Hands-on experiments for cognitive stimulation of young children of slums

[1]Deepti Rani, [2]Dr.Suvidha

[1]Ph.D. Scholar, [2]Associate Professor
Banasthali VIdhyapeeth, Rajasthan

***Abstract*: This paper conducts a literature review to determine the best methods for improving children's cognitive development. Based on the findings, the researcher concludes that hands-on learning, i.e., a collaborative process in which the focus is on doing the activities, is the most effective method for improving cognitive development in preschool children. Cognitive development of young children had been thrust area of researches in last 25 years. Myriad research papers are available that embark upon the various angles and operation involved in cognition in young children. These papers open up the areas and dimension for futuristic researches.**

Introduction

Practical experiments allow people to learn by doing and experiencing things rather than merely reading about them. The phrase "hands-on" is employed because these jobs typically require the physical use of one's hands. For example, rather than being taught the theory through books or pencil and paper exercises, children may be taught mathematical concepts through manipulatives such as counting cubes and sorting objects.

For young children, who learn best via hands-on experiences, experiments are especially important because of the way their brains are wired. From the moment they are born, children learn by imitating, and experimenting with their hands and bodies. Play is still the most significant way for kids to learn new skills. Children learn skills far more rapidly while they are having fun. With traditional pencil and paper or flashcards, for instance, teaching the alphabet and essential letter forming skills to young children may quickly become boring.

Allowing children to draw letters with their fingers in a tray of sand or shaving foam, or providing playdough or clay to form the letters, is a pleasant practice that will not appear difficult or frightening. In addition to being more pleasant, learning about letters in this manner increases the likelihood that youngsters will remember how to form the letters more successfully than more traditional reading activities. It must be conceded that carrying out practical experiments in the classroom is tough. On the one hand, students establish their own conclusions by interpreting what they hear, read, and witness throughout an experiment, whereas students who require more direction struggle to grasp the experiment (Thanasoulas, 2001). This is necessary so that teachers are aware of the precautions to take when conducting experiments, are prepared to manage the classroom, and understand how to handle supplies.

Many studies have found that teaching learners through hands-on experiments improves their growth since it is "a process whereby conceptions are created from and continually changed by experiences" (Kolb, 1984: 26). According to Norman (2005), the majority of studies have found that when students are taught using this manner, they are more interested in science and other disciplines. Kids may also be fascinated by practical activities as their interest in science grows (Andersen and Vandehey, 2012). The development of students' intrinsic motivation will eventually inspire them to learn more about science on their own. Allen (1973) discovered that when teachers used hands-on experiments in science classrooms, pupils' conduct and discipline improved dramatically. Additionally, Jindrich (1998) discovered that learning by doing improves memory in both adults and toddlers.

Reviews

Author	Purpose	Research design	Target population	Psychosocial assessment	Result
Douglas H. Clements et al. 1999	Preschoolers can utilize the examined criteria to tell members of a class of forms apart from other figures.	Survey method	3-6 years old children	Hands on activities (shapes)	"The study revealed that young newborns initially establish schemas based on visual shape feature analysis. While these schemas are evolving, youngsters continue to differentiate forms largely by visual matching."
Terry D et al. 1999	To investigate the connection between cognitive growth and taking part in an organized music programmed.	Experimental study	4-6 years old children	1.A pre- and post-tested with six subtests of the Stanford-Binet	"This study discovered a link between early music instruction and spatial-temporal cognitive ability."

				Intelligence Scale 2.Music Skills Assessment (MSA)	
Rasol Abdullah Mirzaie et al. 2009	To investigate how science-related activities affect the development of creative thinking in male preschoolers.	Experimental study	Six years children	Torrance's Test of Creative Thinking (TTCT)	"The findings demonstrated a significant difference in TTCT scores between the experimental and control groups, as well as before and after education in the experimental group."
FilizErbay and S. Sunay Yildirimdogru 2010	To assess the success of creative theatre education in helping preschool-aged impaired kids integrated into mainstream education learn social communication skills including greeting, joining the group, and starting a conversation.	Observational study	Six-years old child	Social Communication Skills Evaluation Observation Form	"It was discovered that creative theatre instruction has a considerable favorable influence on the subject's social communication abilities."
Elena Chronopoulou and Vasiliki Riga 2012	1. Investigated how preschoolers' creative thinking was affected by music and movement exercises. 2. To study that how the program affected creative behaviors.	Experimental research	Five years old children	Using an experimental research approach, a three-month instructional programmed was created and put into action.	"The findings demonstrated that these variables' growth rates in the experimental group were significantly different from their equivalent rates in the control group."
Munevver Can Yasar and Neriman Aral 2012	To determine how theatrical instruction affects young children's imaginative thinking.	Experimental study	61-72 months old children	the pre-test and post-test-retention test experimental design	"Demonstrated a significant difference between the experimental and control group children's creative thinking scores."
Jessica Hoffmann and Sandra Russ 2012	To investigate the connections between pretend play, creativity, emotion control, and executive functioning in kids.	Evaluative study	61 female children	1.Children's cognitive and affective processes measures by play scale (APS). 2.Checklist	"The findings of this study provide credence to hypotheses that relate play, creativity, and emotion control."
Sharon M. Ramshay, MPH 2013	To research how the children's cognitive development is impacted by their environment's stimulation and social interaction	Observational study	Four years old children	Over the course of six weeks, there were 15 hours of observation with the kids.	"The children's surroundings was shown to have a favorable effect on their cognitive development, with peer-interaction-based activities having the greatest effects."

