Croatian Journal of Education
Vol.27; No.2/2025, pages: 573-618
Original research paper
Paper submitted: 6th January 2025
Paper accepted: 9th June 2025
https://doi.org/10.15516/cje.v27i2.6296

The Influence of Montessori Educaton and Traditional Education on Preschool Children's Executive Functions, Self-Regulated Learning and Mastery Motivation: A Comparative Study

Elif Sezgin
Mudanya University, Faculty of Health Sciences

Abstract

This study sought to compare the executive functions, self-regulated learning behaviours and mastery motivation levels of 66- to 72-month-old children receiving Montessori education and those educated according to the non-Montessori programmes. The research sample included a total of 100 children – 50 from Montessori institutions and 50 from institutions in the MNE's preschool education programme (Ministry of National Education), out of which 51 girls and 49 boys, and 10 teachers. The normality of the data's distribution was checked via Shapiro-Wilks test. As the data did not demonstrate a normal distribution, non-parametric tests were employed, and descriptive statistics were presented as median (min-max) values. Two-group comparisons were conducted using the Mann-Whitney U test. The findings showed that children in Montessori programs exhibited higher mastery motivation, better self-regulated learning skills and more advanced executive functions than children in the MNE program.

Key words: *executive functions; Montessori education; motivation; preschool; self-regulated learning,*

Introduction

Recent studies emphasize the importance of Executive Functions (EF) for learning, behaviour and social adjustment, and their impact across life (Diamond, 2013;

Schoemaker et al., 2013). The literature emphasizes their efficiency in increasing children's academic and social achievement, especially in the preschool period, which is crucial for the development of executive functions. Therefore, the preschool program should include early interventions to support executive functions. Executive functions (EF) are a complex set of cognitive processes that facilitate the completion of complex tasks and regulation of behaviour and emotions (Garon et al., 2008). EF encompass three separate but interrelated cognitive components: inhibitory control, working memory and cognitive flexibility (Diamond, 2013; Miyake et al., 2000).

Executive functions appear in infancy and develop intensively throughout childhood and even in young adulthood as a function of maturation of the prefrontal region (Carriedo et al., 2016). Executive functions develop intensively and in parallel with children's cognitive and emotional maturation during childhood, as children acquire the ability to manage their thoughts, emotions and actions. A significant improvement in these skills occurs between the ages of three and five (CDC, 2011). There is a clear and strong relationship between executive functions and self-regulated learning. In the preschool period, executive functions predict self-regulated learning, which in turn effects academic competence. In the preschool period, executive functions indirectly affect academic competence through self-regulated learning (Grüneisen et al., 2023). Executive functions and self-regulated learning affect preschool-age children's academic competence and academic achievement (Howard et al., 2022; Grüneisen et al., 2023). The evidence is clear: education can boost executive functions and self-regulated learning skills in preschool children (Walk et al., 2018; Perels et al., 2009).

The Montessori method is an educational approach that views children as active, independent learners who can build their individuality with proper guidance and a well-prepared environment. Educators act as intermediaries between children and educational materials, which are multi-sensory, engaging and promote self-correction and patience. Classrooms are designed to foster independence by allowing children to choose their activities, their duration and location. The day includes long, continuous work periods, and there are no rewards or punishments, which helps to avoid competition and develop intrinsic motivation (Montessori, 2011; Montessori, 2016; Lillard & Heise, 2016)

Montessori education and executive functions

Executive functions encompass working memory, impulse control, metacognitive thinking, emotional responses and behaviour (Howell et al., 2013; Lan et al., 2011), and they develop from early childhood to adolescence (Roebers et al., 2012). Montessori pedagogy has been shown to support these functions. Montessori materials, such as the Pink Tower, support planning, cognitive flexibility and self-regulation skills in children (Lillard, 2012; Lillard & McHugh, 2019). Findings show that Montessori education improves executive functions, especially in the three to six age group (Lillard et al., 2017; Lillard & Else-Quest, 2006; Phillips-Silver & Daza, 2018). Recent

evidence suggests that Montessori education may contribute to the development of early literacy, mathematical abilities and working memory (Demangeon et al., 2024; Guerrero et al., 2023). However, some investigations have failed to demonstrate clear advantages, with the discrepancies often linked to the precision of assessment tools or external contextual variables (Denervaud et al., 2019; Lillard & Else-Quest, 2006). In summary, existing literature suggests that children in Montessori schools, which prioritize autonomy and self-regulation, generally outperform their counterparts in traditional schools on executive function (EF) tasks. However, some studies have found no significant differences. Nonetheless, the current evidence is inconclusive due to various factors, including differences in the tasks used to assess EF and potential baseline variations between comparison groups (Guerrero et al., 2023). Therefore, further research is needed to address these considerations. This study also compared the EF skills of 100 five- to six-year-olds attending either a Montessori or a traditional kindergarten, with similar socio-economic backgrounds and equal education durations. Children's executive functions were assessed using a battery of tasks designed to measure various EF processes. Specifically, working memory and inhibitory control were assessed separately, as well as simultaneously. Additionally, children's abilities to engage their attention, working memory, inhibitory control and social interaction behaviours concurrently were also evaluated.

Montessori education and self-regulated learning

Self-regulated learning is a process whereby children take responsibility for planning, monitoring and adjusting their own learning. It relies on abilities such as self-motivation, emotional control and evaluating outcomes (Bandura, 1991; Blair, 2003; Zimmerman, 2002; Zimmerman & Schunk, 2011). Self-regulated learning shifts the emphasis from the teacher to the student, supports children and encourages them to take initiative and actively participate in educational activities (Minkyoung, 2018). The Montessori approach provides a foundation for the development of all skills that enable children to develop effective learning strategies, evaluate and enhance their own progress and improve learning outcomes (Veenman et al., 2014; Azevedo & Aleven, 2013). Although Montessori did not explicitly refer to "self-regulation," her notion of self-discipline—which includes focus, persistence, organization and respect—closely reflects this idea (Montessori, 1995). Montessori classrooms help develop these skills by providing thoughtfully designed materials, supporting independent learning and guiding children according to their individual developmental needs (Çakıroğlu Wilbrant, 2008, 2009; Korkmaz, 2006; Tepeli, 2011; Mroczkowski, 2014). Evidence suggests that Montessori method supports self-regulated learning in older age groups (Postlewaite, 2023; Denervaud et al., 2020), although its direct impact on preschool children remains less clear. Early childhood is a critical period for the development of self-regulated learning (SEL) skills and strategies (Bronson, 2000; Jacob et al., 2019). The competence approach, which proposes integrating self-regulated learning in preschool

education, prompts inquiries into the influence of children's self-regulation on their development. Self-regulated learning is of paramount importance in today's society. It enables individuals to educate themselves and be successful. The preschool institution environment and the teacher who prepares and develops it play a significant role in the child's self-regulated learning (Sarva et al., 2021). It is imperative that preschool education institutions and applied education models make for a learning environment conducive to self-regulated learning in early childhood. This is due to the fact that early childhood encompasses a critical period in all domains of development, including the acquisition of self-regulated learning skills. Whitebread et al. (2009) contend that the emerging SRL skills of young children are frequently underestimated and that, when provided with the opportunity, even very young children can approach learning in a strategic and thoughtful manner. The emergence of SRL foundations occurs around the age of two to three, with rapid growth in SRL skills during early childhood (ages three to eight) (Diamond, 2002; Montroy et al., 2016). This skill should be fostered in early childhood, which encompasses critical years for the development of SRL skills. The investigation of educational models, methods and techniques that support this skill should be conducted in greater detail.

Montessori and mastery motivation

Mastery motivation refers to preschool children's innate drive to acquire new skills and complete tasks that are crucial for their cognitive and emotional development. Mastery motivation is fundamental in early childhood, when children actively explore their environment, and it is influenced by factors such as teacher and parental support, emotional involvement and the learning environment. Montessori education, which emphasizes child-centered and self-directed approaches, enhances intrinsic motivation by allowing children to choose activities, promoting hands-on experiences and prioritizing the learning process over the final outcome (Liu, 2023; Barrett & Morgan, 2018; Lillard et al., 2017; Tiala et al., 2020). Such autonomy encourages goal-setting, problem-solving and a sense of pride in achievements, which fosters a culture where challenges are welcomed and mistakes are viewed as learning opportunities. Research has demonstrated that this approach nurtures elevated levels of resilience and perseverance in children; these characteristics are closely associated with mastery motivation (Lillard, 2012). The Montessori method rests on two pillars: intentional observation and prepared environment. Through careful observation, teachers tailor support to each child's developmental needs. The classroom is designed to foster self-directed exploration and engagement. This integrated approach nurtures competence, autonomy and relatedness, leading to greater intrinsic motivation and mastery orientation than typically seen in conventional classrooms (Greene, 2005; McClellan & Kinsey, 1997; Ryniker & Shoho, 2001). Research shows that Montessori children, particularly those aged four to five, exhibit higher mastery orientation and classroom engagement compared to their peers in traditional classrooms; this is

associated with the emphasis on self-directed learning and absence of extrinsic rewards (Lillard et al., 2017). However, studies examining the effects of educational models on mastery motivation in preschool children are still limited. This construct requires more comprehensive investigation of how Montessori education supports intrinsic motivation and perseverance.

Preschool institutions and Montessori education in Turkey

In Turkey, preschool institutions are the foundation of formal education, focusing on early academic development. The preschool education programme aims to promote healthy growth; provide rich learning experiences; support optimal development in motor, social-emotional, language and cognitive areas; teach self-care skills and prepare children for primary school (Bayrak, 2024). The Montessori programme's main goals are to cultivate a positive attitude toward learning, self-discipline, motivation, independence, self-confidence, concentration, curiosity and an appreciation for order (Korkmaz, 2005). In a Montessori classroom, children are free to move around, select activities and use materials in ways that suit their preferences (Daoust, 2004). The MNE 2013 programme book reveals that in Turkish preschools, choosing free activities, as in Montessori classrooms, is only permitted during designated free time. Other activities are flexible but conducted with all students at once, following a daily education flow plan (Tuncer, 2015). In Turkish preschools, much of the classroom space is devoted to activity corners, and current practices largely favour group learning, with limited opportunities for individualisation. Unlike conventional preschools, Montessori institutions operate with more flexibility and less regulation. Turkish preschools adhere to a set daily schedule where all children participate in the same activities according to the teacher's sequence.

Montessori classrooms are tailored to accommodate individual differences among children and reflect teachers' methods and skills, in contrast to the standardized, teacher-directed and group-oriented structure typical of Turkish preschools under the MNE programme (Dere & Temel, 1999; Tuncer, 2015). The Montessori approach, developed by Maria Montessori, emphasizes child-centered learning, supports the development of independent living skills and employs integrated classroom designs that enhance sensory, motor, language and social development, while fostering autonomy, self-discipline and problem-solving abilities (Dereli, 2017; Dedeoğlu, 2018; Yıldızbaş et al., 2016; Toran, 2011; Özbey & Kutluca, 2023; Follari, 2007). Montessori education has been in existence for over a century, yet studies examining its impact on child development are scarce when compared to the preschool education programme of the Ministry of National Education implemented in Turkey. The existing studies have predominantly focused on cognitive and social development. Domestic studies have examined cognitive skills (Buldur, 2019; Üstündağ, 2019; Dedeoğlu, 2018; Canbulat-Zengin, 2019; Tayfun & Aydoğan, 2021; Toran & Temel, 2014; Kaza, 2021; Kayılı, 2018),

and social and emotional skills (Yücesan & Özyürek, 2017; Yavaş, 2020; Keçecioğlu, 2015; Koçyiğit & Kayılı, 2008; Uçar & Durualp, 2023; Dereli, 2017; Dedeoğlu, 2018; Kuşçu et al., 2014; Tepeli & Yilmaz, 2012; Bülgür, 2018; Bezirci, 2017). There are no domestic studies on executive functions, and only four have examined self-regulation in Montessori children (Dinçer Yavuz, 2019; Tiryaki et al., 2021; Soydan et al., 2018; Yavuz, 2019; Saki, 2020).

International studies have examined executive functions in children receiving Montessori education (e.g., Denervaud et al., 2019; Phillips-Silver & Daza, 2018; Bagby et al., 2012; Lillard, 2012; Lillard & Heise, 2016; Darcy, 2014). These studies explored cognitive flexibility, working memory, selective attention (Denervaud et al., 2019) and cognitive control (Phillips-Silver & Daza, 2018). Other research looked at executive functions in preschool children, as well as their mathematics skills, social skills and reading abilities (Courtier et al., 2021; Guerrero et al., 2023). Despite an examination of the executive functions of children receiving Montessori education, no definitive conclusions have been reached regarding the positive effect of Montessori education on executive functions. The extant findings are, in general, inconsistent (Guerrero et al., 2023). It is therefore necessary to undertake a more thorough and rigorous examination of the relationship between the Montessori approach and preschool children's executive functions.

A review of the literature in cognitive neuroscience reveals that educational practices can influence the development of executive functions (EF) in young children. Moreover, there is a paucity of evidence regarding the impact of such practices on preschool children (Phillips-Silver & Daza, 2018). However, there is currently no research examining the relationship between self-regulation behaviours and educational models, so the issue remains unresolved. While Montessori is believed to promote self-regulation (Denervaud et al., 2020; Montessori, 1995), there are no direct studies on preschool children. Maria Montessori's assertion that every child is inherently creative and possesses the capacity for independent learning (Almajed, 2020) asserts a pedagogical approach that emphasises self-regulated learning (Bahateg, 2010). The Montessori method entails individualised instruction, with Montessori materials designed to foster and sustain children's independent learning. However, a notable gap exists in the literature with respect to research on self-regulated learning behaviours in children receiving Montessori education during the preschool period in Turkey and abroad. However, studies on older students suggest that Montessori education increases motivation (Rathunde & Csikszentmihalyi, 2005). It was found that characteristics such as self-regulation and motivation are extremely important, and the Montessori method can effectively develop them. However, there are no studies that directly investigate and document them in the early period, nor have any of the studies reported in the literature compared the executive functions, self-regulated learning behaviours and motivation levels of children who receive and do not receive Montessori education. Consequently, the findings of this study will address this gap and contribute to the

field by elucidating the impact of Montessori education on children's development. The aim is therefore to compare the self-regulated learning behaviours, executive functions and motivation levels of 66- to 72-month-old children who attend private preschools implementing Montessori programmes and those who attend private preschools implementing the MNE programme. In this regard, the present study will evaluate and compare the self-regulated learning behaviours, motivation levels and executive functions (including self-regulation skills, short-term memory and inhibitory control) of children who receive and do not receive Montessori education. In line with this aim, this study sought to answer the following research questions:

1 – Do the executive functions of children who receive Montessori education significantly differ from these skills in children who do not receive Montessori education?

2 – Do the motivation levels of children who receive Montessori education significantly differ from this motivation in children who do not receive Montessori education?

3 – Do the self-regulated learning behaviours of children who receive Montessori education significantly differ from these behaviours in children who do not receive Montessori education?

Procedure and ethical considerations

The University's Institutional Ethics Committee approved the study (E-92662996-044-129344). Between March and June 2022, measurement tools were applied in a private preschool education institution implementing the national education programme and a private school implementing Montessori preschool programme in the Nilüfer District of Bursa. The purpose and content of the study were explained in detail to teachers and families. Permission for voluntary participation in the study was obtained from the teachers, and the parents also gave their consent. They have been assured that the collected data will be kept anonymous and used for scientific purposes, without collecting personal information. Preschool teachers were asked to fill out personal information forms containing children's demographic information, the self-regulated learning behaviours scale and the motivation scale for each child participating in the study.

The researcher obtained permission from both principals for the study's implementation, after which he applied the measurement tool for executive functions. For this purpose, the researcher went to the kindergartens two days a week after morning free time and used the scales individually for each child in the designated room.

Methodology

Research model

In this study, a causal-comparative design, one of the quantitative research designs, was selected as the most appropriate methodology. Causal comparison studies are research projects designed to ascertain the underlying causes of an existing or naturally occurring situation or event, as well as the variables that influence these causes or

the effected results (Büyüköztürk et al., 2008). The relational screening model was employed to compare the executive functions, motivation levels and self-regulated learning behaviours of children who receive Montessori education and the children educated according to the MNE's preschool programme (Karasar, 2016).

Participants

The participants in this study were chosen via purposive sampling, which enables in-depth examination which allows for of specific research variables and phenomena identified as relevant to the study. In this type of sampling, a researcher exercises discretion in determining which individuals or entities will be selected, with the objective of ensuring the most appropriate sample for the examination of the relevant issues (Balcı, 2015; Johnson & Christensen, 2014). Criterion sampling method, which was used in this study, is defined as a selection of situations that meet a set of predetermined criteria created by researchers, or a previously prepared list may be used. The readily accessible case sampling method is swift and practical, wherein a researcher selects a proximate and readily accessible situation (Yıldırım & Şimşek, 2013).

