

Executive Function In Early Childhood: What Do Teachers Know And Do In The Classroom?

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ABSTRACT: The purpose of this study is to investigate how early childhood education (ECE) teachers comprehend and use learning techniques that promote the development of executive function in young children. The three primary components of executive functions—working memory, inhibitory control, and cognitive flexibility—are essential to children's self-regulation and preparation for learning. Several early childhood education teachers in the Jakarta and Bekasi regions were interviewed in-depth to gather data using a qualitative methodology. The research findings indicate that most teachers are not familiar with the term "executive function," but in practice, they have been conducting activities that support these aspects in daily learning. Nevertheless, the implementation of these activities has not been fully directed or recognized as part of executive function development. Therefore, efforts to enhance teacher professionalism through specialized training or seminars are needed so that their understanding and pedagogical practices can be more optimal in supporting the development of executive functions in early childhood.

KEYWORDS: Early Childhood, Executive Function, Teacher Experience

INTRODUCTION

Research on executive function, particularly in early development, is still ongoing. The broad cognitive processes linked to working memory, inhibitory control, and flexible attention shifting are referred to as "executive function" processes, which is studied thoroughly in neuropsychology and neuroscience (Blair, 2016). The ability of a child to take charge, adapt to their environment, maintain self-control while playing or completing tasks given to them by parents or teachers, observe, organize information processing, and behave are all aspects of executive function; these are the child's innate skills for school readiness (Naif & Susanti, 2024). According to Diamond (Diamond, 2013), the three primary components of the executive function idea are working memory, inhibitory control (which involves avoiding temptation and selective attention), and cognitive flexibility (which involves perceiving many viewpoints and being able to adjust quickly).

For various reasons, over the past few decades, researchers have been interested in the topic of early childhood executive function (Röthlisberger et al., 2012). According to several studies, executive function is related to the cognitive and socio-emotional development of students and predicts various life outcomes.

There is a significant correlation between executive function and school success and academic achievement (Blair, 2002; Jacob & Parkinson, 2015). All aspects of students' academic achievement are related to work values, one of the indicators of executive function (Vandenbroucke et al., 2017).

Executive functions develop most rapidly throughout the preschool years, alongside the neural networks associated with the prefrontal cortex. This network persists in its development throughout adulthood (Huizinga et al., 2006; Zelazo & Carlson, 2012). Young children build executive functions that enhance their ability to focus, regulate emotions, deliberate prior to action, and suppress urges (Diamond, 2013). Children with typical development excel in attention concentration, action sequence planning, response inhibition, and cognitive flexibility between the ages of two and six (Berk & Meyers, 2013). Preschool children exhibit significant improvement in their executive functioning and are receptive to developmental intervention (Walk et al., 2018).

Early childhood is a vital and accelerated stage of a child's cognitive, physical, social, and emotional development. A child's brain is experiencing substantial transformations at this period. The development of executive functions is significantly influenced by interactions with the environment, including parental approaches, play, and educational activities (Raver et al., 2013). Deficiencies in executive function throughout early development may result in difficulties across cognitive, social, and behavioral domains (Anderson, 2002). This illustrates the significance of fostering responsibility in young children. Recent research indicates that the transition to first grade is crucial for the development of executive function. This may avert future academic issues (Vandenbroucke et al., 2017). Early executive function training may mitigate inequities in subsequent student success (Schoemaker et al., 2013).

Limited study has been undertaken about early childhood education teachers' experiences with executive functions, including their knowledge and competencies in teaching these functions. Considering the characteristics of the classroom environment that might impact developmental trajectories is crucial, since there exists a significant correlation between executive function capabilities and school preparation and achievement. This is particularly significant throughout preschool and early educational years (Keenan et al., 2020).

Teachers profoundly influence the development of students' executive functions (Diamond, 2016). Children with executive function difficulties often face reprimands and get unsatisfactory marks, which may adversely impact their self-esteem, subsequently resulting in diminished academic expectations. Furthermore, kids exhibiting strong executive function abilities will obtain affirmative feedback from teachers, so enhancing their classroom performance. The social interactions of kids with teachers and classmates may be affected by social or environmental variables, including teacher conduct (Sosis-Vasic et al., 2015). The capacity of students' working memory is correlated with their social interactions with educators

and classmates (De Wilde et al., 2016). The educational environment significantly impacts children's conduct. Moreover, the influence of teachers' pressure might affect the maturation of children's executive functions (Neuenschwander et al., 2017).