Bilge Taskin-Can 2013	To look at the impact of creative drama-based training on scientific process abilities and light and sound unit learning.	quasi-experimental design	Preschool children	1.“Scientific Process Skills Test” and the “Achievement Test” 2. Five lesson plans constructed by researcher	“Students in the experimental group, where creative drama education was used, and the control group, who were taught through teacher-centered instruction, showed statistically significant achievement and scientific process skills test differences in favor of the experimental group during the study's light and sound science units.”
Saroja Dhanapal and Evelyn Wan Zi Shan 2014	To assess the value of hands-on experiments in learning Science	Mix method, Comprising of qualitative and quantitative research method	4-year-old students	Hands-on experiments activities	“The results showed that certain students performed better because they learned and recalled information better through practical experiments.”
Valerie Carson et al 2015	To conduct a thorough evaluation of all observational and experimental research looking at the connection between early childhood physical exercise and cognitive development.	Systematic study	Below five years children	Reviewed the previous studies	“There is no evidence that longer or more frequent physical activity has a statistically significant negative impact on cognitive development. Studies from six of the seven were graded as having a high risk of bias and poor quality.”
Marina Ebert 2015	This article discusses the creation and preliminary validation of a workshop that teaches kids how to express their emotions and be creative via participation in the visual arts.	Experimental study	6-12 years old children	6 sessions workshop(intervention)	“The programmed was well-received by the kids, and they expressed interest in future chances for art-based learning.”
Cecilia O. Ekwueme et all. 2015	The effect of the hands-on approach on students' academic achievement and their perceptions of this activity-based methodology were examined.	quasi-experimental research design	60 students	Pretest, posttest, Questionnaire and interview schedule	“The study found that students' performance and involvement in math and science activities had improved.”

Tam, Po Chi 2016	This study attempts to look into a group of toddlers' creative learning of theatrical education.	Observational and case study	4-5 years old	Data from the draw-and-tell activity was utilized to help kids artistically recount and reimagine their dramatic experiences as a final reflection.	"The study's findings demonstrate a complex interplay between teaching, learning, and researching, confirming that a certain sort of creative learning in theatre education is molded not only by a specific style of teaching, but also by the research approach."
Jessica D. Hoffmann and Sandra W. Russ 2016	Research has shown that play skills improvement programmed can be successful.	1.Pilot 2.Experimental study	5-8 years old	1. Intervention 2. The Alternate Uses Test (Wallach & Kogan, 1965), a test of divergent thought, and a narrative assignment were used to gauge creativity. The Positive and Negative Affect Schedule for Children was used to gauge state positive affect.	"The results point to the advantages of pretend play in child development and show that school-based treatments for enhancing play and creativity are feasible."
N Rao et al 2017	To assess the efficiency of various early childhood treatments in fostering children's cognitive development in developing nations and to pinpoint the variables that influence intervention efficacy.	Meta-analysis research design	Children below 8 years	Compared and evaluate to published intervention studies	"The most successful programmed were comprehensive programmed (g=1.05), followed by child-focused education and stimulation (g=0.64), parent-focused support (g=0.44), income supplements (g=0.23), and nutrition and health treatments (g=0.11)."
Gunseli Yildirim and Guzin Oz Yilmaz Akamca 2017	To research how preschoolers' cognitive, motor, linguistic, and social-emotional development is affected by outdoor activities.	Quasi-experimental research design	Preschool children	Pre-test and post-test model constructed by researcher	"Outdoor activities boosted preschoolers' cognitive, linguistic, social-emotional, and motor skills, according to the research."
Sanja Simlesa et al. 2017	To investigate the association between language comprehension in preschoolers and several executive processes (inhibitory control,	Correlational study	4-5 years old children	The measuring instruments for assessment of the children's executive functions were Grass/Snow task; Inhibition task	"This study highlights the significance of working memory and inhibitory control for preschoolers' language understanding."