The following criteria were employed in the children's selection for the reserach sample: a) no known developmental or neurological deficits in a child (based on information obtained from parents and preschool teachers), b) at least three years of attending preschool, c) preschool teachers and parents agreed to participate in the study, and d) similar socio-demographic structure of all families, i.e. their middle and/or high socio-economic status. Adhering to the listed criteria, a total of 50 children attending a private school that provides Montessori education and 50 children attending a private kindergarten that implements the MEB program participated in the study, as well as ten teachers. The comparison group was a private preschool education institution implementing the MNE's preschool education program, which was deemed to possess sociodemographic characteristics analogous to those of the institution implementing Montessori education. Furthermore, the duration of preschool education was considered in both groups, with three years of preschool attendance taken as a criterion. The rationale for selecting two groups with equivalent sociodemographic characteristics is the assumption that any observed differences in children's self-regulated learning behaviours, motivation and executive functions do not stem from sociodemographic characteristics but only from the school type variable. Therefore, the selected Montessori school and the private preschool implementing the MNE preschool education are located at the centre of a highly socioeconomically developed neighbourhood of the Nilüfer district. Two proxy indicators were used to assess socioeconomic status: the parents' level of education (four-year bachelor's degree) and the poverty index, which reflects the economic status of the family's neighbourhood. The poverty rate in the district is quite low. Most people in the region have high living standard, and households experiencing financial difficulties are rare. Considering that the children selected from both schools have similar socioeconomic structures, it was made sure that the parents have similar economic and educational levels.

Table 1
Children's demographic characteristics

	girls	boys	Total	*P*
Number of children, N (%)	51 (51.0)	49 (49.0)	100	
– Montessori group	24 (48.0)	26 (52.0)	50 (50.0)	0.428
– MNE group	27 (54.0)	23 (46.0)	50 (50.0)	
Children's age (years), median (IQR), min.-max.	5 (1), 5-6	6 (1), 5-6	5 (1), 5-6	0.689
– Montessori group	5 (1), 5-6	6 (1), 5-6	5.5 (1), 5-6	0.575
MNE group	5 (1), 5-6	6 (1), 5-6	5 (1), 5-6	0.589

IQR: Interquartile range

The data in Table 1 show that 100 children participated in the study: 50 children who receive Montessori education and 50 who receive traditional preschool education. Sample's distribution according to gender was: 51% girls and 49% boys in the Montessori group; 54% girls and 23% boys in the MNE group. The average age of the children who received Montessori education was 5.5 years, and the average age of those who received traditional (MNE) preschool education was 5 years. Montessori group and traditional education group were homogeneous in terms of both gender and age ($P > 0.428$).

Data collection tools

Child Information Form: Data on the children's age and gender were obtained via this form, which was filled in by preschool teachers.

***Children Independent Learning Development Checklist 3-5 (Turkish version)*:** Turkish adaptation of the Children Independent Learning Development Checklist (3-5) was applied to determine the self-regulated learning behaviours of the children participating in the study. The original scale was developed by Whitebread et al. (2009) and adapted to the Turkish context by Saraç et al. (2019). The scale consists of a single-factor with 16 items, which are evaluated on a four-point Likert scale. The test-retest reliability of the measuring tool was .961, and the internal consistency coefficient was found to be .968. As the score obtained from the scale increases, independent learning ability also increases. The scale was filled in by preschool teachers for each child.

The Dimensions of Mastery Questionnaire (DMQ-18) for Preschool Children: The Dimensions of Mastery Questionnaire (DMQ-18) for Preschool Children, developed by Jozsa and Morgan (2015), consists of 7 sub-dimensions and 39 items. These sub-dimensions are cognitive persistence, gross motor persistence, social persistence with adults, social persistence with children, mastery pleasure, negative reactions and general competence. It is evaluated on a five-point Likert scale. Higher scores indicate increased levels of motivation. The scale was adapted for use in the domestic context by Özbey and Dağlıoğlu (2017). The test-retest reliability of the scale was calculated as .85. The Cronbach Alpha reliability coefficients for the sub-dimensions were .90

for cognitive persistence, .85 for gross motor persistence, .88 for social persistence with adults, .86 for social persistence with children, .65 for mastery pleasure, .79 for negative reactions and .94 for general competence (Özbey, 2018). The scale was filled in by preschool teachers for each child.

Executive function tasks

In this study, children's working memory and inhibitory control were evaluated separately. At the same time, working memory and inhibitory control were evaluated together. Children's ability to simultaneously activate attention, working memory, preventive control skills and behaviour in social interaction was also evaluated. Less is More task was used to determine children's inhibitory control skills. Nine Boxes task was used to determine their working memory performance, and Day-Night task to determine both working memory and inhibitory control. Heads-Toes-Knees-Shoulders (HTKS) measurement tool was used to determine attention, working memory and inhibitory control skills at the same time.

Less is More: Developed by Carlson et al. (2005) and adapted by İvrendi (2020). This task is used to determine children's inhibitory control skills. Less is More is a task based on the probability of a reverse reward, wherein children are asked to choose between a small number of candies (two candies) and a large number of candies (five candies) placed in two containers (transparent containers). The highest possible score that is 16. A moderate relationship was found between the measures applied for test-retest reliability of the Less is More task (r=.39), and the inter-practitioner agreement Kappa value was .99 (İvrendi, 2020).

Nine Boxes: Developed by Diamond et al. (1997) and adapted by İvrendi (2020). It is related to the use of working memory. The children are asked to find the small cartoon character placed inside one of the nine boxes with lids of different shapes and colours. The highest score that can be obtained is 9. A moderate relationship was found between the measures applied for test-retest reliability of the Nine Boxes task (r=.46), and the inter-practitioner fit Kappa value was 100 (İvrendi, 2020).

Day-Night Task: Developed by Gerstadt et al. (1994) and adapted by İvrendi (2020). It includes the use of working memory and inhibitory control. The task includes eight Sun paintings and eight Moon paintings, and it entails three phases: education, practice and implementation. The education phase is carried out so that the child first learns to distinguish between the day and night picture and then learns to name the day picture as Night and the night picture as Day. In the second phase, the child practices to call the day picture Night and the night picture Day. They are entitled to three rounds of practice. The actual implementation starts if the child gives two correct answers in a row during the practice phase. After the last instruction is repeated, the implementation is terminated if one of the two pictures is named incorrectly. In this study, only the number of correct answers was included in the analyses. The highest score is 16. It was determined that there was a high level of correlation between the

measurements applied for the test-retest reliability of the Day-Night task (r= .90), and the inter-practitioner compliance Kappa value was .58 (İvrendi, 2020).

Head-Toes-Knees-Shoulders (HTKS) Task: This task was developed by Cameron Ponitz et al. (2008), and it assesses behaviour correction skills in three- to seven-year-old children. It is an easy-to-use self-regulation measurement tool. The reliability study found a Cronbach's alpha value of 0.96 for the total score. The scale was adapted to Turkish by Sezgin and Demiriz (2015). The Cronbach's alpha values for the HTKS task measurement tool were 0.93 for part one, 0.95 for part two, 0.94 for part three and 0.96 overall (Sezgin & Demiriz, 2015). This measurement tool consists of three parts, with a total of 30 tasks (10 in each section). These tasks measure children's attention, working memory, inhibitory control and social interaction skills. Children respond to four different verbal commands, and their responses are observed and recorded. The tool requires minimal training and no special materials, and it is based on interaction between the practitioner and the child. In the first part, children touch their heads and toes in the opposite way to the given commands and continue this throughout the test. The second part adds knees and shoulders. In the third part, the rules change, pairing head and knees together and shoulders and toes together. Each section has 10 items scored as follows: 0 for false, 1 for self-correct and 2 for true, with a maximum of 20 points per section and 60 points overall (Sezgin & Demiriz, 2015).

Data collection

After obtaining the necessary permissions for the study, the principals and preschool teachers of selected kindergartens were interviewed, after receiving information about the study. Before the actual implementation of the executive function tasks, all scales were administered to ten children in a tranquil room at the school. This was done to better understand the application guidelines of the scales and gain proficiency in their implementation. The research commenced in March 2022, and the scales were administered to the participating children after their morning leisure activity. The implementation of the scales started with the Less Is More and Day and Night Task. Each measurement tool was applied individually in a quiet, separate room at the school, with explanations provided for each scale prior to implementation. The Nine Boxes Task and Head-Toes-Knees-Shoulders (HTSK) task were conducted one day after the implementation of Day and Night and Less is More task. Throughout the implementation of the tasks, if children became distracted or bored, they were permitted to engage with their toys in their respective classrooms. Each section of the measurement tools was scored independently for correct behaviours, with every correct response from the child being documented on the coding sheet for each individual child. The preschool teachers were requested to complete the Independent Learning Behaviours Scale and the Preschool Motivation Scale for each child participating in the study, with the objective of determining the children's self-regulated learning behaviours. It took approximately ten minutes for the teachers to respond to complete the scales for every child

Data analysis

The suitability of the data for normal distribution was evaluated via Shapiro-Wilks test. As the data did not demonstrate a normal distribution, non-parametric tests were employed, and descriptive statistics were presented as median (min-max) values. Two-group comparisons were conducted using the Mann-Whitney U test. The statistical significance level was set at α=0.05. The SPSS v25 package programme was used for data analysis.

Results

This section presents the findings on executive functions, self-regulated learning skills and motivation levels of children receiving Montessori education and children receiving traditional preschool education (MNE).

Table 2

The comparison of scores of children receiving Montessori and children receiving MNE preschool education

	Mean Ranks		p-values
	Montessori education (N=50)	MNE preschool education (N=50)	
Less is More (inhibitory control) total	66,09	34,91	<0,001*
Nine Boxes total	50,25	50,75	0,924
Day Night total	48,28	52,72	0,415
HTKS (attention-working memory- inhibitory control)	62,85	38,15	<0,001*
Independent (self-regulated learning) total	62,39	38,61	<0,001*
Motivation-cognitive persistence	61,33	39,67	<0,001*
Motivation-gross motor persistence	57,51	43,49	0,015**
Motivation-persistence with adults	56,56	44,44	0,036**
Motivation-persistence with children	60,10	40,90	0,001*
Motivation and high level of satisfaction	63,84	37,16	<0,001*
Motivation-Expression of negative emotions	60,01	40,99	0,001*
Motivation-general competence	60,90	40,10	<0,001*

*<0,01; **<0,05

The findings presented in Table 2 demonstrate that the Montessori educational approach positively influences children's development, particularly with regard to their executive functions, independent learning skills and mastery motivation. Children receiving Montessori education had significantly higher scores on the Less is More (inhibitory control) (16 (0-16)), HTSK (attention-working memory-inhibitory control) (55 (20-59)), and self-regulated learning (SRL) (57.5 (29-78)) tasks compared to children receiving MNE preschool education. However, when the sub-dimensions of the mastery motivation scale were analysed, it was found that

the scores of cognitive persistence (22.5 (14-25)), high-level satisfaction (24 (9-25)), general competence (21.5 (16-24), persistence with children (25 (14-30) and expression of negative emotions (31 (17-39)) were significantly higher than those of children receiving MNE preschool education. Furthermore, children receiving Montessori education demonstrated higher scores on the subscales of perseverance with adults (21(13-24)) and perseverance in gross motor skills (22(14-25)) when compared to children receiving MNE preschool education. On all mastery motivation subscales, the scores of children receiving Montessori education were significantly higher ($p < 0.05$ or lower) than the scores of children receiving MNE education, with differences in cognitive persistence ($p < 0.001$), high level of satisfaction ($p < 0.001$) and general competence ($p < 0.001$) being particularly significant.

Discussion

The findings of the study provide important data for evaluating the differences between Montessori and MNE preschool education programs. An examination of the scale scores of children receiving Montessori and MNE Preschool education revealed that those in the Montessori group demonstrated significantly higher levels of self-regulated learning behaviours, mastery motivation levels and executive functions (inhibitory control and attention, working memory and inhibitory control). This finding suggests that Montessori education may be more effective in developing children's executive functions. The children's inhibitory control skills were determined by the Less is More task. Inhibitory control has been demonstrated to play a pivotal role in developing other executive functions. Inhibitory control is an executive function that "enables the child to control his/her actions or resist distractions from external stimuli" (Diamond, 2013, p.137). Inhibitory control is defined as the ability to resist and control automatic behaviours that may lead to errors (e.g., resisting the urge to run down the corridor) (Deshaies & Éthier, 2024; Diamond, 2013). According to the results of the current study, it can be said that Montessori education significantly affects the development of children's executive functions, mainly inhibitory control skills. The study also observed that children received high scores on the HTSK task, which measures attention, working memory and inhibitory control skills. This finding shows that Montessori education improves children's attention, working memory and inhibitory control skills. Denervaud et al. (2019) reported a positive influence of Montessori method on children's working memory, and Phillips-Silver and Daza (2018) found that executive functions, inhibitory control and cognitive flexibility skills of three-year-old children receiving Montessori education improved. Lillard et al. (2017) and Lillard (2012) found that the executive functions of Montessori children were more advanced compared to children who did not receive Montessori education. Significant explanation of this phenomenon is that continuous exposure to the Montessori educational model enhances cognitive abilities over time (Andújar & Gaitero, 2016). Research shows that children who are educated via Montessori method

have stronger executive function skills, improved planning and organizing skills, as well as heightened attention and refined regulation of emotions, and Montessori materials improve various aspects of children's executive functions. The Pink Tower, a key Montessori material, requires careful planning. Research indicates that when children select blocks by size, it enhances working memory, cognitive flexibility and task switching (Lillard, 2012). According to the current study and other research findings, Montessori education positively influences preschool children's executive functions.

When an analysis was conducted of the Montessori children's self-regulated learning skills, it was found that they scored significantly higher on the independent learning scale than children receiving MNE preschool education. This finding indicates that Montessori education supports children's independent (self-regulated) learning skills. The underlying reason for this phenomenon is that the Montessori approach fosters autonomy in learning and encourages children to think independently, which fosters self-direction and self-confidence in their learning. Independent learning, or self-regulated learning, guides learning towards achieving the set learning outcomes. Self-regulated learning (SRL) is children's ability to control their own learning experiences, which involves conscious planning and management of their learning processes. It allows children to set goals, create strategies, monitor their own progress and make adjustments, which fosters more independent and effective learning (Wolters, 2003). Research has demonstrated that children participating in Montessori programs demonstrate enhanced executive functioning skills, which supports their self-regulation abilities (Atis-Akyol, 2023; Denervaud et al., 2020). Denervaud et al. (2019) emphasize that Montessori students are able to intensively concentrate, and they possess self-regulation characteristics critical for effective learning and academic achievement. While extant literature suggests that Montessori education promotes self-regulated learning in children (Atis-Akyol, 2023; Denervaud et al., 2020; Denervaud et al., 2019), the effect of Montessori education on self-regulated learning in preschool children has not been directly investigated, but the Research in this area has been predominantly focused on older age groups. Denervaud et al. (2020) found that Montessori students (aged 8 to 12) showed improved error monitoring and self-directed executive functions, which indicates that the Montessori environment supports these skills. The concept of self-directed learning, which is closely related to the notion of self-regulated learning, has been the focus of research in both older age groups and among adolescents. Self-regulated learning (SRL) constitutes a stage within the self-directed learning (SDL) process whereby the learner assumes responsibility for managing the entire learning process from inception to conclusion. This encompasses setting learning objectives and the selection of relevant resources. While self-directed learning manages the entire process comprehensively, self-regulated learning focuses on specific steps and strategies (Zimmerman, 2002; Schunk & Ertmer, 2000). Learners with high self-regulation proactively identify their learning needs and set learning goals, decide on appropriate strategies, organize and prioritize materials and information according

to their time, monitor their learning by seeking feedback on their performance and make necessary adjustments for future learning tasks (Winne, 1995; Zimmermann, 2002). Parallel practice can be observed in the Montessori approach. The teacher's role is limited to providing instructions on using the materials. The teacher guides the child to create their own experience by using the material and learning independently. Montessori materials are meticulously prepared to facilitate identifying and rectifying errors for children (Oğuz & Köksal Akyol, 2006). In light of these observations, it can be concluded that the Montessori approach fosters self-regulated learning by allowing children to make independent decisions regarding their learning. Denervaud et al. (2020) found in their study that while students in traditional classrooms learn from teacher feedback, Montessori classrooms encourage students to work independently with materials specifically designed to support self-discovery of errors (Calderon, 2024). Kendall (1992) found that Montessori students exhibited significantly higher levels of independence, initiative and self-regulation skills. As can be seen, the effect of Montessori education on self-regulated learning has been investigated in older children. On the other hand, research investigating self-regulated learning and the structures that make up self-regulated learning in preschool children is insufficient. Therefore, more research on this subject is recommended, with particular focus on the impact of Montessori education on self-regulated learning in the preschool period.

