

## ANALYSIS OF GAME-BASED ACTIVITIES AND DRAMATIC PLAY EFFECTS ON PRE-SCHOOLERS' EXECUTIVE FUNCTIONING

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### ABSTRACT

Executive function are mental skills that includes flexible thinking, working memory, and self-control needed daily to learn, work, and manage daily life. This study evaluates a comparative analysis of game-based activities and dramatic play effects on executive functioning among pre-school children. A pre-test, post-test, and control group quasi-experimental research design was used in this work. The study included a sample of eighty (80) pre-schoolers from public and private schools in six local government areas of the Ogun East Senatorial District, ranging in age from five to six years. For six weeks, each group had intervention meetings. Data were gathered using Dawson and Guare's (2010) Executive Function Skills Questionnaire for Children (Preschool and Kindergarten Version). Data were analysed using a One-way ANCOVA with results tested at .0 level of significance. Findings revealed among others, that game-based activities and dramatic play intervention had similar effects on executive functioning of pre-school children ( $F(1, 79) = 2.265; p > .05$ ). The study concluded that both intervention strategies are effective in the improvement of pre-school children executive functioning.

**Keywords:** Dramatic play; Executive function; Game-based activities; Pre-school children.

### INTRODUCTION

The most crucial period of a child's existence is the early years, from birth to school age. These are the most important years in human development. A child's social behaviour, personality, and IQ all develop at this time. Scientists studying the nervous system have shown that the early years are when the brain develops most quickly and completely. However, a child's early environment has a significant impact on how their brain circuits develop. Therefore, providing stimulation at the right time will ensure proper networking of these brain cells. One of the areas of brain development in children that needs to be critically examined is the executive functioning skills. A person's ability to control and modify their conduct is known as executive function (EF) (Zealzo et al., 2016). The capacity to concentrate, retain, and process information, block out distractions, and shift gears is a component of this regulation and adaptation (Zelazo et al., 2016).

The frontal lobe is the region of the brain responsible for controlling these abilities. The executive function facilitates attention span switching, avoidance of incorrect speech or action, experience-based decision-making, memory of specifics, multitasking, planning and organisation, and time management. An individual whose executive function is impaired exhibits less regulated behaviour, which can impair their capacity to work, attend school, operate independently, and uphold positive relationships. Therefore, efforts should be made to enhance executive function skills in children, for them to function effectively now and also in future. Early life acquisition of EF skills is essential for maximising growth. Indeed, EF is a

good indicator of kindergarten preparedness; children with higher levels of EF also do better in the classroom (Willoughby et al., 2017). Additionally, research indicates that kindergarten performers do better academically overall (Jones et al., 2015).

Executive functioning skills are the intellectual skills needed for the cognitive skills needed for thought control, emotional control and actions. They are skills needed to function well in life. It has a lot of benefits for the children themselves and the society at large. Children with executive function deficits struggle to learn how to avoid distractions, be determined and persistent in solving problems, control their harsh reactions, develop a leadership and teamwork spirit, follow multi-step instructions, and make decisions, among other skills. When children's EF skills are strengthened, society generally benefits from having more educated citizens who can handle the difficulties of the twenty-first century, more income generated by an adaptable workforce, a creative, increased social cohesion, lower rates of crime, talented, and safer neighbourhoods. It is therefore important to investigate the term executive function, and evaluate the best method to use in improving the E.F skills in children, especially the ones in the pre-primary school. Unfortunately, some schools do not teach EF skills effectively, so the children who struggle are often misunderstood and shamed. One of the areas with which researchers have suggested to help in the development of executive function in children is the inclusion of game-based activities and dramatic play in the learning activities of preschool children.

