

"We have not implemented a cybernetic-based curriculum due to lack of training and information." (quote of interview with Kindergarten Teacher Islam Al Mumtaz, August 30, 2024)

The results of the study found that the main challenge in implementing a cybernetic-based curriculum is the low technological literacy among teachers. In Condrodimuko Kindergarten and Nur Amila Kindergarten Pandeglang, many teachers are not yet accustomed to using technology, so they need continuous training. This condition is in line with the research of Kwon et al. (2019), which emphasizes the importance of teacher digital literacy for the success of technology-based learning. In Nur Amila Kindergarten, additional obstacles in the form of poor internet network access also hinder the smooth running of digital learning. This is consistent with the findings of Lei et al. (2015), which show that adequate infrastructure is very important for the adoption of technology in schools. In Al Mumtaz Islamic Kindergarten, the main obstacle is the difficulty of teachers in switching from traditional methods to a technology-based curriculum. Teachers there are more comfortable using the center method and have not received sufficient training to understand the concept of a cybernetic-based curriculum. This condition is in line with the findings of Sholihah et al. (2024), who noted that many kindergartens still rely on traditional approaches to learning.

Supporting Factors for the Implementation of Cybernetic-Based Curriculum in PAUD

Supporting factors for the implementation of cybernetic-based curriculum involve collaboration between the principal, teachers, and parents. In Condrodimuko Kindergarten, the principal who understands the cybernetic-based curriculum is the key to successful implementation, supported by parents who see the benefits of this program in improving children's independence, creativity, and innovation. The technology used in learning, such as digital teaching aids, also helps motivate children to actively participate. In Nur Amila Kindergarten, although understanding of the curriculum is still limited, parents show enthusiasm in supporting the learning process. The approach that integrates children's interests and talents is an additional motivation for successful implementation. In Al Mumtaz Islamic Kindergarten, although the cybernetic-based curriculum has not been implemented, the existing center approach provides a strong foundation for developing children's skills. Parents at this school also expressed full support if the curriculum is implemented, indicating the potential for positive collaboration in the future. The following findings are evidenced by the results of the interviews as follows.

"We try to provide a fun learning experience by using technology teaching aids." (excerpt from interview with Kindergarten Teacher Condrodimuko, August 22, 2024)

"I really support technology-based learning like this." (excerpt from interview with Kindergarten Parent Nur Amila, August 26, 2024)

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"If this curriculum is implemented in schools, I will definitely fully support it, as long as there is a clear explanation of the benefits and how to implement it." (excerpt from an interview with a parent of an Islamic Kindergarten student at Al Mumtaz, August 30, 2024)

The results of the study showed that parental involvement is one of the main supporting factors in the implementation of cybernetic-based curriculum. In Condrodimuko Kindergarten, parental support contributed to the success of the program, although there were differences in the level of understanding of the benefits of technology. This finding is in line with Plowman's research (2016), which states that the role of parents is crucial in ensuring that children can optimally utilize technology at home. The positive impact of the cybernetic curriculum on children is also an important supporting factor. In Condrodimuko Kindergarten, the implementation of this curriculum has helped to increase children's independence, creativity, and discipline, showing the great potential of adopting technology in early childhood learning. Government support or technology service providers are also needed to ensure the availability of infrastructure and training for teachers, especially in areas that face technological limitations, such as Nur Amila Pandeglang Kindergarten.

CONCLUSION

The conclusion of this study is that the implementation of the cybernetic-based independent curriculum in three kindergartens, namely Condrodimuko Kindergarten, Nur Amila Pandeglang Kindergarten, and Al-Mumtaz Islamic Kindergarten, showed varying results. In Condrodimuko Kindergarten, the implementation has gone well even though teachers still face challenges in understanding and adopting technology, and there are differences in parental support regarding the use of technology at home. In Nur Amila Pandeglang Kindergarten, the implementation has just started with several obstacles, such as limited network access and lack of parental understanding of this curriculum. Meanwhile, in Al-Mumtaz Islamic Kindergarten, the cybernetic curriculum has not been implemented, and learning is still focused on the center method. Overall, the main obstacle in implementing the cybernetic-based independent curriculum is the lack of teacher understanding and technological support, even though there is enthusiasm from parents for positive changes in children. The recommendations of this study are to improve technological literacy for teachers through training, improving technological infrastructure in schools, and socializing parents about the importance of using technology in education. The implementation of the cybernetic-based independent curriculum also needs to be monitored periodically to ensure its effectiveness. For further researchers, it is recommended to study teacher technological literacy, the effectiveness of using technology in early childhood learning, a comparison of implementation in various regions, and the role of parents in supporting this curriculum.

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