The analysis of mastery motivation sub-dimensions shows significantly higher scores by Montessori children than by children in the traditional kindergarten on the following sub-dimensions: cognitive persistence, high-level satisfaction, general competence and perseverance with children and adults, as well as expression of negative emotions. Furthermore, children receiving Montessori education achieved higher scores on mastery motivation sub-dimension of persistence with adults and in gross motor skills compared to children receiving MNE preschool education. Differences in the subscales of cognitive/object persistence ($p < 0.001$), high-level satisfaction ($p < 0.001$) and general competence ($p < 0.001$) are particularly noteworthy. The cognitive/object persistence subdimension of the mastery motivation scale measures whether a child applies a significant degree of cognitive effort to complete any task initiated. The findings suggest that Montessori education enhances children's motivation to repeat a specific skill until mastery is attained, to complete given tasks despite extended duration and to persevere in difficult tasks. Research findings suggest that children in Montessori environments demonstrate advanced executive functioning skills, which facilitate the ability to plan, focus attention and manage emotions effectively (Lillard, 2012). These robust executive functions, in turn, enable children to cope with complex tasks and persevere when confronted with difficulties (Drever et al. 2015). The high-level satisfaction subscale measures the child's ability to express satisfaction with joy and excitement when they achieve a specific task. The findings obtained from this study demonstrate that children who receive Montessori education have developed motivation to work until they succeed in a task, irrespective of its complexity or

duration. Research shows that children experience high satisfaction and joy when completing tasks successfully. This finding explains that the Montessori method can increase self-efficacy and overall satisfaction in children because it allows them to complete tasks independently and succeed. In the Montessori approach, children are encouraged to select their activities, which promotes autonomy and a sense of ownership over their learning experiences. The autonomy thus granted is conducive to the principles of mastery motivation (Koh & Frick, 2010), and children in such environments exhibit an increased propensity to engage deeply with tasks of their choosing. Studies have shown that children in Montessori programs are frequently more persistent in completing tasks as they receive support in their attempts to explore and comprehend concepts in depth. Consequently, children receiving Montessori education have been shown to possess a heightened sense of achievement and emotional satisfaction (Fleming et al., 2019). In Rathunde's (2003) study, Montessori students reported heightened levels of activity, strength, excitement, happiness, relaxation, social interaction and pride while engaged in academic work. They also reported higher levels of enjoyment, increased interest in their work and stronger desire to engage in academic activities than their traditional peers. The results of this study's show high levels of general competence, social persistence with children and negative emotional reactions in children educated according to the Montessori method. High levels of social persistence may be attributed to the emphasis on collaborative learning and group activities within the Montessori classroom environment. This educational approach fosters cooperative learning, which has been demonstrated to enhance mastery motivation (Mutmainna et al., 2024). The general competence sub-dimension assesses children's perception of their abilities in various domains, including acquiring knowledge and practice, as well as their capacity to effectively deal with challenges. High levels of general competence self-perceptions in Montessori children suggests that the approach improves self-confidence and problem-solving abilities. Persistence in social interactions sub-dimension entails children's persistence in the interaction with their peers; for instance, how they play together for long periods of time, how they understand when friends want to play, how they perceive their friends' feelings and how they behave towards them. The results of this study show that Montessori education fosters peer relations and social skills in children. A study by Özçelik and Sapsağlam (2023) compared the social competencies of children receiving Montessori, Waldorf and regular education. The study's findings demonstrated that the Montessori programme fosters social competence to a greater extent than other programs. Similarly, Keçecioğlu (2015) found that children receiving Montessori education exhibited more developed social skills than children receiving education according to the national programme. In Montessori preschool classes, older and younger children are taught together. Older children play with and guide younger children in the classroom. This approach creates opportunities for children of all ages to develop communication and social skills (Edwards et al., 2009). The unique features of the Montessori approach

such as children working together, teaching and supporting each other, unique learning materials, one child playing while the other waits, and the classroom environment consisting of mixed-age groups allow children to interact with each other. This supports children's motivation to persevere with their peers. The negative reactions sub-dimension measures the expression of negative emotions such as anger, shame and rage children feel when they fail a task. It was found that children receiving Montessori education are able to express the experienced negative emotions caused by failure. This indicates that they persevere in completing the task even if they fail. It is natural to feel and express negative and positive emotions, and it is unhealthy to suppress these emotions. It is important to express emotions openly and appropriately, regardless of whether they are positive or negative. While some studies have found a link between physical aggression and negative emotional expression (e.g., Ersan & Tok, 2020), viewing negative emotional expression as a natural part of the human experience is important. It is widely accepted that emotions such as happiness, anger, sadness, fear, confusion and disgust are fundamental to human experience. Research suggests preschool children have four basic emotions: happiness, anger, sadness and fear. These are widely regarded as the primary emotions. Studies highlighted that these emotions are predominant in preschool children, who sometimes express fear as surprise and anger as disgust (Ersan & Tok, 2020). Montessori education supports age-appropriate emotional expression, and it may also contribute to positive emotional regulation. This study's results show higher levels of mastery motivation in Montessori children than in children educated according to the traditional programme, which is in line with the findings reported in the literature. Some researchers have suggested that preschool children in Montessori settings show higher levels of mastery motivation than their peers in traditional education settings (Lillard et al., 2017; Courtier et al., 2021). Prokofieva (2019) suggested that Montessori education fosters children's self-motivation, even in subjects they may not be particularly interested in. Rathunde (2009) observed that Montessori classroom environments positively impact children's motivation. Setiawan and Ena (2019) highlighted that the Montessori approach encourages children's natural inclination toward learning and contributes to the development of intrinsic motivation. Mastery motivation entails the drive to engage and master tasks, which is crucial in early childhood education. In Montessori classrooms, children explore their interests and engage in self-regulated learning, which means they take ownership of their own education (Lillard, 2012). It has been found that this autonomy is linked to increased intrinsic motivation, which propulses children's intense cognitive engagement and persistence (Lillard et al., 2017; Courtier et al., 2021). Research suggests that children educated in Montessori environments tend to demonstrate higher levels of intrinsic motivation compared to their peers in traditional educational settings (Koh & Frick, 2010; Liu, 2023). However, it is worth noting that there is a paucity of studies in the literature directly examining the levels of mastery motivation in preschool children receiving Montessori education. For

example, Lillard et al. (2017) posited that children participating in Montessori programmes exhibited a greater inclination towards skills development at the ages of four and five in comparison to the control group. An explanation of this finding could be the absence of extrinsic rewards within the Montessori framework. The effect of Montessori education on children's motivation levels in older age groups has been the subject of a few studies. Rathunde and Csikszentmihalyi (2005) found that secondary school students receiving Montessori education appeared to have higher intrinsic motivation. Batubara et al. (2020) also found that primary school children receiving Montessori education had higher motivation and that Montessori materials were one of the factors affecting students' motivation. These findings show that the Montessori approach supports children's motivation at different educational levels because it encourages independence, self-confidence and spontaneous participation in learning activities, and it does not entail extrinsic rewards (Setiawan & Ena, 2019; Lillard et al., 2017). To sum up, materials aligned with children's interests, teachers supporting children's independence, children as active participants in the learning process, environment supportive of intrinsic motivation and the absence of extrinsic rewards are all features unique to the Montessory pedagogy, and their synergy effects the increase in children's mastery motivation.

Conclusion

The results of the current study showed that Montessori education positively affects preschool children's mastery motivation, self-regulated learning and executive functions. The current findings will facilitate more comprehensive and useful applications for Montessori education by allowing us to understand the critical effect of the Montessori approach at the basic level and see the relationship between motivation, self-regulated learning and executive functions. It has been suggested that the supportive structure of Montessori education for executive functioning processes may positively affect children's problem-solving skills and learning strategies (Denervaud et al., 2019; Andújar & Gaitero, 2016). Montessori education emphasizes child-centered learning, independence and development of self-regulation skills. This approach has the potential to support self-regulated learning by encouraging children to take the initiative and develop intrinsic motivation that is important for academic success and lifelong learning. Montessori education emphasizes autonomy and self-determination, with research showing that children in these classrooms often experience greater autonomy, which leads to increased motivation and engagement (Lillard et al., 2021; Johnston, 2016). Self-regulated learning is critical to educational success, especially in early childhood education settings such as Montessori schools. Montessori education emphasizes independence, self-direction and active participation in learning, which are essential for developing self-regulation skills in children (Follmer & Sperling, 2016; Effeney et al., 2013). Montessori practices encourage children to take responsibility for their learning experiences. This approach is consistent with self-regulated learning,

encompassing metacognitive, motivational and behavioural processes that enable children to manage their learning (Effeney et al., 2013; Follmer & Sperling, 2016). In Montessori classrooms, children are granted autonomy in selecting their activities, establishing their objectives and reflecting on their learning, which fosters intrinsic motivation and self-directed learning (Atis-Akyol, 2023; Denervaud et al., 2020). The current study's findings generally show that the Montessori classroom environment and its unique features, such as materials prepared according to the child's interests and needs, a teacher who encourages the child to be independent, being active in the learning process and managing it, the learning environment bsupportive of intrinsic motivation and the absence of extrinsic rewards all have a positive effect on increasing children's mastery motivation.

Limitations and recommendations

Although the results of the current study show that Montessori education positively affects children's mastery motivation, self-regulated learning and executive functions in the preschool period, it is important to emphasize that these results are due to the implemented cross-sectional research design. Based on the results, educators working with preschool children are recommended to integrate self-regulated learning, EF and mastery motivation into their curricula and classroom environments. This study has certain limitations. A purposeful and easily accessible sampling method was used to determine the sample. Due to the specified criteria, only a limited number of schools were included in the study. Therefore, it was not possible to randomly select the sample. This selection process and the non-random nature of the sample may have affected the results. However, the effect of the Montessori approach is discussed in the study. Other factors that influence motivation, self-regulated learning and executive functions have not been examined. The current study on SRL measurement relied on the teachers' reports, which possibly entailed student classroom behaviours that might not be in line with the most relevant aspects of self-regulated learning (Davis et al., 2021).

References

Almajed, M. A. (2020). Teachers' perceptions of supporting preschool children in self-learning in Montessori classrooms: A case study of three Saudi preschools. *Multi-Knowledge Electronic Comprehensive Journal for Education & Science Publications (MECSJ), 37*.

Andújar, M. I. G., & Gaitero, Ó. G. (2016). Executive functions in children of 9 and 12 years old in Montessori method. *RA Journal of Applied Research*. https://doi.org/10.18535/rajar/v2i12.01

Atis-Akyol, N., Uludag, G., & Tosun, B. (2023). Montessori practices in early childhood education with teachers' experiences. *Research in Pedagogy, 13*(1), 177-192. https://doi.org/10.5937/istrped2301177a

Azevedo, R., & Aleven, V. (2013). *Metacognition and learning technologies: An overview of current interdisciplinary research*. In International handbook of metacognition and learning technologies (pp. 1-16). https://doi.org/10.1007/978-1-4419-5546-3_1

Balcı, A. (2015). *Sosyal bilimlerde araştırma yöntem teknik ve ilkeler [Research methods and techniques in social sciences]* (11th ed.). Pegem Academy Publications.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes, 50*(2), 248-287. https://doi.org/10.1016/0749-5978(91)90022-L

Bagby, J., Barnard-Brak, L., Sulak, T., Jones, N., & Walter, M. (2012). The effects of environment on children's executive function: A study of three private schools. *Journal of Research in Childhood Education, 26*(4), 418-426. https://doi.org/10.1080/02568543.2012.711431

Barrett, K. C., & Morgan, G. A. (2018). Mastery motivation: Retrospect, present, and future directions. *Advances in Motivation Science, 1*-39. https://doi.org/10.1016/bs.adms.2018.01.002

Batubara, F., Derin, T., Putri, N. S., & Yudar, R. S. (2020). Five factors influencing the students' motivation to learn English as a foreign language: A closer look into Montessori classroom environment. *REiLA: Journal of Research and Innovation in Language, 2*(2), 76-84. https://doi.org/10.31849/reila.v2i2.3165

Bayrak, S. (2024). Okul öncesi eğitim müfredatıyla montessori eğitim sisteminin karşılaştırılması [Comparison of the preschool curriculum and the Montessori education system]. *The Journal Of Academic Social Science Studies, 9*(73), 427-435. https://doi.org/10.9761/JASSS7790

Bezirci, H. (2017). *Montessori yönteminin anaokulu çocukların akran ilişkilerine ve akran tepkilerine etkisinin incelenmesi [Examining the effects of the Montessori method on kindergarten children's peer relationships and peer reactions].*(Unpublished Master's Thesis, Selçuk University Institute of Social Sciences, Konya).

Blair, C. (2003). Behavioral inhibition and behavioral activation in young children: Relations with self-regulation and adaptation to preschool in children attending Head Start. *Developmental Psychobiology: The Journal of the International Society for Developmental Psychobiology, 42*(3), 301-311. https://doi.org/10.1002/dev.10103

Buldur, A. (2019). Montessori eğitim programına devam eden okul öncesi dönem çocuklarının bilimsel süreç becerilerindeki değişimin incelenmesi [Examining the changes in scientific process skills of preschool children attending the Montessori education program]. *Cumhuriyet Uluslararası Eğitim Dergisi, 8*(4), 1172-1186.

Bülgür, N. (2018). *Montessori eğitiminin 5-6 yaş grubu çocukların yalnızlık ve sosyal memnuniyetsizlik düzeyleri üzerindeki etkisi (Adana ili örneği) [The effect of Montessori education on the levels of loneliness and social dissatisfaction of 5-6 year old children (Adana province example)].* (Master's thesis, Çağ University Institute of Social Sciences).

Büyüköztürk, Ş., Çakmak, E., Akgün, Ö., Karadeniz, Ş., & Demirel, F.(2008). *Bilimsel Araştırma Yöntemleri [Scientific Research Methods]*, Pegem Academy, Ankara.

Bronson, M. B. (2000). Recognizing and supporting the development of self-regulation in young children. *Young Children, 6*.

Carriedo, N., Corral, A., Montoro, P. R., Herrero, L., & Rucián, M. (2016). Development of the updating executive function: From 7-year-olds to young adults. *Developmental Psychology, 52*(4), 666. https://doi.org/10.1037/dev0000091

Calderon, A. S. (2024). The impact of Montessori education on creative expression in preschoolers. *Research and Advances in Education, 3*(8), 39-48. https://10.56397/RAE.2024.08.06

Canbulat-Zengin, İ. (2019). *5-6 yaş çocukların matematik becerilerinin geliştirilmesinde Montessori eğitim programının etkisi [The effect of Montessori education on the levels of loneliness and social dissatisfaction of 5-6 year old children (Adana province example)].* (Unpublished Master's Thesis, Yeditepe University, Institute of Educational Sciences, Istanbul).

Carlson, S. M., Davis, A. C., & Leach, J. G. (2005). Less is more: Executive function and symbolic representation in preschool children. *Psychological Science, 16*(8), 609-616. https://doi.org/10.1111/j.1467-9280.2005.01583.x

Center on the Developing Child. (2011, February). Building the brain's "air traffic control" system: How early experiences shape the development of executive function. *Proceedings of National Forum on Early Childhood Policy and Programs*, Harvard University, Cambridge, MA. www.developingchild.harvard.edu

Cameron Ponitz, C. E., McClelland, M. M., Jewkes, A. M., Connor, C. M. D., Farris, C. L., & Morrison, F. J. (2008). Touch your toes! Developing a direct measure of behavioral regulation in early childhood. *Early Childhood Research Quarterly, 23(*2), 141–158. https://doi.org/10.1016/j.ecresq.2007.01.004

Courtier, P., Gardes, M. L., Van der Henst, J. B., Noveck, I. A., Croset, M. C., Epinat-Duclos, L., Jessica, J., & Prado, J. (2021). Effects of Montessori education on the academic, cognitive, and social development of disadvantaged preschoolers: A randomized controlled study in the French public-school system. *Child Development*, *92*(5), 2069-2088. https://doi.org/10.1111/cdev.13575

Çakıroğlu-Wilbrandt, E. (2008). *Montessori eğitiminin temelleri ve kaynaştırma eğitiminde* önemi. In Montessori Yöntemiyle Kaynaştırma Eğitimi *[The foundations of Montessori education and its importance in inclusive education*. In Inclusive Education with the Montessori Method] (pp. 1-20). Binbirçiçek Vakfı Publishing. Ankara.

Darcy, A. (2014). *Executive function in early childhood: Qualitative and quantitative patterns of development among students within a Montessori classroom* (Doctoral dissertation, Kennesaw State University).

Daoust, C. J. (2004). *An examination of implementation practices in Montessori early childhood education* [Doctoral dissertation, University of California, Berkeley]. ProQuest Dissertations and Theses Global.

Davis, H., Valcan, D. S., & Pino-Pasternak, D. (2021). The relationship between executive functioning and self-regulated learning in Australian children. *British Journal of Developmental Psychology, 39*(4), 625-652. https://doi.org/10.1111/bjdp.12391

Deshaies, I., & Éthier, O. (2024). Development of inhibitory control in 5-year-olds in preschool education: Influence on the quality of their engagement. *Dimensions, 6*(2), 208-218. https://doi.org/10.25236/IJNDE.2024.060233

Denervaud, S., Fornari, E., Yang, X., Hagmann, P., Immordino-Yang, M. H., & Sander, D. (2020). An fmri study of error monitoring in Montessori and traditionally-schooled children. *NPJ Science of Learning, 5*(1). https://doi.org/10.1038/s41539-020-0069-6

Demangeon, A., Claudel-Valentin, S., & Tazouti, Y. (2024). Early literacy, early numeracy and executive functions of French kindergartners in Montessori and conventional environments. *Early Years*, 1-15. https://doi.org/10.1080/09575146.2024.2343706

Denervaud, S., Knebel, J. F., Hagmann, P., & Gentaz, E. (2019). Beyond executive functions, creativity skills benefit academic outcomes: Insights from Montessori education. *PLoS ONE, 14*(11), e0225319. https://doi.org/10.1371/journal.pone.02253192

Denervaud, S., Knebel, J. F., Immordino-Yang, M. H., & Hagmann, P. (2020). Effects of traditional versus Montessori schooling on 4- to 15-year old children's performance monitoring. *Mind, Brain, and Education, 14*(2), 167-175. https://doi.org/10.1111/mbe.12233

Dere, H. ve Temel, F. (1999). *Okul* öncesi *eğitimde Yaklaşımlar [Approaches to preschool education]*. Gazi University kindergarten/kindergarten teacher handbook. Ya-Pa Publishing.