Games, both digital and conventional, are used to support and enhance teaching, learning, and assessment in game-based activities, also known as game-based learning (GBL). It offers a teaching strategy that encourages hands-on, active learning and has the power to pique students' interest and inspire them. The use of games in teaching children make them to be actively involved in the daily lessons since it gets their attention, while they are interested in learning a game. Observations have revealed that children are natural lovers of games. A game relaxes tension, clears boredom and fosters an environment where teaching and learning is pleasant, interesting, exciting, stimulating, motivating and academically rewarding (Cheung & Ng, 2021). At any age, games are a great way to learn, but they are especially valuable for younger pupils. Playing games gives children the chance to practise both their skills and weaknesses. It enables children to try things out by trial and error, figure out the best approaches, solve issues, and gain new abilities and confidence. It's simple for adults to overlook the benefits of games and believe that children should be learning through good education instead of playing games, yet playing games with children is just as vital because it enhances learning.

Certain gaming interventions, such as those centred on computer training, martial arts, meditation, and physical activity, have been noted to potentially aid in the development of executive functions (Diamond & Lee, 2015). The term "cognitive games" refers to a collection of several games that are intended to enhance cognitive abilities and are utilised for training and intervention (Ramos et al., 2019). Based on their features, one may comprehend that the games aid in the development of executive functions because they encourage training in a secure environment and can produce learning that extends beyond the actual game play. Research has demonstrated the value of assessing how children's use of digital games affects their executive processes, flexibility and reasoning, and working memory and attention (Rueda et al., 2012).

Rueda et al. (2012) conducted a study that included 37 5-year-old children who were separated into two groups based on relevant research. The first group underwent 10 sessions of computerised attention training, whereas the control group did not participate in any intervention sessions. Children's performance on a range of tasks, including attention, intelligence, and attachment management, was evaluated before to, throughout, and two

months following the conclusion of training. According to the findings, the trained group's children activated their executive care network more quickly and effectively than the untrained children (Rueda et al., 2012). Rosas et al. (2019) suggested using digital games for three months in the classroom to help 1,274 first- and second-year students meet the learning objectives. Aspects of spelling, math skills, reading comprehension, and play motivation were among the competencies evaluated in the youngsters.

The results demonstrated a substantial difference in reading, writing, and mathematics between the experimental and control groups. The authors draw the conclusion that encouraging learning in the classroom can be accomplished with the help of digital games. These studies demonstrate how purposeful and mediated game use in the classroom can foster the development of social and emotional competencies in addition to improving cognitive function since peer use of games takes place in a social context. Social connection, the need to handle failure and frustration, success, conflict, and negotiation all have an impact on the development of these skills. Children learn social skills and interests through gaming interaction, which also advances their development (Wang & Aamodt, 2012). Furthermore, the children's interaction with the partner is essential to the process because, beyond just sharing a place, the youngster develops empathy, learns new ways to interact with others, and gains respect for other children.

Dramatic play, sometimes referred to as pretend play, starts when young children start to act out while they are playing, and it lasts until elementary school when they start to explore through media, literature, and fantasy (Kostelnik et al., 2011). Playing pretend meant acting out familiar actions, like stirring an empty pot or tending to a doll. When children get closer to turning three, they can at least briefly include other children in their pretend play. On the other hand, socio-dramatic play accounts for a large portion of pretend play for children aged 4, 5, and 6. Older pre-schoolers' play themes span from the everyday (pets, the grocery store, a fire station, etc.) to the fantastical (superheroes, mermaids, etc.), future-focused (jobs), and scientific (sea animals, space travel, planets, etc.). Many learning possibilities are provided by dramatic play for pre-schoolers in all developmental domains. By engaging in peer conversations, they will expand their vocabulary, hone their motor skills by manipulating dramatic play elements, practise perspective-taking when reacting to their peers' play roles, develop social skills, and sharpen their cognitive abilities as they debate themes and offer play ideas.