Numerous research indicate that educators enhance children's development of executive function. Consequently, it is essential to investigate teachers' understanding of the executive function in children, particularly throughout early life. Thus, the majority of international research has depended on a quantitative methodology, using surveys that may include closed-ended questions. Few research have investigated teachers' comprehension of the executive function in general or their contributions to student performance inside the classroom. Numerous research have been undertaken in Indonesia on executive functions, while this concept remains relatively novel. This prevents teachers from comprehending the significance of executive functioning. Nonetheless, executive function is a crucial indicator of school readiness (Blair & Razza, 2007) and has the capacity to forecast students' academic success (Clark et al., 2010).

METHODS

This research employs the qualitative approach, which encompasses narrative analysis. This approach enables researchers to investigate the more intricate meanings behind the phenomena under investigation by enabling them to gain a more comprehensive understanding of the experiences and perspectives of each individual. Researchers are able to adapt their approach to the evolving conditions and dynamics of the study due to the contextual and adaptable nature of this method. Narrative analysis lacks a definitive protocol; however, certain narrative researchers have established procedures that may be implemented (Butina, 2015). The inquiry in this investigation pertains to the manner in which educators engage with the executive functions of young children in the classroom. This encompasses teachers' proficiency in instructing young children to function as executives in the classroom, as well as their comprehension of executive function terminology.

Participant

A total of five early childhood education teachers from the Jakarta and Bekasi regions are participating in this research. The majority of these teachers are from Jakarta, while just a minor number of them are from Bekasi. In addition to being female, all of the participants have a minimum of one year of experience working as early childhood education teachers. Although there are some teachers who have more than five years of experience, the majority of them have just under five years. In addition, observations in this study were made of 18 children who were from two different classrooms. These children's age is between four and six.

Table 1.

Characteristics of Teacher Participants

Participant Demographics	Total (n)	Percentage (%)	Code
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Gender			
Female	5	100	G1, G2, G3, G4,G5
Age			
Under 30 years old	1	20	G4
30-40 years old	3	60	G1, G3, G5
Over 40 years old	1	20	G2
Educational Background			
High School Graduate	2	40	G2, G4
Bachelor's Degree	2	40	G1, G5
Master's Degree Graduate	1	20	G3
Teaching Experience			
1-5 years	3	60	G1, G3, G4
6-10 years	1	20	G5
More that 10 years	1	20	G2

Data Collection

In the course of this investigation, data were gathered via the uses of interviews and observations. Individual interviews and group interviews are the two methods that may be used to conduct interviews. The questions that are asked during the interview are of a semi-structured nature and are broken up into three sections: the demographics of the teachers, their understanding of concepts connected to executive function, and their ability to train children's executive function abilities in instructional settings.

During the interview, questions are asked on three fundamental markers of executive function: working memory, inhibitory control, and cognitive flexibility. These are key indicators of executive function. The researchers came up with a list of questions that were relevant to the abilities of teachers. Specifically, they inquired about the manner in which teachers instruct children's capabilities in the classroom in relation to three indicators of executive function. During the course of classroom instruction, the researcher observed the conduct of both the students and the teachers. When carrying out the research, the researcher referred to a number of items from the BRIEF (Behavior Rating Inventory of Executive Function) evaluation as a source of information. The behaviors that have been seen include both the actions taken by teachers in response to the behaviors that have been noticed, as well as the behaviors of children that suggest obstacles to executive function. Between the months of November and December of 2024, this data was gathered.

Table 2.
Interview Questions

Executive Function Indicator	Scope of Questions Regarding Teacher Skills
Working Memory	The teacher responds to inquiries about how to help the students retain and process information during class instruction, including how to explain the class routine, how to help the students remember the teacher's directions, and how well the students comprehend the lesson content.
Inhibitory Control	The teacher responded to inquiries about how he teaches kids to restrain their impulses and maintain focus on pertinent stimuli. Some of the techniques he uses include teaching kids to pay attention to the teacher, teaching them

	to raise their hands when they have questions, teaching them to wait their turn, reminding them to finish assignments, and teaching them to behave appropriately in class.
Cognitive Flexibility	The teacher responded to inquiries regarding his approach to fostering children's adaptability in the face of change. This includes instructing children on how to transition from one activity to another, adjust to novel experiences, regulate their emotions in the face of unpleasant circumstances, adjust when circumstances do not unfold as anticipated, and recognize the positive aspects of an unpleasant event.

RESULT AND DISCUSSION

Teacher's Knowledge

Teachers possess a broad experience in executive functions, which includes the capacity to instruct children. The interview results regarding the knowledge of teachers indicate that the term executive function has never been encountered by the majority of them. However, some of them have encountered terms that are indicators of executive function, such as cognitive flexibility, inhibitory control, and working memory. The majority of teachers are either unaware of or have never encountered those terms.