Dedeoğlu, S. (2018). *MEB okul öncesi eğitim programı ve Montessori programına göre eğitim alan çocukların bilişsel gelişim ve sosyal yetkinliklerinin karşılaştırmalı olarak incelenmesi [A comparative study of the cognitive development and social competence of children receiving education according to the MNE preschool education program and the Montessori program]*. (Doctoral dissertation, Necmettin Erbakan University Institute of Educational Sciences).

Dereli, E. (2017). Montessori eğitim programının çocukların psikososyal gelişimlerine ve sosyal problem çözme becerilerine etkisinin incelenmesi [Examining the effects of the Montessori education program on children's psychosocial development and social problem-solving skills]. *Ahi Evran University Kırşehir Faculty of Education Journal, 18*(2), 135-153.

Drever, A. I., Odders-White, E., Kalish, C. W., Else-Quest, N. M., Hoagland, E. M., & Nelms, E. N. (2015). Foundations of financial well-being: Insights into the role of executive function, financial socialization, and experience-based learning in childhood and youth. *Journal of Consumer Affairs, 49*(1), 13-38. https://doi.org/10.1111/joca.12068

Dinçer Yavuz, İ. (2019). *Okul öncesi dönemde Montessori yöntemi ile veya geleneksel yöntem ile eğitim alan çocukların okul olgunluğu düzeyleri, öz düzenleme becerileri ve annelerinin çocuklarının yeteneklerine ilişkin algıları [School readiness levels, self-regulation skills and mothers' perceptions of their children's abilities in children who received education with the Montessori method or the traditional method in the preschool period]* (Master's thesis, Ufuk University Institute of Social Sciences).

Diamond, A., Prevor, M. B., Callender, G., & Druin, D. P. (1997). Prefrontal cortex cognitive deficits in children treated early and continuously for PKU. *Monographs of the Society for Research in Child Development, 62*(1), 1-206. https://doi.org/10.2307/1166208

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135-168. https://doi.org/10.1146/annurev-psych-113011-143750

Diamond, A. (2002). Normal development of prefrontal cortex from birth to young adulthood: Cognitive functions, anatomy and biochemistry. In D. T. Stuss & R. T. Knight (Eds.), *Principles of frontal lobe function* (pp. 466–503). Oxford University Press. https://doi.org/10.1093/acprof:oso/97801951

Edwards, A., Daniels, H., Gallagher, T., Leadbetter, J., & Warmington, P. (2009*). Improving inter-professional collaborations*: *Multi-agency working for children's wellbeing*. Routledge. https://doi.org/10.4324/9780203884058

Effeney, G., Carroll, A., & Bahr, N. (2013). Self-regulated learning and executive function: Exploring the relationships in a sample of adolescent males. *Educational Psychology, 33*(7), 773-796. https://doi.org/10.1080/01443410.2013.785054

Ersan, C., & Tok, Ş. (2020). The study of the aggression levels of preschool children in terms of emotion expression and emotion regulation. *Education & Science, 45*(201). https://doi.org/10.15390/EB.2019.8150

Fleming, D. J., Culclasure, B., & Zhang, D. (2019). The Montessori model and creativity. *Journal of Montessori Research, 5*(2), 1-14. https://doi.org/10.17161/jomr.v5i2.7695

Follmer, D. J., & Sperling, R. A. (2016). The mediating role of metacognition in the relationship between executive function and self-regulated learning. *British Journal of Educational Psychology, 86*(4), 559-575. https://doi.org/10.1111/bjep.12123

Follari, L. M. (2007). *Foundations and best practices in early childhood education: History, theories, and approaches to learning*. Pearson Merrill.

Howard, S. J., Vasseleu, E., Neilsen-Hewett, C., De Rosnay, M., & Williams, K. E. (2022). Predicting academic school readiness and risk status from different assessment approaches and constructs of early self-regulation. *Child & Youth Care Forum, 51*(2), 369-393. https://doi.org/10.1007/s10566-021-09636-y

Howell, D., Osternig, L., Van Donkelaar, P., Mayr, U., & Chou, L. S. (2013). Effects of concussion on attention and executive function in adolescents. *Medicine & Science in Sports & Exercise, 45*(6), 1030-1037 https://doi.org/10.1249/MSS.0b013e3182814595

Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin, 134*(1), 31-60. https://doi.org/10.1037/0033-2909.134.1.31

Gerstadt, C., Hong, Y., & Diamond, A. (1994). The relationship between cognition and action: Performance of 3 ½-7-year old children on a Stroop-like day-night test. *Cognition, 53*, 129-153. https://doi.org/10.1016/0010-0277(94)90068-X

Greene, C. S. (2020). *The impact of grace and courtesy lessons on self-regulation in a toddler Montessori environment*. (Master of Arts in Education Thesis, St. Catherine University)

Grüneisen, L., Dörrenbächer-Ulrich, L., & Perels, F. (2023). Self-regulated learning as a mediator of the relation between executive functions and preschool academic competence. *Acta Psychologica, 240*, 104053. https://doi.org/10.1016/j.actpsy.2023.104053

Guerrero, S., Núñez, M., & Corbacho, C. (2023). Shaping executive function in preschool: The role of early educational practice. *Cognitive Development, 67*, 101344. https://doi.org/10.1016/j.cogdev.2023.101344

İvrendi, A. (2020). Okula hazır bulunuşluk ve yürütücü işlev performansları arasındaki ilişki [The relationship between school readiness and executive function performances]. *Journal of Early Childhood Studies, 4*(2), 66-87. https://doi.org/10.24130/eccd-jecs.1967202042208

Jacob, L., Dörrenbächer, S., & Perels, F. (2019). A pilot study of the online assessment of self-regulated learning in preschool children: Development of a direct, quantitative measurement tool. *International Electronic Journal of Elementary Education, 12*(2), 115-126. https://doi.org/10.26822/iejee.2019257655

Johnson, R. B., & Christensen, L. (2014*). Educational research: Quantitative, qualitative and mixed approaches (5th ed.)*. Sage Publications, Inc.

Johnston, L. M. C. (2016). Examining Montessori middle school through a self-determination theory lens: A mixed methods study of the lived experiences of adolescents. *Journal of Montessori Research, 2(*1), 27. https://doi.org/10.17161/jomr.v2i1.4994

Karasar, N. (2014). *Bilimsel araştırma yöntemi: Kavramlar, ilkeler, teknikler [Scientific research method: Concepts, principles, techniques]* (26th ed.). Nobel Publishing.

Kayılı, G. (2018). The effect of Montessori method on cognitive tempo of kindergarten children. *Early Child Development and Care, 188*(3), 327-335. https://doi.org/10.1080/03004430.2016.1217849

Kaza, Ö. (2021). *Montessori eğitimi ile okul* öncesi *eğitim programı uygulanan okul* öncesi öğrencilerinin *yaratıcı düşünme becerilerinin incelenmesi* [*Examining the creative thinking skills of preschool students who received Montessori education and preschool education program]* (Master's Thesis, Samsun: Ondokuz Mayıs University Graduate Education Institute).

Keçecioğlu, Ö. (2015). *MEB okul öncesi eğitim programı ve Montessori yaklaşımına göre eğitim alan 5 yaş çocuklarının sosyal becerilerinin* incelenmesi *[Examining the social skills of 5-year-old children receiving education according to the MEB preschool education program and Montessori approach]* (Master's thesis, Institute of Educational Sciences Marmara University, Istanbul).

Kendall, S. D. (1992). *The development of autonomy in children: An examination of the Montessori educational model* (Doctoral dissertation, Walden University).

Koçyiğit, S., & Kayılı, G. (2008). Montessori eğitimi alan ve almayan anaokulu öğrencilerinin sosyal becerilerinin karşılaştırılması [Comparison of social skills of kindergarten students who received Montessori education and those who did not]. *Journal of Selcuk University Social Sciences Institute, (20),* 511-516.

Koh, J. H. L., & Frick, T. W. (2010). Implementing autonomy support: Insights from a Montessori classroom. *International Journal of Education*, 2(2). https://doi.org/10.5296/ije.v2i2.511

Korkmaz, E. (2006). *Montessori metodu: Eğitimde bir alternatif* [*The Montessori method: An alternative in education*]. Algı Publishing.

Kuşçu, Ö., Bozdaş, Y., & Yıldırım Doğru, S. S. (2014). Montessori Eğitiminin Çocuklarda Sorumluluk,Alma, Sırasını Bekleme, Başladığı İşi Bitirme Becerisine Etkisinin Değerlendirilmesi [Evaluation of the effect of Montessori education in taking responsibility, waiting for turns, and skills on completion of started tasks]. *Journal of Values Education, 12*(27), 307-322.

Lan, X., Legare, C. H., Ponitz, C. C., Li, S., & Morrison, F. J. (2011). Investigating the links between the subcomponents of executive function and academic achievement: A cross-cultural analysis of Chinese and American preschoolers. *Journal of Experimental Child Psychology, 108*(3), 677-692. https://doi.org/10.1016/j.jecp.2010.11.001

Lillard, A. S., & Heise, M. J. (2016). An intervention study: Removing supplemented materials from Montessori classrooms associated with better child outcomes. *Journal of Montessori Research, 2*(1), 16-26. https://doi.org/10.17161/jomr.v2i1.5678

Lillard, A. S. (2012). Preschool children's development in classic Montessori, supplemented Montessori, and conventional programs. *Journal of School Psychology, 50*(3), 379-401. https://doi.org/10.1016/j.jsp.2012.01.001

Lillard, A. S., & McHugh, V. (2019). Authentic Montessori: The Dottoressa's view at the end of her life Part I – The environment. *Journal of Montessori Research, 5*(1), 1-18. https://doi.org/10.17161/jomr.v5i1.7716

Lillard, A., & Else-Quest, N. (2006). Evaluating Montessori education. *Science, 313*(5795), 1893-1894. https://doi.org/10.1126/science.1132362

Lillard, A. S., Heise, M. J., Richey, E. M., Tong, X., Hart, A., & Bray, P. M. (2017). Montessori preschool elevates and equalizes child outcomes: A longitudinal study. *Frontiers in Psychology, 8*. https://doi.org/10.3389/fpsyg.2017.01783

Lillard, A. S., Meyer, M. C., Vasc, D., & Fukuda, E. (2021). An association between Montessori education in childhood and adult wellbeing. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.721943

Liu, S., & Tian, A. (2023). The influence of Montessori education on children's personality development and the way of thinking. *Lecture Notes in Education Psychology and Public Media, 16*(1), 173-180. https://doi.org/10.54254/2753-7048/16/20231141

McClellan, D. E., & Kinsey, S. (1997). Children's social behavior in relationship to participation in mixed-age or same-age classrooms. *Journal of Research in Childhood Education, 12*(2), 177-189.

Minkyoung, K. (2018). Self-directed learning. In B. F. Bruce (Ed.), *The SAGE encyclopedia of educational research, measurement, and evaluation.* SAGE Publications.

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive psychology, 41*(1), 49-100. https://doi.org/10.1006/cogp.1999.0734

Montessori, M. (2011). *The absorbent mind*. Lulu.com.

Montessori, M. (2016). *The Montessori method: Scientific pedagogy as applied to child education*. anboco.

Montessori, M. (1995). *The absorbent mind* (Rev. ed.). Owl Books.

Mutmainna, N., Rizqi, V., Halim, C., & Astuti, P. (2024). A comparative study of Montessori and traditional education approaches: Cognitive development and academic achievement. *International Education Trend Issues, 2*(2), 298-205. https://doi.org/10.56442/ieti.v2i2.697

Józsa, K., &. Morgan, G.A.(2015). An improved measure of mastery motivation: Reliability and validity of the dimensions of mastery questionnaire (DMQ 18) for preschool children. *Hungarian Educational Research Journal,* 5(4).

Mroczkowski, J. (2014). *Comparing the normalization of children in traditional and Montessori kindergarten* (Master's Thesis. University of Wisconsin-River Falls).

Oğuz, B. U. V., & Akyol, A. K. (2006). Çocuk eğitiminde Montessori yaklaşımı [Montessori approach in child education]. Çukurova *University Social Sciences Institute Journal, 15*(1), 243-256.

Özbey, S. (2018). Okul öncesi dönem çocuklarında motivasyon ve öz düzenleme becerileri üzerine bir inceleme [An investigation of motivation and self-regulation skills in preschool children]. *Journal of Academic Social Research, 6*(65), 26-47. http://dx.doi.org/10.16992/ASOS.13361

Özbey, S., & Dağlıoğlu, H. E. (2017). Adaptation study of the motivation scale for the preschool children (DMQ18). *International Journal of Academic Research, 2(*1), 1–14.

Özbey, D., & Kutluca, A. Y. (2023). Montessori Uygulayıcısı Erken Çocukluk Dönemi Eğitimcilerinin Bilimsel Süreç Becerilerinin Kazandırılmasına İlişkin Görüş ve Uygulamalarının İncelenmesi [Examining the views and practices of Montessori early childhood educators on the acquisition of scientific process skills]. *Yaşadıkça Education, 37*(3), 683-710. https://doi.org/10.33308/26674874.2023373622

Özçelik, M., & Sapsağlam, Ö. (2023). Examination of the social competence and types of competition of preschool children in terms of different early childhood education programs. *International E-Journal of Educational Studies, 7*(13), 1-12. https://doi.org/10.31458/iejes.1189921

Perels, F., Merget-Kullmann, M., Wende, M., Schmitz, B., & Buchbinder, C. (2009). Improving self-regulated learning of preschool children: Evaluation of training for kindergarten teachers. *British Journal of Educational Psychology, 79*(2), 311-327. https://doi.org/10.1348/000709908X322875

Phillips-Silver, J., & Daza, M. T. (2018). Cognitive control at age 3: Evaluating executive functions in an equitable Montessori preschool. *Frontiers in Education, 3*, https://doi.org/106. 10.3389/feduc.2018.00106

Postlewaite, E. L. (2023). *The development of adolescent students' self-directed learning skills within a Montessori program during COVID-19: A longitudinal mixed-methods study* (Doctoral dissertation, The Claremont Graduate University).

Prokofieva, E. N. (2019). Motivation in primary Montessori school as an important component of independence. *Problems of Modern Education, (6)*, 248-256. https://doi.org/10.31862/2218-8711-2019-6-248-256

Rathunde, K., & Csikszentmihalyi, M. (2005). Middle school students' motivation and quality of experience: A comparison of Montessori and traditional school environments. *American Journal of Education, 111*(3), 341-371. https://doi.org/10.1086/428885

Rathunde, K. (2003). A comparison of Montessori and traditional middle schools: Motivation, quality of experience, and social context. *Namta Journal, 28*(3), 12-53.

Ryniker, D. H., & Shoho, A. R. (2001). Student perceptions of their elementary classrooms: Montessori vs. traditional environment. *Montessori Life, Winter*, 45-48.

Sarva, E., Linde, I., & Daniela, L. (2021). Self-regulated learning in remote educational context. *Human, Technologies and Quality of Education, 2021*, 376-386. https://doi.org/10.22364/htqe.2021.27

Saki, H. (2020). Montessori felsefesi ile eğitim alan 24-72 ay arası çocukların psikolojik dayanıklılıklarının incelenmesi [Investigation of the psychological resilience of children aged 24-72 months who received education with Montessori philosophy]. *Istanbul Kent University Journal of Human and Social Sciences, 1*(1), 15-33.

Saraç, S., Karakelle, S., & Whitebread, D. (2019). Children independent learning development checklist 3-5 (Child 3-5): Validity and reliability study for the Turkish form. *International Journal of Early Years Education, 27*(4), 361-373. https://doi.org/10.17051/ilkonline.2019.610148

Setiawan, N. A., & Ena, O. T. (2019). Junior high school students' perceptions on the implementation of Montessori approach in vocabulary learning. *English Education: Journal of English Teaching and Research, 4*(2), 75-92. https://doi.org/10.29407/jetar.v4i2.13662

Sezgin, E., & Demiriz, S. (2015). Davranış düzenleme becerileri ölçme aracı baş ayak parmakları dizler omuzlar bado görevlerinin geçerlik ve güvenirlik çalışması [Validity and reliability study of the behavior regulation skills measurement tool, thumb, toes, knees, shoulders, bado tasks]. *ACED International Journal of Family, Child and Education, 7*, 24-35.

Schoemaker, K., Mulder, H., Deković, M., & Matthys, W. (2013). Executive functions in preschool children with externalizing behavior problems: A meta-analysis. *Journal of Abnormal Child Psychology, 41*(3), 457-471. https://doi.org/10.1007/s10802-012-9684-x

Schunk, D.H., & Ertmer, P.A. (2000). Self-regulation and academic learning: Self-efficacy enhancing interventions. In M. Boekaerts, P.R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 631-647). Academic Press.