In dramatic play, children participate in a variety of real-world scenarios, pretending to be someone or something different from themselves, and inventing situations and actions that match their chosen roles. Pretend play or dramatic play is very helpful for a child's development. Dramatic play helps children to step away from the problem and think about it from different angles. It helps children understand different ways of finding solutions. Stated differently, children who play dramatic roles really acquire the primary executive function skills—impulse control, emotional regulation, flexibility, planning, prioritisation, self-awareness, task initiation, working memory, and organization—through their play. As children play, they talk to themselves. This “talking” is an important sign that they are in control of their thoughts. It is a sign that the child incorporates the guidance of others into his/her own behavioural pattern. During dramatic play, children act out stories that they have heard before, things they have experienced before, or things their teacher have taught them in the class before. Children find it challenging to employ working memory, which is the capacity to retain information in the mind and retrieve it from long-term memory whenever needed.

When acting out or telling stories, children need to use their executive function skills to connect parts of their story together and create naturally relevant elements. While listening to others and waiting their turn, they practice impulse control skills. Executive function has

been found to be associated with children's dramatic play (Thibodeau-Nielsen et al. 2020). In fact, inhibitory control is thought to be associated with children's dramatic play because children must inhibit reality in order to maintain the imagined elements of play (Carlson et al., 2014). Similarly, cognitive flexibility may be associated with dramatic play. Such activities include understanding the perspectives of an imaginary other and the ability to move in and out of the play frame in order to manage the play.

Play has been shown to be an effective way to improve learning and brain development in recent years. Additionally, research indicates that children's play improves their executive function (EF) abilities (Gibb et al., 2021). Thibodeau-Nielsen et al. (2020) examined whether or not a sample of 191 Head Start pre-schoolers' dramatic play behaviours predicted executive function effects in the first grade and whether or not dramatic play mitigates the negative effects of increased risk on children's development of executive function. The findings supported the hypothesis that dramatic play in preschool and executive function in first grade have a favourable association. Additionally, there was a negative correlation between higher risk in preschool and first-grade EF outcomes and dramatic play; the correlation was smaller for children who played more dramatic than for those who played less dramatic. Subsequent analyses indicate that dramatic play may have a significant impact on the inhibitory control component of EF in that particular population.

Similar to this, Walker et al. (2020) studied pre-school teachers in Brisbane, Australia, as part of an intervention programme that incorporates executive function exercises into teachers' regular practices and uses dramatic play to create situations that are relevant to problems that children can solve using their executive function abilities. The study involves teachers and children creating an imaginary situation or play world for a period of time, could be one school term. The study revealed that teachers can improve children's EFs when EF activities are included in teachers' everyday practices, and when dramatic play is used to develop relevant problem circumstances that children can solve using executive functions skills.

More recently, White et al. (2021) looked into how social and solitary dramatic play by pre-schoolers during one school year could predict how inhibitory control, a crucial part of executive function, develops. 132 Spanish-speaking pre-schoolers from ten Head Start classrooms in the southwest of the country participated in this study. According to the study, dramatic play was the only play activity that could be used to predict the development of inhibitory control in preschool settings. The study supported an increasing body of theoretical and empirical evidence supporting the significance of dramatic play in the development of executive function and underlined the need for future research on play-based therapies.

The purpose of this study is to experimentally conduct a comparative study of game-based activities and dramatic play, analyse it, and find out which of it is most effective in improving the executive functioning of pre-school children. Therefore, this study evaluates the effects game-based activities in comparison with dramatic play effects on the executive function of pre-primary school pupils in Ogun East Senatorial District of Nigeria.

## METHODOLOGY

### Design

Pre-, post-, and control group components were included in this quasi-experimental study design. Treatments were evaluated at two levels: the game-based group and dramatic play group.

## Participants

All pre-primary students in the one-year mandatory pre-primary program, which comes before Primary One in public and private primary schools in Ogun East Senatorial District, Ogun State, Nigeria, between the ages of five and six, form the population for this study. For the study, a sample of eighty pre-schoolers was employed. The five- to six-year-old pre-schoolers attended both public and private schools. For the investigation, a multi-stage sampling method was used. Using a simple random selection procedure, four local government areas were selected at the first stage from among the nine local governments in Ogun State's Ogun East Senatorial Districts.