Table 3.
Teacher's Response to the Term "Executive Function"

Term	Heard of it	Never heard of it
Executive Function	0	100 % (n=5)
Working Memory	20 % (n=1)	80 % (n=4)
Inhibitory Control	0	100 % (n=5)
Cognitive Flexibility	40 % (n=2)	60 % (n=3)

The outcome is that teachers lack a robust comprehension of this concept. None of the teacher were familiar with the terminology of executive function or the name "executive." Teachers are increasingly acquainted with words associated with indicators of executive function, including working memory and cognitive flexibility. Nevertheless, the teacher's understanding of these two phrases is inadequate, as shown by the brevity and inaccuracy of the responses provided. The teachers exhibited inconsistency and uncertainty while elucidating the signs of executive function.

Table 4.
Teacher's Knowledge of Executive Function Indicators

Term	Response
Working Menory	"I personally have, from my child's experience." For example, the child observes and records more, and whether the child can explain it back. (G3)
Cognitive Flexibility	"I've heard that it means children adjust their way of thinking to the existing conditions." If I'm wrong, please correct me, ma'am. (G1) "I Have heard, yes." Maybe the smarter child, the one who catches on faster. (G2)

The concept of "executive function," which is widely used in the fields of neuroscience and neuropsychology, has only lately been brought into the realm of education in Indonesia. As a result, teachers in Indonesia have a limited

understanding of this concept. To make matters worse, the curriculum for teacher education does not include any instruction or exposure to executive functions for prospective teachers. A significant number of teachers in Indonesia place a greater emphasis on the implementation of curricula, practical teaching skills, and classroom management. However, executive functions that are associated with cognitive abilities, such as planning, impulse control, and children's problem-solving, get inadequate attention. Furthermore, early childhood education curriculum in Western nations are more likely to include literature that discusses executive functions than in other countries. On the other hand, this body of literature has not yet been extensively translated into Indonesian or included into the educational material of Indonesian schools. The results of research carried out in Ireland (Keenan et al., 2020) where just 35.8 percent of the teachers who participated in the study were acquainted with the phrase "executive function," are similar to these findings. The only individuals who are familiar with the concepts of working memory and cognitive flexibility are teachers who have either a master's degree or more than 10 years of expertise in the field of education. Gilmore and Cragg performed study in England and found that educators with more teaching experience reported having stronger awareness of executive functions (Gilmore & Cragg, 2014). This finding in this study is consistent with the findings of the research that was done in England.

Teacher’s Skill

The findings of interviews and classroom observations indicate that teachers have the ability to teach students within the corridor of executive functions, which consists of three indicators of executive functions: working memory, inhibitory control, and cognitive flexibility. Teachers have the ability to teach students within the corridor of executive functions, even though they are not yet familiar with this terminology and do not have a deep understanding of this concept.

Table 5.
Teacher's Response Regarding Working Memory Training Skills

Working Memory	Response
Explaining the subject with repetition	"There will definitely be repetition, and the teacher has her own targets, for example, what the child needs to achieve." Each child is different, so the repetition is also adjusted to the children. (G1) "In training children to remember, we repeat and then we evaluate." (G2) "For example, songs, we practice every day, we repeat them so the child remembers." (G3) "There are some children who need to be given repeated practice several times and with examples of how to do it." (G5)

In order to help the child practice inhibition control—the capacity to control impulses and maintain focus on pertinent stimuli—the teacher uses verbal reminders to help them stay focused on tasks, to wait for their turn or line up, raise their hands or ask for permission, and controls impulsive behavior.

Table 6.
Teacher's Response Regarding Skills in Training Inhibition Control

Inhibitory Control	Response
Teaching children to raise their hands/ask for permission and wait their turn	<p>"Certainly, the teacher herself has already implemented the rule that if students want to go to the bathroom, or want to drink, or want to ask a question, they can raise their hand." (G 1)</p> <p>"There are some children who already understand to wait for their turn, but there are children who are not patient." We remind them, it's not allowed, you have to wait first. We usually set the rules. (G2)</p> <p>"If any child doesn't want to line up, we tell them, go to the back, line up first." (G3)</p> <p>"Children, when asked to do something, some of them want to do what they like first, they ask, 'Can I play first, Miss?'" (G5)</p>

While in the classroom, the teacher also shows their effort to enhance children's executive function skill that are connected to cognitive flexibility indicator. The teachers encourage the students how to adjust to new experiences, how to deal with challenging circumstances, how to deal with unexpected circumstances, and how to look on the bright side of unpleasant event.