Soydan, S. B., Pirpir, D. A., & Ergin, E. (2018). The impact of the Montessori approach in supporting children's self-regulation skills. In A. Morin (Ed.), *Educational sciences research in the globalizing world* (pp. 283-296). Lambert Academic Publishing.

Tayfun, N., & Aydoğan, Y. (2021). Montessori yönteminin okul öncesi çocuklarının matematik becerilerine etkisi [The effect of the Montessori method on preschool children's mathematical skills]. *International Journal of Field Education, 7*(2), 207-228. https://doi.org/10.32570/ijofe.948085

Tepeli, K., & Yılmaz, E. (2012). Üç farklı programa göre eğitim alan okul öncesi çocukların sosyal kural algılarının incelenmesi [Investigation of social rule perceptions of preschool children receiving education according to three different programs]. *Journal of Selcuk University Social Sciences Institute, (28), 197-207.*

Tiryaki, A. Y., Findik, E., Çetin Sultanoğlu, S., Beker, E., Biçakci, M. Y., Aral, N., & Özdoğan Özbal, E. (2021). A study on the effect of Montessori education on self-regulation skills in preschoolers. *Early Child Development and Care, 191*(7–8), 1219–1229. https://doi.org/10.1080/03004430.2021.1928107

Tiala, N. H., Haryanti, F., & Akhmadi, A. (2020). The relationship between father involvement with growth and social-emotional development in preschool children. *Indian Journal of Public Health Research & Amp; Development, 11*(2), 1598. https://doi.org/10.37506/v11/i2/2020/ijphrd/195054

Toran, M., & Temel, Z. F. (2014). Montessori yaklaşımın çocukların kavram edinimi üzerindeki etkisinin incelenmesi [Examining the effects of Montessori approach on children's concept acquisition]. *Primary Education Online, 13*(1), 1-10.

Toran, M. *(2011). Montessori yonteminin cocuklarin kavram edinimi, sosyal uyumlari ve kucuk kas motor becerileri uzerindeki etkisinin incelenmesi. [Examination effects of Montessori method on children's concept acquisition, social adaptation, and fine motor skills].* (Doctoral dissertation, Gazi University, Ankara, Turkey).

Tuncer, B. (2015). Okul öncesi eğitim programlarının incelenmesi ve Türkiye'de uygulanan programla karşılaştırılması [Examining preschool education programs and comparing them with the program implemented in Turkey International]. *Journal of Field Education, 1(*2), 39-58.

Uçar, S., & Durualp, E. (2023). *Montessori eğitim alan ve almayan okul* öncesi *dönemdeki* çocukların *oyun davranışlarının incelenmesi [Investigation of play behaviors of preschool children with and without Montessori education].* (Master's thesis, Ankara Universitesi Institute of Health Sciences, Turkey).

Üstündağ, K. (2019). *Montessori yönteminin okul öncesi dönemdeki çocukların bilimsel süreç becerilerine etkisinin incelenmesi* [*Examining the effect of the Montessori method on preschool children's scientific process skills].*(Doctoral dissertation, Necmettin Erbakan University Institute of Educational Sciences).

Veenman, M. V. J., Bavelaar, L., De Wolf, L., & Van Haaren, M. G. P. (2014). The online assessment of metacognitive skills in a computerized environment. *Learning and Individual Differences, 29*, 123-130. https://doi.org/10.1016/j.lindif.2013.01.003

Walk, L. M., Evers, W. F., Quante, S., & Hille, K. (2018). Evaluation of a teacher training program to enhance executive functions in preschool children. *PLOS ONE, 13*(5), e0197454. https://doi.org/10.1371/journal.pone.0197454

Whitebread, D., Coltman, P., Pasternak, D. P., Sangster, C., Grau, V., Bingham, S., Almeqdad, Q., & Demetriou, D. (2009). The development of two observational tools for assessing metacognition and self-regulated learning in young children. *Metacognition and Learning, 4*(1), 63–85. https://doi.org/10.1007/s11409-008-9033-1

Winne, P. H. (1995). Inherent details in self-regulated learning. *Educational Psychologist, 30*(4), 173-187. https://doi.org/10.1207/s15326985ep3004_2

Wolters, C. A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist, 38*(4), 189-205. https://doi.org/10.1207/S15326985EP3804_1

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64-70. https://doi.org/10.1207/s15430421tip4102_2

Zimmerman, B. J., & Schunk, D. H. (2011). *Self-regulated learning and performance: An introduction and an overview.* In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 1-12). Routledge.

Yavuz, İ. D. (2019). *Okul öncesi dönemde montessori yöntemi ile veya geleneksel yöntem ile eğitim alan çocukların okul olgunluğu düzeyleri, öz düzenleme becerileri ve annelerinin çocuklarının yeteneklerine ilişkin algıları [School readiness levels, self-regulation skills, and mothers' perceptions of their children's abilities in children who received education with the Montessori method or the traditional method in the preschool period]* (Master's thesis, Ufuk Üniversitesi, institute of social sciences).

Yavaş, M. (2020). *Montessori ve MEB okul* öncesi *eğitim programında eğitim gören* çocukların *değer düzeyleri, sosyal yetkinlik ve davranışlarının karşılaştırmalı olarak incelenmesi [A comparative study of the value levels, social competence and behaviours of children receiving education in Montessori and MEB preschool education programs]*. (Master's thesis, Istanbul Sabahattin Zaim University İnstitute Of Social Sciences, Turkey).

Yıldırım, A., & Şimşek, H. (2013). *Sosyal bilimlerde nitel araştırma yöntemleri [Qualitative research methods in social sciences] (*9th ed.). Seçkin Publishing.

Yıldızbaş, F., & Aslıyüksek, M. (2016). Montessori eğitiminin 4-5 yaş çocuklarının motor beceri, görsel algı ve bellek, el-göz koordinasyonu ile küçük kas becerilerinin gelişimine etkisinin incelenmesi [Investigation of the effects of Montessori education on the development of motor skills, visual perception and memory, hand-eye coordination and small muscle skills of 4-5 year old children]. *Turkish Studies, 11(3).* http://dx.doi.org/10.7827/TurkishStudies.9053

Yücesan, Y., & Özyürek, A. (2017). Montessori eğitimi alan ve almayan okul öncesi dönem çocuklarının problem ve davranışlarının incelenmesi [An examination of the problems and behaviours of preschool children with and without Montessori education]. *EUL Journal of Social Sciences, 8*(2), 215-226.

Elif Sezgin
Mudanya University
Faculty of Health Sciences
Child Development Programme
Turkey
elif.sezgin@mudanya.edu.tr

Utjecaj Montessori obrazovanja i tradicionalnoga obrazovanja na izvršne funkcije, samoregulirano učenje i motivaciju za postignućem djece predškolske dobi: komparativna studija

Sažetak

Cilj ovoga istraživanja bio je usporediti izvršne funkcije, samoregulirano učenje i motivaciju za postignućem djece starosti 66 do 72 mjeseca koja pohađaju Montessori obrazovne programe i redovne obrazovne programe. Uzorak istraživanja uključivao je 50 djece iz Montessori vrtića (obrazovanje prema Montessori programu) i 50 djece iz tradicionalnoga vrtića, gdje se djeca obrazuju prema programu Ministarstva obrazovanja Turske (MO). Uzorak je uključio sveukupno 100 djece, od čega 51 djevojčicu i 49 dječaka, te 10 odgajatelja. Normalnost distribucije podataka provjerena je upotrebom Shapiro-Wilksova testa, a budući da ista nije ustanovljena, korišteni su neparametrijski testovi. Vrijednosti deskriptivne statistike predstavljene su kao centralne (od minimalnih do maksimalnih) vrijednosti. Usporedbe između grupa provedene su putem Mann-Whitney U testa. Rezultati pokazuju da su djeca u Montessori programima imala više razine motivacije, bolje vještine samoreguliranoga učenja i naprednije izvršne funkcije od djece koja se obrazuju prema redovnim programima Ministarstva obrazovanja Republike Turske.

Ključne riječi: *izvršne funkcije; Montessori obrazovanje; predškola; samoregulirano učenje*

Uvod

Novija istraživanja naglašavaju važnost izvršnih funkcija (IF) za učenje, ponašanje i socijalnu prilagodbu tijekom života (Diamond, 2013; Schoemaker i sur., 2013). Literatura ukazuje na učinkovitost izvršnih funkcija u poboljšanju akademskoga i socijalnoga uspjeha djece, posebno u predškolskome periodu, koji predstavlja kritično vrijeme razvoja tih funkcija. Stoga bi predškolski program trebao uključiti intervencije kojima bi se razvijale izvršne funkcije. Izvršne funkcije (IF) obuhvaćaju složeni skup

kognitivnih procesa koji omogućuju izvršavanje kompleksinih zadataka i upravljanje ponašanjem i emocijama (Garon i sur., 2008). Izvršne funkcije nedvojbeno obuhvaćaju tri odvojene, ali međusobno povezane kognitivne sastavnice: inhibicijsku kontrolu, radno pamćenje i kognitivnu fleksibilnost (Diamond, 2013; Miyake i sur., 2000).

Izvršne funkcije javljaju se u ranome djetinjstvu i intenzivno se razvijaju tijekom djetinjstva, pa čak i kroz odraslo doba, kao funkcija sazrijevanja prefrontalnoga korteksa (Carriedo i sur., 2016). Paralelno s kognitivnim i emocionalnim sazrijevanjem djece razvijaju se i izvršne funkcije, pa tako ona postaju sposobna upravljati vlastitim mislima, emocijama i ponašanjem. Između dobi od tri do pet godina života ove vještine se značajno poboljšavaju (CDC, 2011). Ustanovljena je jasna i snažna povezanost između izvršnih funkcija i samoreguliranoga učenja. U predškolskoj dobi izvršne funkcije prediktori su samoreguliranoga učenja, koje posljedično predviđa akademske kompetencije. Izvršne funkcije u predškolskoj dobi neizravno utječu na akademsku sposobnost putem samoreguliranoga učenja (Grüneisen i sur., 2023). Stoga, izvršne funkcije i samoregulirano učenje utječu na akademske sposobnosti i akademski uspjeh djece predškolske dobi(Howard i sur., 2022; Grüneisen i sur., 2023). Dokazi su jasni: obrazovanje potiče razvoj izvršnih funkcija i vještine samoreguliranoga učenja djece predškolske dobi (Walk i sur., 2018; Perels i sur., 2009).

Montessori metoda je obrazovni pristup koji djecu stavlja u ulogu aktivnih i neovisnih učenika koji uz odgovarajuće vodstvo i pripremljenu okolinu grade svoju individualnost. Edukatori funkcioniraju kao posrednici između djece i obrazovnih materijala koji su multisenzorni i poticajni, promiču ispravljanje vlastitih pogrešaka i strpljenje. Učionice su dizajnirane tako da potiču neovisnost, pružajući djeci priliku da odabiru aktivnosti, njihovo trajanje i mjesto odvijanja. Dan uključuje duge, kontinuirane periode rada, a ne postoje kazne i nagrade, što doprinosi izbjegavanju kompetitivnosti i potiče intrinzičnu motivaciju (Montessori, 2011; Montessori, 2016; Lillard i Heise, 2016)

Montessori obrazovanje i izvršne funkcije

Izvršne funkcije obuhvaćaju radnu memoriju, kontrolu impulsa, metakogniciju, emocionalne reakcije i ponašanje (Howell i sur., 2013; Lan i sur., 2011), a razvijaju se od ranoga djetinjstva do adolescencije (Roebers i sur., 2012). Dokazano je da Montessori pedagogija podržava razvoj ovih funkcija. Montessori materijali, poput Ružičastoga tornja, podupiru vještine planiranja, kognitivne fleksibilnosti i samoregulacije djece (Lillard, 2012; Lillard i McHugh, 2019). Rezultati istraživanja pokazuju da Montessori obrazovanje poboljšava izvršne funkcije, posebno u dobnoj skupini od tri do šest godina (Lillard i sur., 2017; Lillard i Else-Quest, 2006; Phillips-Silver i Daza, 2018). Noviji dokazi ukazuju na to da Montessori obrazovanje može doprinijeti razvoju rane pismenosti, matematičkih vještina i radne memorije (Demangeon i sur., 2024; Guerrero i sur., 2023). Međutim, neka istraživanja nisu uspjela dokazati jasne prednosti, a neusklađenosti su često povezane s preciznosti mjernih alata ili vanjskim kontekstualnim varijablama (Denervaud i sur., 2019; Lillard i Else-Quest, 2006). Postojeća literatura govori u prilogu

tomu da djeca u Montessori školama, koje daju prednost autonomiji i samoregulaciji, općenito imaju bolji uspjeh od svojih vršnjaka u tradicionalnim školama u zadatcima izvršnih funkcija (IF). Međutim, u nekim istraživanjima nisu pronađene značajne razlike. Rezultati istraživanja u literaturi neusklađeni su zbog raznih čimbenika koji uključuju razlike u zadatcima koji se koriste za procjenu IV-a i potencijalne osnovne varijacije između grupa za usporedbu (Guerrero i sur., 2023). Buduća istraživanja trebala bi se usmjeriti na rješavanja ovih pitanja. U ovome istraživanju uspoređivane su izvršne vještine stotinu djece u dobi od pet do šest godina koja pohađaju Montessori i tradicionalni vrtić, a koja imaju sličnu socioekonomsku pozadinu i jednaku dužinu prethodnoga obrazovanja. Izvršne funkcije djece procjenjivane su nizom zadataka koji su oblikovani za mjerenje raznih procesa u pozadini izvršnih funkcija. Specifično, radna memorija i inhibicijska kontrola procjenjivane su posebno, ali i zajedno, tj. istovremeno. Osim toga, pažnja, radna memorija, inhibicijska kontrola i socijalne interakcije djece također su evaluirane istovremeno.

Montessori obrazovanje i samoregulirano učenje

Samoregulirano učenje je proces u kojemu djeca preuzimaju odgovornost za planiranje, nadgledanje i prilagodbu vlastitoga učenja. Ono počiva na sposobnostima poput samomotivacije, emocionalne kontrole i evaluacije ishoda (Bandura, 1991; Blair, 2003; Zimmerman, 2002; Zimmerman i Schunk, 2011). Samoregulirano učenje pomiče naglasak s učitelja na učenika, ohrabrujući i podržavajući djecu u preuzimanju inicijative i aktivnom sudjelovanju u rješavanju obrazovanih zadaća (Minkyoung, 2018). Montessori pedagogija djeci pruža temelj za razvoj učinkovitih strategija učenja, nadgledanje i evaluaciju vlastitoga učenja, napredak u učenju i postizanje povezanih ishoda (Veenman i sur., 2014; Azevedo i Aleven, 2013). Iako Montessori nije eksplicitno spominjala samoregulaciju, njezine zamisli o samodisciplini – koja uključuje fokus, upornost, organizaciju i poštovanje – bliske su toj ideji (Montessori, 1995). Montessori učionice podupiru razvoj tih vještina osiguravajući pažljivo dizajnirane materijale, podržavajući neovisno učenje i usmjeravajući djecu prema njihovim individulanim razvojnim potrebama (Çakıroğlu Wilbrant, 2008, 2009; Korkmaz, 2006; Tepeli, 2011; Mroczkowski, 2014). Dokazi u literaturi i praksi govore da Montessori obrazovanje podupire samoregulirano učenje u starijim dobnim skupinama (Postlewaite, 2023; Denervaud i sur., 2020), iako je njegov direktan utjecaj na predškolsku djecu manje jasan. Rano djetinjstvo je kritično razdoblje za ravoj vještina i strategija samoreguliranoga učenja (Bronson, 2000; Jacob i sur., 2019). Kompetencijski pristup, koji promiče integraciju samoreguliranoga učenja u predškolskom obrazovanju, potiče istraživanje utjecaja dječje samoregulacije na njihov razvoj. Samoregulirano učenje ima središnju ulogu u današnjem društvu. Ono omogućuje samoobrazovanje i učinkovit i uspješan razvoj. Okolina predškolske institucije i odgajatelj koji tu okolinu priprema imaju značajnu ulogu u samoreguliranome učenju djeteta (Sarva i sur., 2021). Uspostavljanje okoline za učenje pogodne za razvoj samoreguliranoga učenja u ranome djetinjstvu

obaveza je predškolskih institucija i primijenjenih obrazovanih modela zbog toga što rano djetinjstvo predstavlja kritičan period u svim razvojnim područjima, uključujući razvoj sposobnosti samoreguliranoga učenja. Whitebread i suradnici (2009) naglašavaju da su vještine samoreguliranoga učenja mlađe djece u nastanku često podcijenjene i da, kada im se pruži prilika, čak i vrlo mala djeca mogu učiti na strateški i promišljen način. Osnove za razvoj samoreguliranoga učenja javljaju se u dobi od dvije do tri godine, a vještine SRU-a brzo rastu tijekom ranoga djetinjstva, tj. u dobi od tri do osam godina (Diamond, 2002; Montroy i sur., 2016). Razvoj ovih vještina trebao bi se poticati u ranome djetinjstvu, koje predstavlja kritične godine za njihov razvoj. Istraživanje obrazovnih modela, metoda i tehnika koje podržavaju ove vještine trebalo bi biti iscrpnije.