One public and one private pre-primary school were chosen at random from each of the four local government areas to make a total of two schools from each local authority. There were ten pupils sampled in each school, for a total of eighty pupils. Second, both privately owned, government-approved and registered pre-primary schools as well as public primary schools that provided pre-primary lessons were selected at random. These were selected from the list of selected municipal administrations. Among the schools, the experimental groups were assigned at random.

## Instrument

The Executive Skills Questionnaire for Children-Revised (Preschool and kindergarten Version) created by Dawson and Guare (2010) was adopted for data collection. The Likert scale response format with 33 item scale having 11 skill areas that appear to represent discrete and independent executive skill domains was created to assess the level of the executive skills of children in order to determine the individual strength and weaknesses of each child. The Executive Skills Questionnaire has sufficient validity and reliability, according to research. Test-retest reliability was determined to be .70, and internal consistency estimates include Cronbach's alpha = .91 (showing great internal consistency) and Guttman split-half coefficient = .91 (indicating outstanding internal consistency reliability) (Striat et al., 2020).

The questionnaire, for the purpose of this study was completed for each child by teachers of the schools visited, based on how well it describes each child in their class to show their strength and weakness in executive skills.

## Procedure

The study was carried out in three phases:

### *Phase One: Pre-treatment*

Participants were selected and assigned into treatment groups and control group. All the pre-primary school children in the sampled classes of the Schools were administered with the research instrument. Therefore, participants based on their score were rated low and high respectively. The children observed to have low executive function skills according to the outcome of the pre-test were selected. Ten (10) children each were randomly sampled from the twelve (12) pre-primary schools visited in the six (6) local government used for this study. The children from the schools were randomly assigned into treatments and a control group.

### *Phase Two: Treatment*

The treatment packages were administered on the participants for a period of six weeks covering the highlight of game-based exercise and exposing the children to dramatic play sessions under the different treatment group. The class teachers in the sampled classes were trained as research assistants before the administration of the treatment package.



### **Phase Three: Post Treatment**

This is where the treatment programme's evaluation phase is at. In order to assess the efficacy of the treatment packages, the participants in the two groups were given the instrument once more at the eighth week. Thereafter, the researcher appreciated the participants for their involvement in the experiment before her departure.

### **Method of Data Analysis**

Analysis of Covariance (ANCOVA), an inferential statistical technique, was used to examine the pre- and post-evaluation results. Because of the quasi-experimental pre- and post-test designs, two experimental non-equivalent intact groups, and two treatment designs (dramatic play and game-based exercise), ANCOVA was employed to evaluate the hypotheses. A Scheffe To determine the reason behind these notable variations, post hoc analysis was employed, and graphs were utilised to decipher important interaction effects. Every hypothesis was examined with a significance threshold of  $p < .05$ .

## **RESULTS**

### **Preliminary Analysis of Data**

**Table 1.** Descriptive Statistics of Participants' Executive function by Treatment.

Treatment	Mean	Std. Deviation	N
Game-Based play	76.40	11.515	40
Dramatic play	73.45	9.432	40
Total	74.93	10.564	80

Results in Table 1 revealed the descriptive statistics of executive functioning of participants in the two experimental treatment groups, game- based activities and dramatic play groups. It was observed that participants in the game-based activity group and had a mean score of 76.40 and a standard deviation of 11.515, while those in the dramatic playgroup had a mean score of 73.45 and standard deviation of 9.432.

### **Hypothesis Testing**

**Table 2.** Estimates of Effect of Treatment on Executive function of Participants  
Grand Mean = 74.925<sup>a</sup>

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Game-Based play	73.762 <sup>a</sup>	1.067	71.637	75.886
Dramatic play	76.088 <sup>a</sup>	1.067	73.964	78.213

Table 2 showed the mean and standard error for executive functioning among preschool children under game-based activity and dramatic play treatment groups with covariates appearing in the model and evaluated at 54.30. the grand mean was 74.925.