Table 7.
Teacher's Response Regarding Skills for Training Cognitive Flexibility

Cognitive Flexibility	Response
Training children to transition and adapt to new things	<p>"Usually, we explain to the children who have difficulty transitioning to the next task, we communicate that now it's our turn to move to the next center." (G1)</p> <p>"Usually, we remind them what the next activity is after this." For example, after writing, those who are done can wash their hands to get ready for a meal. (G2)</p> <p>"For the children who can already do it, we just monitor them." There are also those who can't do it yet, we help them. For example, if their friends are done and want to eat, the teacher reminds them, "It's okay, don't be worried, I'll wait, finish it first." (G3)</p> <p>"For example, after the children finish art and craft, usually some of them ask, 'Aunty, can I play?' They play, I give them a little time to play, around 10-15 minutes, and then I say, 'Okay, time to tidy up, we're going to learn about numbers.'" (G5)</p>

Children's Behavior in Class (Observation)

Behaviors in children that impair executive functions encompass difficulty remaining seated, excessive movement within the classroom, hesitance to engage with teachers, challenges in initiating tasks, struggles with task completion due to distractibility, rushing through a task, aggression, impulsivity, use of inappropriate language, and frustration when their wishes are unfulfilled.

In cases where teachers face children's behavioral issues, how teachers respond depends on each child's characteristics. There are some children who only need to be reminded verbally, others who require a direct example, and some who need physical assistance. If there are children who take longer to complete tasks,

the teacher appears more flexible. In the classroom, all children are given the same assignment, but the teacher sets goals for each child based on their abilities.

Working memory is in charge of concurrently processing and storing incoming data (Gray et al., 2017). Children's limited attention span, forgetfulness, and trouble remembering are among the elements used to evaluate executive function in the BRIEF assessment, which are the characteristics of working memory problems (Ezpeleta et al., 2015). This suggests that teachers must impart a great deal of knowledge. Blair (2016) states that repeated practice on executive function tasks, both directly and via academic learning, is anticipated to improve the fundamental brain connections associated with information coordination. Additionally, teachers appear to incorporate actual media into their lessons. In the classroom, real media may also aid in the development of children's executive function abilities (Stockreef, 2024).

Self-control is when someone is able to manage their behavior and emotions by resisting temptation and not acting impulsively, which is called inhibition control (Diamond, 2013). Children's behavior in the classroom that shows problems with this indicator must always be monitored by the teacher because they can become aggressive (hitting friends without any reason) and impulsive (scribbling in friends' books while their friends are doing assignments). Children who exhibit aggressive and impulsive behavior not only disrupt classroom learning but are also less effective in completing tasks. Additionally, teachers must take time for interventions with students, such as temporarily separating the student from the friend who hit them, calming them down, advising them, teaching them to apologize, and encouraging them to return to their tasks. Academic ability in early childhood and academic achievement in later years are related to the cessation of control over the child (Simpson & Carroll, 2019).

The ability to switch between tasks allows a person to control actions and adapt to changing environments, known as cognitive flexibility (Buttelmann & Karbach, 2017). Cognitive flexibility includes the ability to understand others' perspectives, the ability to adapt to changes, and the ability to switch between tasks. Observations show that children with issues related to this indicator find it difficult to switch to new activities and struggle to accept anything that does not align with their desires. The teacher appears to verbally persuade and help the child control their emotions when dealing with the behavior of children who have difficulty with cognitive flexibility. Children should be provided with knowledge and techniques that they can use to regulate and reflect on their emotions as well as take the perspective of others when experiencing emotions (Blair, 2016).

Some children have more severe executive function issues compared to their peers. They need to be examined by a doctor or clinical psychologist to determine if they have a developmental disorder, also known as a neurodevelopmental disorder. This is due to the fact that children with developmental disorders also experience difficulties in the development of their executive functions. By

conducting early screenings, it is hoped that children will receive assistance sooner to support their development and maximize their learning abilities in the classroom.

CONCLUSION

This research examining teachers' experiences, including knowledge and abilities related to the executive functions of early childhood children, indicates that these experiences are crucial for fostering the development of children's executive functions. Teachers possess little knowledge on executive function. The constraints faced by teachers stemming from insufficient knowledge or training regarding the enhancement of children's executive function skills (Morgan-Borkowsky, 2012). Consequently, even if the students are exposed to just a limited number of words, the teachers have uncertainty over their responses and struggle to explain the ideas effectively. Teachers can still develop skills to train the executive functions of young children in the classroom, even though their knowledge of these functions is limited. It turns out that the corridor of executive function includes what teachers teach in the classroom and how teachers handle children's behavior. Although teachers' theoretical knowledge is limited, their ability to create a supportive environment and provide positive responses is also an important factor in helping the development of children's executive functions. However, teachers' skills in teaching children to become executives are not yet optimal due to a lack of experience.

In general, the findings of this study indicate that teachers need to be provided with additional training, seminars, and professional development opportunities in order to facilitate the development of executive functions in young children. It is intended that this enhancement will assist young children in being better equipped to study and in developing their capabilities to deal with social and cognitive issues in the future via the use of this improvement. There are a lot of limitations to this study, including the fact that the number of participants is limited and that it only covers certain regions. In the future, it is anticipated that they will be able to employ a bigger sample size.

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