Montessori obrazovanje i motivacija za postignućem

Motivacija za postignućem odnosi se na urođeni nagon djece predškolske dobi za stjecanjem novih vještina i izvršavanjem zadataka koji su krucijalni za njihov kognitivni i emocionalni razvoj. Motivacija za postignućem temeljna je u ranome djetinjstvu kada djeca aktivno istražuju svoju okolinu i pod utjecajem je čimbenika poput učiteljske i roditeljske podrške, emocionalnoga angažmana i karakteristika okoline učenja. Montessori obrazovanje, koje favorizira samousmjeravajuće pristupe i pristupe usmjerene na dijete, razvija intrinzičnu motivaciju tako što omogućuje djeci odabir aktivnosti, promiče praktična iskustva i prednost daje procesu učenja, a ne ishodima (Liu, 2023; Barrett i Morgan, 2018; Lillard i sur., 2017; Tiala i sur., 2020). Tako postignuta autonomija potiče postavljanje ciljeva i rješavanje problema te razvija osjećaj ponosa zbog uspjeha i na taj način njeguje kulturu u kojoj su izazovi dobrodošli, a greške se doživljavaju kao prilike za učenje. Istraživanja su pokazala da ovaj obrazovni pristup vodi povišenim razinama otpornosti i ustrajnosti kod djece i navedene osobine blisko su povezane s motivacijom za postignućem (Lillard, 2012). Montessori metoda bazira se na dva počela: namjernom promatranju i pripremljenoj okolini. Pažljivim promatranjem učitelji kroje podršku koja odgovara razvojnim potrebama svakoga pojedinog djeteta. Učionica je oblikovana tako da potiče samousmjereno istraživanje i angažman. Ovaj integrirani pristup njeguje kompetenciju, autonomiju i povezanost, što vodi višim razinama intrinzične motivacije i motivacije za postignućem nego što je slučaj u konvencionalnim učionicama (Greene, 2005; McClellan i Kinsey, 1997; Ryniker i Shoho, 2001). Istraživanja pokazuju da djeca koja su obrazovana Montessori metodom, posebno u dobi od četiri do pet godina, pokazuju veće razine motivacije za postignućem i aktivnosti u usporedbi s njihovim vršnjacima u tradicionalnim učionicama, što je povezano s naglaskom na samoregulirano učenje i izostanak ekstrinzičnih potkrjepljenja (Lillard i sur., 2017). Međutim, studije u kojima se istražuju učinci obrazovnih modela na motivaciju za postignućem djece predškolske dobi još su uvijek nedostatne. Ova činjenica nalaže sveobuhvatnije istraživanje načina na koji Montessori obrazovanje razvija intrinzičnu motivaciju i ustrajnost.

Predškolske institucije i Montessori obrazovanje u Turskoj

Predškolske institucije u Turskoj osnova su formalnoga obrazovanja i fokusiraju se na rani akademski razvoj. Obrazovni program resornoga ministarstva nastoji promicati zdravi razvoj, osigurati bogata iskustva učenja, podržati optimalni razvoj motoričkih, socioemocionalnih, jezičnih i kognitivnih područja, poučavati vještine brige o sebi i pripremiti djecu za osnovnu školu (Bayrak, 2024). Osnovni ciljevi Montessori programa su razvijanje pozitivnoga stava prema učenju, samodiscipline, motivacije, neovisnosti, samopouzdanja, koncentracije, znatiželje i poštivanje reda (Korkmaz, 2005). U Montessori učionicama djeca se slobodno kreću, odabiru aktivnosti i koriste materijale na načine koji odgovaraju njihovim preferencijama (Daoust, 2004). Programska knjižica Ministarstva državnoga obrazovanja iz 2013. godine pokazuje da su u turskim vrtićima aktivnosti slobodnoga izbora, poput onih u Montessori vrtićima, dozvoljene samo tijekom vremena za slobodne aktivnosti. Druge aktivnosti su fleksibilne, ali se provode sa svom djecom u isto vrijeme, slijedeći dnevni tijek obrazovanih aktivnosti (Tuncer, 2015). U turskim vrtićima mnogo prostora posvećeno je kutićima za aktivnosti, a trenutačne prakse uvelike favoriziraju grupno učenje s ograničenim prilikama za individualizirano obrazovanje. Za razliku od toga Montessori vrtići i škole su fleksibilniji i imaju manje pravila. Turski vrtići funkcioniraju prema unaprijed utvrđenom dnevnom rasporedu pri čemu djeca sudjeluju u istim aktivnostima prema slijedu koji odredi odgajatelj/učitelj.

Montessori učionice oblikovane su tako da uvažavaju individualne razlike između djece i odražavaju metode i vještine učitelja, u suprotnosti sa standardnom strukturom turskih vrtića, koji rade po programu resornoga ministarstva, a koja je usmjerena na učitelja i na grupu (Dere i Temel, 1999; Tuncer, 2015). Montessori pristup, koji je razvila Maria Montessori, naglašava učenje u čijemu je središtu dijete, podržava razvoj autonomnih životnih vještina te koristi dizajn integrirane učionice koji podržava senzorni, motorički, jezični i socijalni razvoj, a u isto vrijeme potiče autonomiju, samodisciplinu i sposobnosti rješavanja problema (Dereli, 2017; Dedeoğlu, 2018; Yıldızbaş i sur., 2016; Toran, 2011; Özbey i Kutluca, 2023; Follari, 2007). Montessori obrazovanje postoji duže od jednoga stoljeća, a broj istraživanja koja ispituju komparativni utjecaj ove vrste obrazovanja na razvoj djece svejedno je mali. Postojeće studije prvenstveno su se fokusirale na kognitivni i socijalni razvoj, pa su tako domaća istraživanja ispitivala kognitivne vještine (Buldur, 2019; Üstündağ, 2019; Dedeoğlu, 2018; Canbulat-Zengin, 2019; Tayfun i Aydoğan, 2021; Toran i Temel, 2014; Kaza, 2021; Kayılı, 2018) te socijalne i emocionalne vještine (Yücesan i Özyürek, 2017; Yavaş, 2020; Keçecioğlu, 2015; Koçyiğit i Kayılı, 2008; Uçar i Durualp, 2023; Dereli, 2017; Dedeoğlu, 2018; Kuşçu i sur., 2014; Tepeli i Yilmaz, 2012; Bülgür, 2018; Bezirci, 2017). U Turkoj ne postoje istraživanja izvršnih funkcija djece, a samo su četiri studije ispitivale samoregulaciju djece obrazovane po Montessori modelu (Dinçer Yavuz, 2019; Tiryaki i sur., 2021; Soydan i sur., 2018; Yavuz, 2019; Saki, 2020).

Međunarodne studije ispitivale su izvršne funkcije djece obrazovane Montessori metodom (Denervaud i sur., 2019; Phillips-Silver i Daza, 2018; Bagby i sur., 2012; Lillard, 2012; Lillard i Heise, 2016; Darcy, 2014). Te studije istraživale su kognitivnu fleksibilnost, radnu memoriju i selektivnu pažnju (Denervaud i sur., 2019) te kognitivnu kontrolu djece u Montessori ustanovama (Phillips-Silver i Daza, 2018). Druga istraživanja promatrala su izvršne funkcije predškolaca kao i njihove motoričke, socijalne vještine i sposobnost čitanja (Courtier i sur., 2021; Guerrero i sur., 2023). Unatoč istraživanjima koja su ispitivala izvršne funkcija djece obrazovane prema Montessori modelu, nije se došlo do definitivnih zaključaka o pozitivnom učinku Montessori obrazovanja na izvršne funkcije. Postojeći rezultati općenito su proturječni (Guerrero i sur., 2023). Stoga je nužno temeljitije i ozbiljnije istražiti odnos između Montessori pristupa i izvršnih funkcija djece predškolske dobi.

Pregled literature o kognitivnoj neuroznanosti pokazuje da obrazovne prakse mogu utjecati na razvoj izvršnih funkcija mlađe djece. Štoviše, dokazi o utjecaju takvih praksi na djecu predškolske dobi su nedostatni (Phillips-Silver i Daza, 2018), a ipak nema istraživanja koje bi ispitivalo odnos između samoregulacijskih ponašanja, pa ovo pitanje ostaje neriješeno. Iako se pretpostavlja da Montessori metoda pozitivno utječe na vještine samoregulacije (Denervaud i sur.,2020; Montessori, 1995), direktne studije s djecom predškolske dobi su nedostatne. Prema tvrdnji Marije Montessori da je kreativnost i neovisno učenje urođena sposobnost svakoga djeteta (Almajed, 2020), njezin pedagoški pristup naglašava samoregulirano učenje (Bahateg, 2010). Montessori metoda podrazumijeva individualiziranu poduku, a Montessori materijali osmišljeni su za razvoj i održivost sposobnosti neovisnoga učenje djece. Međutim, u literaturi postoji manjak istraživanja koja ispituju samoregulirano učenje djece obrazovane prema Montessori metodi tijekom predškolskoga perioda u Turskoj i inozemstvu. Provedena istraživanja sa starijim učenicima pokazuju da Montessori metoda pozitivno utječe na njihovu motivaciju (Rathunde i Csikszentmihalyi, 2005). Na osnovi ovih rezultata osobine poput samoregulacije i motivacije dobivaju iznimnu važnost, a Montessori metoda je učinkovita u njihovom razvoju. Unatoč tomu nema dovoljno istraživanja koja direktno ispituju i dokumentiraju njezin utjecaj u ranome periodu. Još jedan primjetan nedostatak u postojećoj literaturi jest mali broj studija koje su uspoređivale izvršne funkcije, samoregulirano učenje i razine motivacije djece obrazovane prema Montessori metodi i djece iz tradicionalnih obrazovnih institucija. Ovo će istraživanje premostiti navedenu prazninu u literaturi i doprinijeti polju istražujući učinak Montessori obrazovanja na dječji razvoj. Prema tomu, cilj ovoga istraživanja bio je usporediti samoregulilrano učenje, izvršne funkcije i razine motivacije djece u dobi od 66 do 72 mjeseca koja pohađaju privatne vrtiće koji rade prema Montessori programu i djece koja pohađaju privatne vrtiće koji obrazuju djecu prema programu Ministarstva obrazovanja Republike Turkse. S obzirom na tako postavljeni cilj, ova će studija evaluirati i usporediti samoregulirano učenje, razine motivacije i izvršne funkcije (uključujući vještine samoregulacije, kratkoročno pamćenje i inhibicijsku kontrolu) djece koja se obrazuju prema Montessori programu i djece iz redovnih vrtića.

U skladu s ciljem istraživanja, postavljena su sljedeća istraživačka pitanja:

1 – Razlikuju li se značajno izvršne funkcije djece obrazovane prema Montessori metodi značajno od izvršnih funkcija djece koja nisu obrazovana prema Montessori metodi?

2 – Razlikuju se značajno razine motivacije djece obrazovane prema Montessori metodi od razina motivacije djece koja nisu obrazovana prema Montessori metodi?

3 – Razlikuje li se značajno sposobnost samoreguliranoga učenja djece obrazovane prema Montessori metodi od samoreguliranoga učenja djece koja nisu obrazovana prema Montessori metodi?

Postupak i etički obziri

Sveučilišni odbor za etička pitanja odobrio je istraživanje (E-92662996-044-129344). U periodu od ožujka do lipnja 2022. godine upotrijebljeni su mjerni instrumenti u privatnom vrtiću koji slijedi program resornoga državnog ministarstva i privatnom vrtića koji radi prema Montessori programu u četvrti Nilüfer u Bursi. Svrha i sadržaj istraživanja detaljno su objašnjeni odgojiteljima i obiteljima djece. Odgojitelji su pristali dobrovoljno sudjelovati u istraživanju, kao i roditelji, a anonimnost podataka i njihovo korištenje isključivo u istraživačke svrhe, bez sakupljanja osobnih podataka, zajamčena je svim sudionicima. Odgojitelji su ispunjavali obrazac s demografskim podatcima, skalu samoreguliranoga učenja i skalu motivacije za svako dijete koje je sudjelovalo u istraživanju.

Istraživač je dobio dozvolu za provođenje studije od ravnatelja obje predškolske ustanove, nakon čega je primijenio mjerni instrument za izvršne funkcije u za to predviđenoj, tihoj prostoriji. Posjećivao je vrtiće dva puta tjedno i nakon jutarnjega slobodnog vremena provodio mjerenje sa svakim djetetom pojedinačno.

Metodologija

Model istraživanja

Ovo je istraživanje kauzalno-komparativnoga dizajna, koji predstavlja jedan od kvantitativnih istraživačkih nacrta, a odabran je kao istraživački model najprimjereniji ovoj studiji. Studije koje počivaju na kauzalnim usporedbama istraživački su projekti osmišljeni za utvrđivanje temeljnih uzroka postojeće situacije ili događaja, kao i varijabli koje utječu na te uzroke ili posljedice (Büyüköztürk i sur., 2008). Relacijski model probira upotrijebljen je kako bi se usporedile izvršne funkcije, razine motivacije i samoregulirano učenje djece u predškolskoj dobi obrazovane prema Montessori programu i one obrazovane prema tradicionalnom programu (Karasar, 2016).

Sudionici

Uzorak istraživanja formiran je postupkom namjernoga uzorkovanja koje omogućuje dubinsko ispitivanje situacija identificiranih tijekom istraživačkoga procesa. Prilikom formiranja namjernoga uzorka istraživač je diskretan u odabiru pojedinaca ili entiteta,

s ciljem osiguravanja najprimjerenijega uzorka za ispitivanje žarišnih pitanja (Balcı, 2015; Johnson i Christensen, 2014). Kriterijsko uzorkovanje, postupak korišten u ovome istraživanju, odabir je situacija koje zadovoljavaju niz prethodno utvrđenih kriterija koje je pripremio istraživač ili se može koristiti već postojeći popis kriterija. Lako dostupna metoda uzorkovanja slučaja praktična je i brza: istraživač odabire situacije koje su najbliže i lako dostupne (Yıldırım i Şimşek, 2013).

Za odabir djece za sudjelovanje u istraživanju korišteni su sljedeći kriteriji:

a) ne pokazuje razvojne ni neurološke deficite (zasnovano na informacijama dobivenih od roditelja ili odgajatelja), b) najmanje tri godine je obrazovano prema Montessori programu (Montessori grupa) i najmanje tri prema tradicionalnom/redovnom obrazovanom programu (druga grupa djece), c) roditelji i odgojitelji pristali su na sudjelovanje u istraživanju, d) obitelji djece obje skupine sličnoga su socioekonomskoga statusa – srednjega i/ili visokoga. U istraživanju je sudjelovalo ukupno 100 djece i 10 odgajatelja, od čega je 50 djece pohađalo Montessori vrtiće, a 50 redovne vrtiće koji rade prema progrmu državnoga resornog ministarstva. Grupa djece za usporedbu pohađala je privatni vrtić koji slijedi obrazovani program Ministarstva obrazovanja, a sa sličnim sociodemografskim statusom kao djeca iz Montessori vrtića. Nadalje, djeca u objema skupinama provela su najmanje tri godine u obrazovnom sustavu. Odabrane su dvije grupe ispitanika sa sličnim sociodemografskim karakteristikama zbog pretpostavke da razlike u samoreguliranome učenju djece, njihovim razinama motivacije i izvršnih funkcija nisu rezultat sociodemografskih osobina već isključivo vrste obrazovanja, pa su stoga odabrani vrtići iz centralnoga dijela socioekonomski visokorazvijene četvrti Nilüfer. Korištena su dva indikatora socioekonomskoga statusa: stupanj obrazovanja roditelja (četverogodišnji sveučilišni studij) i indeks siromaštva, koji odražava ekonomski status četvrti u kojoj obitelj živi, a koji je u četvrti Nilüfer bio prilično nizak. Naime, većina ljudi u odabranoj četvrti ima visok životni standard, dok su financijski ugrožena kućanstva rijetka. Roditelji djece iz obiju skupina imaju sličan ekonomski i obrazovni status.

Tablica 1

U istraživanju je sudjelovalo ukupno 100 djece: 50 iz Montessori vrtića, od čega 51 % djevojčica) i 50 iz tradicionalnoga vrtića (od čega 54 % djevojčica). Prosječna dob djece iz Montessori vrtića je 5,5 godina, a djece iz tradicionalnoga vrtića 5 godina. Iz navedenih podataka razvidno je da su djeca iz obiju skupina homogena s obzirom na spol i dob ($P > 0{,}428$).

Instrumenti prikupljanja podataka

Obrazac s osnovnim podatcima o djeci: Podatci o dobi i spolu djece prikupljeni su putem ovoga obrasca, koji su ispunjavali odgojitelji.

Skala razvoja samostalnoga učenja djece (3 - ***5 godina) (turska verzija)*:** Turska adaptacija Skale razvoja samostalnoga učenja djece u dobi od tri do pet godina

primijenjena je kako bi se utvrdila ponašanja samoreguliranoga učenja djece sudionika. Originalnu ljestvicu razvili su Whitebread i suradnici (2009), a turskome kontekstu prilagodili Saraç i suradnici (2019). Skala se sastoji od jednoga faktora sa šesnaest čestica koje se procjenjuju na četverostupanjskoj Likertovoj ljestvici. Test-retest pouzdanosti mjernoga instrumenta iznosila je ,961, a koeficijent unutarnje pouzdanosti ,968. Viši rezultat na skali znači viši stupanj razvoja sposobnosti neovisnoga učenja. Skalu su ispunjavali odgojitelji za svako dijete.