**Table 3.** Tests of Between-Subjects Effects of Treatment on the Executive function of Participants

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5484.657 <sup>a</sup>	2	2742.329	63.394	.000	.622
Intercept	10356.607	1	10356.607	239.413	.000	.757
PretestExec	5310.607	1	5310.607	122.765	.000	.615
Treatment	97.992	1	97.992	2.265	.136	.029
Error	3330.893	77	43.258			
Total	457916.000	80				
Corrected Total	8815.550	79				

The result in Table 3 indicated that there is no significant difference in the effect of game-based activity and dramatic play intervention on executive functioning of pre-school children ( $F(1, 79) = 2.265, p > .05$ ). In effect, the hypothesis of no significant difference in executive function among pre-primary children treated with game-based activity and those with dramatic play was accepted by this finding. That implies that both intervention strategies provide similar effects on pre-primary school children's executive function. The results are visually presented in Figure 1.

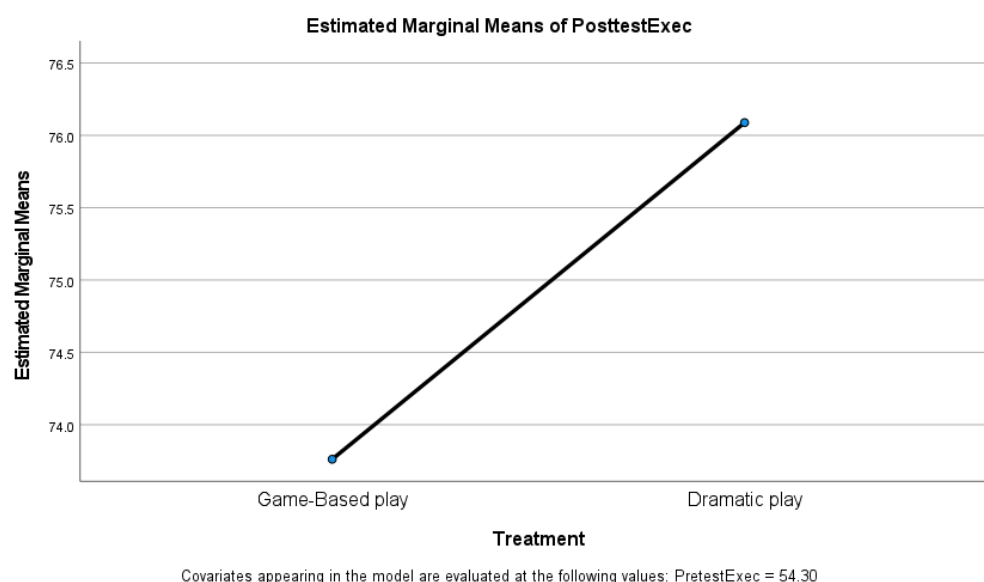


Figure 1: Treatment Effects on Participants' Executive function.

## DISCUSSION

This study investigated the comparative effect of game-based activity and dramatic play on executive functioning among pre-primary school children. As hypothesized, there was no significant difference in executive functioning of pre-school children treated with game-based activity and dramatic play. This means both strategies are similar in their effects on executive function among pre-school children.

The results of this study are not unexpected because all of the intervention strategies have been investigated and proven to be successful on a variety of outcome variables. For example, Rosas et al. (2013) suggested using digital games for three months in the classroom to help 1,274 first- and second-year students meet their learning objectives. Aspects of spelling, math skills, reading comprehension, and play motivation were among the competencies evaluated in the youngsters. Significant differences in reading, writing, and mathematics were

found between the experimental and control groups. The authors concluded that using games to promote learning in the classroom can be a good idea.