Upitnik dimenzija postignuća za djecu predškolske dobi (UDO-18): Upitnik dimenzija postignuća za predškolsku djecu (UDO-18), koji su osmislili Jozsa i Morgan (2015), sastoji se od sedam poddimenzija i 39 čestica. Sedam poddimenzija su kognitivna ustrajnost, motorička ustrajnost, socijalna ustrajnost s odraslima, socijalna ustrajnost s djecom, zadovoljstvo zbog postignuća, negativne reakcije i opće kompetencije. Čestice se procjenjuju na petostupanjskoj Likertovoj ljestvici. Viši rezultat znači više razine motivacije. Skalu su turskom kontekstu prilagodili Zoben i Dağlıoğlu (2017). Test-retest pouzdanosti skale iznosio je ,85, a Cronbachov alfa koeficijent pouzdanosti ,90 za kognitivnu ustrajnost; za motoričku ustrajnost ,85; za socijalnu ustrajnost s odraslima ,88; za socijalnu ustrajnost s djecom ,86; za zadovoljstvo zbog postignuća ,65; za negativne reakcije ,79 i za opće kompetencije ,94 (Özbey, 2018). Skalu su ispunjavali odgojitelji za svako dijete.

Zadatci za procjenu izvršnih funkcija

U ovome istraživanju odvojeno su se ispitivale radna memorija i inhibicijska kontrola djece, no ta dva koncepta ispitivala su se i zajedno, tj. u isto vrijeme. Osim toga, dječja sposobnost djece da u isto vrijeme koriste pažnju, radnu memoriju, preventivne vještine kontrole i budu u socijalnoj interakciji također je ispitivana. Zadatak Manje je više korišten je za utvrđivanje razine inhibicijskih vještina kontrole djece, zadatak Devet kutija za ispitivanje njihovoga radnog pamćenja, zadatak Dan-noć za ispitivanje radne memorije i inhibicijske kontrole zajedno te zadatak Glava-nožni prsti-koljena-ramena (GNKR) za mjerenje pažnje, radne memorije i inhibicijske kontrole u isto vrijeme.

Manje je više: Ovaj zadatak osmislili su Carlson i suradnici (2005), a turskomu kontekstu prilagodio ga je Ireni (2020). Ovim zadatkom mjere se vještine inhibicijske kontrole djece. Zadatak Manje je više zasnovan je na vjerojatnosti obrnutoga nagrađivanja, a od djece se traži da odaberu mali broj bombona (dva) ili veliki broj bombona (pet) koji su smješteni u dvije prozirne posude. Najviši rezultat je 16. Ustanovljena je umjerena korelacija između mjera na test-retestu pouzdanosti zadatka Manje je više (r = ,39), a Kappa vrijednost slaganja praktičara bila je ,99 (İvrendi, 2020).

Devet kutija: Ovaj zadatak osmislili su Diamond i suradnici (1997), a turskomu kontekstu prilagodio ga je İvrendi (2020). Zadatak služi ispitivanju radne memorije. Od djece se traži da pronađu mali papirnati lik koji je smješten u jednoj od deve kutija s poklopcima raznih oblika i boja. Najviši rezultat na ovome testu je 9. Ustanovljena je umjerena korelacija između mjera primijenjenih na test-retestu pouzdanosti

zadatka Devet kutija (r=,46), a Kappa vrijednost slaganja između praktičara bila je 100 (İvrendi, 2020).

***Dan-noć**:* Ovaj zadatak osmislili su Gerstadt i suradnici (1994), a turskomu kontekstu prilagodio ga je İvrendi (2020). Zadatak ispituje upotrebu radne memorije i inhibicijske kontrole. Djeci je prikazano osam slika Sunca i osam slika Mjeseca, a zadatak obuhvaća fazu obrazovanja (informiranja), praktičnu fazu (vježbanja) i fazu provedbe. U prvoj fazi dijete uči razlikovati sliku dana i sliku noći, a potom imenovati sliku dana kao noć i obrnuto, sliku noći kao dan. U drugoj, praktičnoj, fazi dijete vježba nazivati sliku dana Noć, a sliku noći Dan i pri tome ima pravo na tri kruga vježbanja. Treća faza, tj. faza provedbe počinje ako dijete dva puta uzastopno da točan odgovor u prethodnoj fazi, tj. fazi vježbanja. Provedba se prekida prvi put kada dijete krivo imenuje jednu od dviju slike. U ovome istraživanju u analizu su uključeni samo točni odgovori. Najviši rezultat na ovome zadatku je 16. Utvrđena je visoka korelacija između mjera na test-retestu pouzdanosti zadatka Dan-noć (r= ,90), a Kappa vrijednost iznosila je ,58 (İvrendi, 2020).

Glava-nožni prsti-koljena-ramena (GNKR): Ovim zadatkom, koji su osmislili Cameron Ponitz i suradnici (2008) mjere se vještine korekcije ponašanja djece u dobi od tri do sedam godina. To je alat za mjerenje samoregulacije čija je upotreba jednostavna. Izračunati Cronbachov alfa koeficijent testa pouzdanosti iznosio je 0,96 ukupno. Zadatak su turskome kontekstu prilagodili Sezgin i Demiriz (2015). Vrijednost izračunatoga Cronbachova alfa koeficijenta za prvi dio GNKR-a iznosila je 0,93, za drugi dio 0,95 za treći dio 0,94 i 0,96 ukupno (Sezgin i Demiriz, 2015).

Ovaj mjerni instrument sastoji se od tri dijela s ukupno 30 zadataka (10 u svakom dijelu). Zadataci služe za utvrđivanje pažnje, radne memorije, inhibicijske kontrole i socijalnih interakcija djece. Djeca reagiraju na četiri usmene naredbe, a njihovi se odgovori promatraju i bilježe. Primjena ovoga mjernog instrumenta ne zahtijeva veliku pripremu ni specifične materijale, a zasniva se na interakciji između praktičara i djeteta. U prvome dijelu dijete dotiče glavu i nožne prste suprotno od danih naredbi i nastavlja činiti tako tijekom cijeloga testa. U drugome dijelu dodaju se koljena i ramena. U trećemu dijelu pravila se mijenjaju tako da se uparuje glava s koljenima i ramena s nožnim prstima. Svaki dio ima deset čestica koje se boduju na sljedeći način: 0 za neispravnu reakciju, 1 za samoispravak i 2 za točnu reakciju. Maksimum je 20 bodova za svaki dio, tj. 60 bodova ukupno (Sezgin i Demiriz, 2015).

Prikupljanje podataka

Nakon dobivanja potrebnih dozvola za provođenje istraživanja, intervjuirani su ravnatelji i odgojitelji odabrani opisanom metodom uzorkovanja, a prije intervjua su upoznati sa svrhom i postupkom istraživanja. Radi boljega razumijevanja i besprijekorne primjene mjernih instrumenta, prije provede samoga istraživanja sve su mjerne skale isprobane na uzorku od desetero djece u tihoj prostoriji vrtića. Istraživanje je započelo u ožujku, a skale su primijenjene među djecom nakon jutarnjega perioda slobodnih

aktivnosti. Prvo su provedeni zadatci Manje je više i Dan-noć. Svi mjerni instrumenti primijenjeni su sa svakim djetetom pojedinačno u tihoj prostoriji u vrtiću, a djeci su objašnjene sve skale prije same primjene. Dan nakon izvršavanja zadataka Manje je više i Dan-noć, provedeni su zadatci Devet kutija i Glava-nožni prsti-koljena-ramena. Ako djeca nisu bila sposobna održavati pažnju ili im je bilo dosadno, dobila su dozvolu da se odu igrati u svoje učionice. Točni odgovori bilježeni su na list za odgovore za svako pojedinačno dijete. Od odgojitelja se zahtijevalo da ispune Skalu neovisnoga učenja i Skalu motivacije predškolaca za svako dijete koje je sudjelovalo u istraživanju, s ciljem utvrđivanja samoregulacijskoga ponašanja djece. Odgojiteljima je trebalo približno deset minuta da ispune skale za svako dijete.

Analiza podataka

Normalnost distribucije podataka provjerena je Shapiro-Wilksovim testom. Budući da podatci nisu pokazali normalnu distribuciju, korišteni su neparametrijski testovi, a vrijednosti deskriptivne statistike predstavljene su u obliku vrijednosti medijana (minimalnih do maksimalnih). Dvije usporedbe skupina provedene su upotrebom Mann-Whitney U testa. Razina statističke značajnosti postavljena je kao $\alpha = 0,05$. Za analizu podataka korišten je programski paket SPSS v25.

Rezultati

U ovome dijelu predstavljeni su rezultati s obzirom na izvršne funkcije, samoregulirano učenja i razine motivacije djece obrazovane prema Montessori metodi i djece u tradicionalnom sustavu obrazovanja (MO).

Tablica 2

Rezultati prikazani u Tablici 2 pokazuju da Montessori obrazovni pristup ima značajan utjecaj na razvojne ishode djece, posebno na izvršne funkcije, vještine samoreguliranoga učenja i motivaciju za postignućem. Djeca iz Montessori vrtića postigla su značajno više rezultate u inhibicijskoj kontroli (Manje je više) (16 (0 - 16)), pažnji, radnoj memoriji i inhibicijskoj kontroli (55 (20-59)) i sposobnosti samoreguliranoga učenja (57,5 (29 - 78)) od djece u tradicionalnome vrtiću. Kada se analiziraju poddimenzije Skale motivacije za postignućem, vidljivo je da su rezultati djece u Montessori vrtiću značajno viši od onih u tradicionalnome vrtiću za kognitivnu ustrajnost (22,5 (14 - 25)), visoke razine zadovoljstva (24 (9 - 25)), opće kompetencije (21,5 (16 - 24), ustrajnost s djecom (25 (14 - 30) i izražavanju negativnih emocija (31 (17 - 39)). Osim toga, djeca obrazovana po Montessori programu postigla su više rezultate na poddimenzijama ustrajnost s odraslima (21(13 - 24)) i ustrajnost u motoričkim vještinama (22(14 - 25)) od djece koja su obrazovana prema programu Ministarstva. Na svim poddimenzijama Skale motivacije za postignućem djeca iz Montessori vrtića imala su značajno više rezultate ($p < 0,05$ ili niže) od djece iz tradicionalnoga vrtića, a razlike u poddimenzijama kognitivna ustrajnost ($p < 0,001$), visoka razina zadovoljstva ($p < 0,001$) i opće kompetencije ($p < 0,001$) bile su posebno značajne.

Rasprava

Rezultati ovoga istraživanja važni su za evaluaciju razlika između Montessori i tradicionalnih programa predškolskoga obrazovanja Ministarstva obrazovanja Republike Turske. Analiza rezultata dobivenih primjenom mjernih instrumenata pokazuje značajno više rezultate djece iz Montessori vrtića u području samoreguliranoga učenja, motivacije za postignućem i izvršnih funkcija (inhibicijska kontrola i pažnja, radna memorija, inhibicijska kontrola). Ovaj rezultat pokazuje da Montessori obrazovanje može biti učinkovitije od tradicionalnoga za razvoj izvršnih funkcija djece. Vještine inhibicijske kontrole djece ispitivane su zadatkom Manje je više. Dokazano je da inhibicijska kontrola ima središnju ulogu u razvoju ostalih izvršnih funkcija. Inhibicijska kontrola je izvršna funkcija koja „omogućava djetetu kontrolu nad vlastitim radnjama ili opiranje distraktorima u obliku vanjskih podražaja" (Diamond, 2013).

Inhibicijska kontrola sažeto se može odrediti kao sposobnost otpora i kontrole automatiziranim ponašanjima koja mogu uzrokovati greške (npr. odupiranje porivu za trčanjem po hodniku) (Deshaies i Éthier, 2024; Diamond, 2013). Na osnovi rezultata ovoga istraživanja može se ustvrditi da Montessori obrazovanje značajno utječe na razvoj dječjih izvršnih funkcija, osobito inhibicijske kontrole. Djeca iz Montessori vrtića postigla su visoke rezultate na GNKR zadatku, kojim se mjerila pažnja, radna memorija i inhibicijska kontrola. Ovaj rezultat ukazuje na to da Montessori obrazovanje poboljšava navedene sposobnosti. Denervaud i sur. (2019) također su došli do rezultata da Montessori obrazovanje pozitivno utječe na radnu memoriju djece; Phillips-Silver i Daza (2018) otkrili su u svojem istraživanju poboljšanje izvršnih funkcija, inhibicijske kontrole i kognitivne fleksibilnosti trogodišnjaka u Montessori vrtiću. Rezultati istraživanja Lillarda i suradnika (2017) i Lillarda (2012) govore u prilog naprednijih izvršnih funkcija djece u Montessori obrazovnim institucijama od onih djece obrazovane prema tradicionalnim programima, što potvrđuje pretpostavku da kontinuirano izlaganje Montessori obrazovnom modelu tijekom vremena poboljšava kognitivne sposobnosti (Andújar i Gaitero, 2016). Rezultati istraživanja pokazuju da djeca koja su obrazovana prema Montessori modelu imaju bolje razvijene izvršne funkcije, vještine planiranja i organizacijske vještine, pažnju i emocionalnu regulaciju, a Montessori materijali pozitivno djeluju na razne aspekte izvršnih funkcija djece. Korištenje Ružičastoga tornja, ključnoga Montessori materijala, zahtijeva pažljivo planiranje, a istraživanja pokazuju pozitivan utjecaj biranja i slaganja kocaka po veličini u ovome zadatku na radnu memoriju, kognitivnu fleksibilnost i sposobnost prelaženja s jednoga zadatka na drugi (Lillard, 2012). Prema tome, rezultati ovoga i ostalih istraživanja pokazuju pozitivan utjecaj Montessori obrazovanja na razvoj izvršnih funkcija djece predškolske dobi.

Jedan od rezultata ovoga istraživanja su znatno bolje razvijene sposobnosti neovisnoga, tj. samoreguliranoga učenja djece iz Montessori vrtića od onih djece iz tradicionalnoga vrtića. Ovaj rezultat pokazuje pozitivan utjeca Montessori obrazovanja na vještine samoreguliranoga učenja djece zboga toga što potiče autonomiju u učenju i motivira

djecu na samostalno razmišljanje, a sve navedeno pozitivno utječe na samousmjeravanje i samopouzdanje u učenju. Neovisno ili samoregulirano učenje usmjerava ponašanje učenika s obzirom na svrhu. Samoregulirano učenje je sposobnost djeteta da kontrolira vlastiti proces učenja, što podrazumijeva svjesno planiranje i upravljanje vlastitim procesom učenja. Samoregulirano učenje omogućuje postavljanje ciljeva, oblikovanje strategija, nadgledanje napretka i prilagodbe te razvijanje neovisnih i učinkovitih strategija učenja (Wolters, 2003). Istraživanja pokazuju da su izvršne funkcije djece obrazovane prema Montessori programima na visokoj razini, stoga ona imaju i razvijenu sposobnost samoregulacije (Atis-Akyol, 2023; Denervaud i sur., 2020). Denervaud i sur. (2019) naglašavaju da u usporedbi s njihovim vršnjacima iz tradicionalnih obrazovanih ustanova, učenici obrazovani prema Montessori metodi imaju bolju koncentraciju i karakteristike samoregulacije važne za učinkovito učenje i uspjeh u obrazovanju. Dok postojeća literature govori u prilog pozitivnoga utjecaja Montessori obrazovanja na sposobnosti samoregulirajućega učenja djece (Atis-Akyol, 2023; Denervaud i sur., 2020; Denervaud i sur., 2019), taj učinak nije direktno dokazan kada govorimo o djeci predškolske dobi jer su istraživanja ovoga koncepta prvenstveno usmjerena na djecu starijih dobnih skupina. Denervaud i suradnici (2020) otkrili su razvijenu sposobnost praćenja vlastitih grešaka i izvršnih funkcija samoupravljanja Montessori učenika (8 - 12 godina), što govori u prilog tomu da Montessori okolina podržava razvoj navedenih vještina. Koncept samousmjeravanja u procesu učenja starijih učenika i adolescenata, koji je blisko povezan s konceptom samoreguliranoga učenja, u fokusu je istraživanja već neko vrijeme. Samoregulirano učenje stadij je učenja samousmjeravanjem u kojemu učenik preuzima odgovornost za upravljanje cjelokupnim procesom, od njegovih početaka do ishoda. Ovaj proces obuhvaća određivanje ciljeva učenja i odabir odgovarajućih sredstava. Dok se u procesu učenja samousmjeravanjem sveobuhvatno upravlja procesom učenja, samoregulirano učenje fokusira se na specifične korake i strategije (Zimmerman, 2002; Schunk i Ertmer, 2000). Učenici koji imaju razvijenu sposobnost samoregulacije proaktivno identificiraju vlastite potrebe u procesu učenja i shodno tomu postavljaju ciljeve, odlučuju o primjerenim strategijama, organiziraju materijal i informacije prema važnosti i dostupnom vremenu, nadgledaju vlastito učenje tražeći povratnu informaciju i čine nužne promjene u budućim zadatcima učenja (Winne, 1995; Zimmermann, 2002). Paralelna praksa prisutna je u Montessori pristupu. Uloga učitelja je ograničena na davanje uputa za korištenje materijala. Odgojitelj/učitelj vodi djecu u procesu stvaranja vlastitih iskustava putem neovisnoga korištenja materijala i učenja. Montessori materijali pažljivo se pripremaju kako bi omogućili djeci prepoznavanje i ispravljanje vlastitih grešaka (Oğuz i Köksal Akyol, 2006). S obzirom na ove spoznaje, može se zaključiti da Montessori pristup razvija sposobnost samoreguliranoga učenja tako što djeci pruža priliku neovisnoga odlučivanja o vlastitom procesu učenja. Denervaud i suradnici (2020) u svojem istraživanju otkrili su da učenici u tradicionalnim razredima uče putem povratne informacije učitelja, a u Montessori učionicama dobivaju poticaje za neovisan rad s materijalima koji su

dizajnirani posebno kako bi ih potaknuli na samostalno otkrivanje vlastitih pogrešaka (Calderon, 2024). Kendall (1992) je u svojoj studiji pokazao da Montessori učenici pokazuju značajno više razine neovisnosti, inicijative i vještina samoregulacije od učenika koji pohađaju tradicionalne institucije. Kako je rečeno, učinak Montessori obrazovanja na samoregulirano učenje u dosadašnjim istraživanjima ispitivan je među starijom djecom. Međutim, malo je istraživanja koja su se bavila samoreguliranim učenjem i povezanim strukturama djece predškolske dobi. Stoga bi trebalo provesti više studija koje bi istražile ove konstrukte, s posebnim fokusom na utjecaj Montessori obrazovanja na samoregulirano učenje u predškolskom periodu.