In their investigation into the impact of group games on the development of executive functions and social skills in pre-schoolers, Amani et al. (2019) supported these results. With experimental and control groups and a pre-test–post-test design, this study was quasi-experimental. The entire preschool population of Bojnord, Iran, was included in the statistical population. The experimental group participated in twelve 45-minute sessions centred around games designed to boost executive functions. The findings showed that improving children's social skills through team activities enhances their executive function, including cognitive flexibility, inhibitory response, and self-regulation.

Similarly, Thibodeau et al. (2016) used an innovative play intervention using a randomised controlled design to study the directionality of the observed relationship between Fantasy Orientation (FO), which has to do with dramatic or pretend play, and Executive function (EF) development in preschool-aged children. Three conditions were randomly allocated to a sample of 110 children aged three to five years: fantastical pretend-play intervention, non-imaginative play intervention, or business as usual control. The findings showed that whereas children in the other two conditions did not demonstrate gains in EFs, children who took part in a 5-week intervention that involved fantastical pretend-play did. These findings support the hypothesis that fantasy-oriented play, like dramatic play, and EF development are equifinally related. As a result, fantasy-oriented play may be one of several strategies for directly promoting EF development.

Walker et al. (2020) also carried out a study in Brisbane, Australia, involving preschool teachers on an intervention programme in which teachers incorporate executive function exercises into their daily routines and use dramatic play to create situations that are relevant to problems that children can solve with their executive function abilities. The study revealed that teachers can improve children's EFs when EF activities are included in teachers' everyday practices, and when dramatic play is used to develop relevant problem circumstances that children can solve using executive functions skills.

In a different study, White et al. (2021) looked at how social and solitary dramatic play by pre-schoolers during one school year could predict the development of inhibitory control, which is an important part of executive function in the southwest of the United States. According to the study, dramatic play was the only play activity that could be used to predict the development of inhibitory control in preschool settings.

Looking at the findings by different scholars above proved that the use of games is a good medium to enhance active learning and improve children's problem-solving skills as well as improve their executive functioning skills. It has been shown to increase personal achievement and lead to better performance for certain goals in children. Game-based activity is a fun way to teach and learn. Similarly, Preschool children are known for playing impulsively, but dramatic play helps in self-regulation as they play. Youngsters are encouraged to adhere to a set of guidelines that are paired with a pretend play situation. They also learn to act their roles in a way that makes sense for their other playmates. This helps people improve their EF skills—the capacity to control impulses, collaborate with others, and create plans (Erstad, 2022). From all literatures reviewed, dramatic play is a good instrument for cognitive development.

Since games and dramatic play take place in the context of peer social interaction, all the studies mentioned above have demonstrated the benefits of using them in the classroom, particularly when done intentionally and through mediation. These activities not only help students develop their cognitive skills but also their social and emotional intelligence.



## CONCLUSION

Based on the study's results, it was determined that the effects of dramatic play and game-based activities on pre-schoolers' executive functioning were comparable, suggesting that both types of techniques are equally beneficial.

## RECOMMENDATION

The findings of this study revealed that Game-based activity and dramatic play have equal positive effects on the executive functioning among pre-school children. Based on this, the following recommendations are made:

More research on play-based interventions is recommended, as they could have great effect on the cognitive and social development of the children, most especially the pre-schoolers.

Pre-primary education should not be about chalk and talk alone, certain activities should be inculcated into teaching and learning, like imaginative play, storytelling, dancing and singing, use of games as teaching tools and so on.

Schools should provide a more conducive environment for pre-primary school children and provide different play and game materials for children to develop their executive functioning skills. Teachers and care givers should be trained on how to inculcate dramatic play and game-based activities into their teaching and learning to enhance the development of executive functioning in pre-school children.

Policy makers are encouraged include dramatic play and games into the curriculum of the pre-schools and ensuring that teachers use this as part of inculcating knowledge in the children. Authors and publishers of children textbooks are encouraged to incorporate dramatic play and game-based activities in the children's books, rather than just reading and writing activities.

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