Na osnovi analize poddimenzija Skale motivacije za postignućem ustanovljeno je da su djeca obrazovana prema Montessori programu postigla značajno više rezultate nego djeca u tradicionalnom vrtiću u poddimenzijama kognitivne ustrajnosti, visokoga zadovoljstva, opće kompetencije i ustrajnosti s djecom, kao i u izražavanju negativnih emocija. Osim toga, djeca iz Montessori vrtića postigla su više rezultate na poddimenzijama ustrajnost s odraslima i ustrajnost u motoričkim vještinama nego djeca iz tradicionalnoga vrtića. Razlike u poddimenzijama kognitivne ustrajnosti ($p < 0,001$), visokih razina zadovoljstva ($p < 0,001$) i opće kompetencije ($p < 0,001$) su posebno značajne. Poddimenzija kognitivne ustrajnosti Skale motivacije za postignućem mjeri kognitivnu uključenost djeteta pri izvršavanju zadataka. Rezultati pokazuju da Montessori obrazovanje povećava motivaciju djece za ponavljanjem specifičnoga zadatka dok ne ovladaju određenom vještinom, njihovu želju da riješe zadano unatoč produženom trajanju i ustraju u rješavanju teških zadataka. Rezultati istraživanja pokazuju napredne izvršne vještine djece u Montessori obrazovnim ustanovama, što pozitivno utječe na njihovu sposobnost planiranja, usmjeravanja pažnje i učinkovitoga upravljanja emocijama (Lillard, 2012). Dobro razvijene izvršne funkcije posljedično omogućuju djeci rješavanje kompleksnih zadataka i uspješno suočavanje s problemima (Drever i sur. 2015). Poddimenzija visokih razina zadovoljstva mjeri sposobnost djece da izraze zadovoljstvo, tj. radost i uzbuđenje zbog vlastitoga postignuća. Rezultati dobiveni u ovome istraživanju pokazuju da djeca iz Montessori vrtića imaju razvijenu motivaciju za rad na zadatku dok ne postignu uspjeh, neovisno o trajanju i složenosti zadatka. Prijašnja istraživanja pokazuju da djeca doživljavaju visoku razinu radosti i zadovoljstva pri uspješnom rješavanju zadataka. Navedeni rezultati pokazuju da Montessori metoda može povisiti samoučinkovitost i sveukupno zadovoljstvo djeteta jer omogućuje neovisnost i uspjeh u izvršavanju zadataka. U Montessori pristupu djecu se potiče da odabiru vlastite aktivnosti, promiče se autonomija djece i osjećaj zasluge za vlastito iskustvo učenja. Tako ostvarena autonomija prijemčiva je za principe motivacije za postignućem (Koh i Frick, 2010), a djeca u takvim okolinama pokazuju povišenu sklonost aktivne uključenosti u zadatcima koja sama odaberu. Rezultati istraživanja pokazuju da su djeca u Montessori programima često vrlo ustrajna u izvršavanju zadataka jer su njihove aktivnosti istraživanja i posljedično dubinsko razumijevanje koncepata podržani. Kao rezultat, djeca obrazovana prema Montessori programu

imaju intenzivan osjećaj postignuća i emocionalnoga zadovoljstva (Fleming i sur., 2019). U istraživanju Rathundea (2003) djeca obrazovana prema Montessori programu izrazila su povišene razine aktivnosti, snage, uzbuđenja, sreće, opuštenosti, socijalne interakcije i ponosa tijekom obrazovanih aktivnosti. Također su izrazila više razine uživanja, povišeni interes za rad i jaču želju za sudjelovanjem u obrazovnim aktivnostima od svojih vršnjaka obrazovanim po tradicionalnim programima. Rezultati ovoga istraživanja pokazuju visoke razine općih kompetencija, socijalne ustrajnosti s djecom i negativnih emocionalnih reakcija djece iz Montessori vrtića. Visoke razine motivacije za postignućem koju su pokazala djeca u Montessori vrtiću mogu se objasniti pedagoškim pristupom koji naglašava suradničko učenje i grupne aktivnosti. Montessori pristup obrazovanju naglašava suradničko učenje, koje dokazano povisuje razine motivacije za postignućem (Mutmainna i sur., 2024). Poddimenzija općih kompetencija mjeri percepciju djece vlastitih sposobnosti u različitim domenama, uključujući razumijevanje i primjenu znanja, kao i njihovu sposobnost učinkovitoga suočavanja s izazovima i njezinu samopercepciju. Rezultat visoke percepcije općih kompetencija djece pokazuje da Montessori pristup razvija dječje samopouzdanje i sposobnosti rješavanja problema. Poddimenzija ustrajnosti u društvenim odnosima mjeri sposobnost djece da ustraju u igri s vršnjacima: na primjer, koliko dugo se igrati s drugima, kako prepoznati kada se prijatelji žele igrati, kako prepoznati osjećaje prijatelja i kako se prema njima ponašati. Rezultati ovoga istraživanja pokazuju da Montessori obrazovanje razvija vršnjačke odnose i socijalne vještine djece. Özçelik i Sapsağlam (2023) u svojem istraživanju uspoređivali su socijalne kompetencije djece u Montessori i valdorfskom sustavu i djece u redovnom obrazovnom sustavu. Rezultati istraživanja pokazali su da Montessori program razvija socijalne kompetencije djece više od ostalih. Slično tomu, Keçecioğlu (2015) je dokazao da djeca obrazovana po Montessori programu imaju razvijenije socijalne vještine od djece obrazovane prema nacionalnomu programu. U Montessori vrtićima starija i mlađa djeca zajedno sudjeluju u aktivnostima, što znači da starija djeca imaju priliku igrati se s mlađom i voditi ih u tom procesu. Ovaj pristup pozitivno utječe na razvoj komunikacijskih i socijalnih vještina djece svih dobi (Edwards i sur., 2009). Međusobna interakcija djece potiče se jedinstvenim karakteristikama Montessori pristupa poput zajedničkoga sudjelovanja u aktivnostima, pri čemu djeca uče jedni od drugih i međusobno se podržavaju; korištenja unikatnih materijala za učenje – jedno se dijete igra dok drugo čeka svoj red – i obrazovnih prostora (sobe i učionice) u kojima su grupe djece mješovite dobi. Navedene značajke razvijaju ustrajnost u odnosima s vršnjacima. Poddimenzija negativnih reakcija mjeri izražavanje negativnih emocija djece poput ljutnje, srama i bijesa koje djeca osjećaju kada dožive neuspjeh. Istraživanja pokazuju sposobnost djece u Montessori obrazovanju da izraze vlastite negativne emocije zbog neuspjeha, što bi moglo značiti da će ustrajati u pokušajima rješavanja zadatka unatoč neuspjehu. Prirodno je doživljavati i izražavati pozitivne i negativne emocije, a njihovo potiskivanje je nezdravo. Važno je izražavati emocije otvoreno i primjereno, bez obzira na to jesu li pozitivne ili negativne. Iako su neka

istraživanja dokazala povezanost između fizičke agresije i negativnoga emocionalnog izričaja (Ersan i Tok, 2020), važno je promatrati izražavanje negativnih emocija kao legitiman dio ljudskoga iskustva. Općeprihvaćeno je da su emocije poput sreće, ljutnje, tuge, straha, zbunjenosti i odvratnosti osnove ljudskoga iskustva. Istraživanja pokazuju da djeca imaju četiri osnovne emocije: sreću, ljutnju, tugu i strah. Općepoznato je da su ovo četiri primarne emocije. Istraživanja naglašavaju da su te emocije dominantne u predškolskome periodu. Osim toga, djeca predškolske dobi često strah iskazuju kao iznenađenje, a ponekad ljutnju kao odvratnost (Ersan i Tok. 2020). Montessori obrazovanje uči djecu izražavanju osnovnih emocija primjereno dobi i doprinosi pozitivnom upravljanju emocijama. Rezultati ovoga istraživanja pokazuju višu motivaciju za postignućem djece iz Montessori vrtića od motivacije djece koja ne pohađaju Montessori vrtić. Ovaj rezulat u skladu je s rezultatima u literaturi (Lillard i sur., 2017; Courtier i sur., 2021). Prokofieva (2019) je dokazala da Montessori obrazovanje razvija samomotivaciju djece, čak i u područjima za koja nisu posebno zainteresirana. Rathunde (2009) je primijetio da Montessori obrazovne okoline mogu pozitivno utjecati na motivaciju djece, a Setiawan i Ena (2019) naglašavaju da Montessori pristup potiče prirodnu sklonost učenju i doprinosi razvoju intrinzične motivacije. Motivacija za postignućem može se promatrati kao nagon za angažmanom i svladavanjem zadataka, što je krucijalno u obrazovanju u ranome djetinjstvu. U Montessori vrtićima djeca istražuju vlastite interese i angažirana su u samousmjerenom učenju, preuzimajući zasluge za vlastito obrazovanje (Lillard, 2012). Spomenuti oblik autonomije dokazano je povezan s intrinzičnom motivacijom, koja utječe na intenzivnije sudjelovanje djece u zadatcima i vodi većoj upornosti i kognitivnoj uključenosti (Lillard i sur., 2017; Courtier i sur., 2021). Istraživanja pokazuju da djeca obrazovana u Montessori ustanovama pokazuju više razine intrinzične motivacije od svojih vršnjaka iz tradicionalnih obrazovanih okružja (Koh i Frick, 2010; Liu, 2023). Međutim, važno je napomenuti kako postoji manjak istraživanja koja direktno ispituju razine motivacije za postignućem djece predškolske dobi u Montessori sustavu obrazovanja. U istraživanju Lillarda i suradnika (2017) vještine djece obrazovane prema Montessori programu brže su se razvijale od djece iz kontrolne skupine, što se može objasniti izostankom ekstrinzične nagrade u Montessori programima. Utjecaj Montessori obrazovanja na razine motivacije starije djece bio je predmet prijašnjih istraživanja. Na primjer, Rathunde i Csikszentmihalyi (2005) pokazali su da učenici srednjih Montessori škola imaju višu razinu intrinzične motivacije od svojih vršnjaka u tradicionalnim školama, a Batubara i suradnici (2020) ističu da djeca u osnovnim Montessori školama imaju više razine motivacije od vršnjaka u tradicionalnim školama te da su Montessori materijali jedan od faktora koji utječu na povišene razine motivacije. Prema navedenim rezultatima istraživanja može se reći da Montessori pristup ima potencijala za razvoj motivacije djece na različitima razinama obrazovne vertikale. Navedeni pristup pozitivno utječe na razine motivacije zbog toga što potiče neovisnost, samopouzdanje i spontano sudjelovanje u aktivnostima učenja bez ekstrinzičnoga potkrjepljivanja

(Setiawan i Ena, 2019; Lillard i sur., 2017). U Montessori obrazovnim okružjima pozitivan utjecaj na motivaciju za postignućem sukus je jedinstvenih obilježja poput unaprijed pripremljenih materijala prema interesima i potrebama djece, učitelja koji potiče dijete na neovisnost, aktivnosti djece u procesu učenja i samoupravaljanje učenjem, obrazovne okoline koja podržava intrinzičnu motivaciju i izostanka ekstrinzičnih nagrada.

Zaključak

Rezultati ovoga istraživanja pokazuju da Montessori obrazovanje pozitivno utječe na motivaciju za postignućem, samoregulirano učenje i izvršne funkcije djece predškolske dobi. Ovi rezultati omogućit će sveobuhvatnije i korisnije primjene Montessori metode u obrazovanju djece i olakšati razumijevanje značajnoga učinka Montessori pristupa na predškolskoj razini obrazovanja te osvijetliti vezu između motivacije, samoreguliranoga učenja i izvršnih funkcija djece predškolske dobi. Poznato je da Montessori pristup obrazovanju podržava razvoj izvršnih funkcija te tako tako pomaže djeci u rješavanju problema i razvoju strategija učenja (Denervaud i sur., 2019; Andújar i Gaitero, 2016). Montessori obrazovanje naglašava učenje usmjereno na dijete, neovisnost i razvoj vještina samoupravljanja. Ovaj pristup ima potencijal za razvoj samoreguliranoga učenja putem ohrabrivanja djece na preuzimanje inicijative i razvoj intrinzične motivacije koja je važna za uspjeh u obrazovanju i cjeloživotno učenje. Obrazovanje prema Montessori principu naglašava autonomiju i samoodređenje, a istraživanja pokazuju da djeca u Montessori učionicama često doživljavaju veće razine autonomije od djece u klasičnome obrazovanju, što vodi većoj motivaciji i angažmanu (Lillard i sur., 2021; Johnston, 2016). Samoregulirano učenje je kritično za uspjeh u obrazovanju, posebno u okružjima ranoga djetinjstva poput Montessori vrtića. Montessori metoda naglašava neovisnost, samousmjerenje i aktivno sudjelovanje u učenju, što je važno za razvoj vještina samoregulacije djece (Follmer i Sperling, 2016; Effeney i sur., 2013). Montessori prakse potiču djecu na preuzimanje odgovornosti za vlastita iskustva učenja. Ovaj pristup u skladu je sa samoreguliranim učenjem jer obuhvaća metakognitivne, motivacijske i bihevioralne procese koji djeci omogućuju upravljanje vlastitim učenjem (Effeney i sur., 2013; Follmer i Sperling, 2016). U Montessori obrazovnim okolinama djeca samostalno odabiru aktivnosti, određuju ciljeve i razmišljaju o vlastitom učenju, što intenzivira intrinzičnu motivaciju i samousmjeravanje procesa učenja (Atis-Akyol, 2023; Denervaud i sur., 2020). U ovome istraživanju otkrivene su statistički značajne razlike u inhibicijskoj kontroli, izvršnim funkcijama, samoreguiranome učenju i motivaciji za postignućem između djece obrazovane po Montessori metodi i djece obrazovane prema programu resornoga ministarstva, što naglašava dobrobit Montessori obrazovanja u kognitivnome, socijalnome i emocionalnome području.

Ograničenja i preporuke

Iako rezultati ovoga istraživanja pokazuju da Montessori obrazovanje pozitivno utječe na motivaciju za postignućem djece, njihovo samoregulirano učenje i izvršne

funkcije u predškolskome periodu, važno je naglasiti da su ovi rezultati dobiveni zbog presječnoga dizajna istraživanja. Moguće preporuke za edukatore koji rade s djecom predškolske dobi su integracija samoreguliranoga učenja, izvršnih vještina i motivacije za postignućem u kurikule i obrazovne okoline. Ovo istraživanje ima i nekih ograničenja. Za formiranje uzorka upotrijebljena je lako primjenjiva metoda namjernoga uzorkovanja. Zbog specifičnosti kriterija nije bilo moguće nasumično formirati uzorak te je u istraživanje uključen samo ograničeni broj vrtića uključen u uzorak. Moguće je da su ovaj postupak uzorkovanja i posljedični nenasumični uzorak imali utjecaja na rezultate. Osim toga, istraživanje je osvijetlilo utjecaj Montessori obrazovanja na dječje izvršne vještine, a ostali faktori koji utječu na motivaciju, samoregulirano učenje i izvršne funkcije nisu ispitivani. Istraživanje se oslanjalo na izvještaje odgojitelja koji su komentirali ponašanja djece u obrazovnim skupinama, ali ti izvještaji se možda ne podudaraju s najvažnijim aspektima samoreguliranoga učenja (Davis i sur., 2021).