	working memory, planning, and cognitive flexibility).			(NEPSY-II); Digit Span task; CANTAB tasks and Dimensional Change Card Sort.	
Sedighe Momeni et al 2017	To investigate how youngsters between the ages of 4 and 6 are affected creatively by theatre.	Experimental and Descriptive study	4-6 years old	1. Workshop 2. Creativity level measured using the creativity test of Jean-Louis Callier	"The findings showed that youngsters aged 4 to 6 had much more inventiveness after participating in creative theatre."
Rukiyah et all. 2017	To show and persuade early childhood education professionals that science process skill development can be taught in an engaging and efficient manner even in a kindergarten with minimal resources.	case study design	5-6 years	observational forms and child worksheets	"Even in kindergartens with few resources, like Sri Jaya Kindergarten in Palembang, science learning with a process skill method demonstrated beneficial for fostering children's scientific literacy."
Zeynep Deere 2019	To identified the kid's creativity in the preschool.	Experimental study	3-6 years	1.Torrance Creative Thinking Test (TCTT), 2. Intervention (pretest, Posttest)	"The findings demonstrated that preschool instruction positively boosted children's inventiveness."
Reza Nawafella Alya Parangu 2019	To examine the place of digital storytelling in kindergarten teaching.	Evaluative and qualitative study	3-7 years	1.Interview schedule 2 Reviewed the previous studies	"The findings demonstrated that digital storytelling is particularly beneficial for youngsters who grow up in today's digital age; with this technique, they are more motivated to study."
Ilham A.E. Zaeni et all. 2020	To create color and shape learning media for kindergarten students.	The Research and Development (R&D) method	5-6 years	development model for this learning media (the Arduino, TCS3200 color sensor, DF Player, and color card)	"The device's testing revealed that its accuracy for color and form identification is 97 percent, which is considered to be a very good result."
Jenny Yun-Chen Chan and Nicole R. Scalise 2022	To investigate the connection between early childhood numeracy and executive function.	Descriptive and correlation research	3-6 years	1. Minnesota Executive Function Scale 2.Training sessions	"Children's EF skills were discovered to be a predictor of their concurrent abilities in set counting, numeral recognition, number comparison, and number line estimate."

Megan Foulkes et all. 2022	To assess the effects of kid-led household activities for early numeracy, such as child number talk and impromptu concentration on numerosity (SFON).	Mixed method research design	3-5 years	questionnaire, Play-based observation	"The composite numeracy score was not substantially correlated with child-led abilities."
Indrani Nath et al	To examine how slum children's primary education is impacted by their living situation, their house and neighborhood, their parents' education, and their schooling.	Mix method, quantitative and qualitative research design	6-14 years age group	Schedule on socio-economic status and physical facilities of primary school	"According to the research, factors that positively affect a child's education include migration, health, the family's employment, the mother's education level, the family's per-capita income, living conditions, the house and neighborhood, and school infrastructure."

Conclusion

Many studies have found that teaching learners through hands-on experiments improves their growth since it is "a process whereby conceptions are created from and continually changed by experiences" (Kolb, 1984: 26). According to Norman (2005), the majority of studies have found that kids are more interested in science and other topics.

The growth of preschool kids depends on hands-on learning. They gain from this type of education in two significant ways. First of all, hands-on learning gives young pupils the opportunity to experiment with and acquire new concepts through a number of modalities. Second, the way they learn encourages the development and activation of neural networks in their brains. These linkages will aid the student's continued growth and education as they age. A preschool classroom should first be set up to encourage active learning. Desks, tables, and chairs should not be the main attraction in this room at this age. Young children can't and shouldn't be expected to sit still for lengthy periods of time. Pipe cleaner bins, modelling clay, a water table, finger paint, glue, crayons, geoboards, and building bricks are some ideas for manipulatives.

For pupils to learn, reading and writing have long been useful methods. Since the dawn of time, it has essentially been the primary method of teaching students. But current research indicates that giving pupils knowledge with different sides helps them learn and remember it better. According to studies, kids learn best when they are actively immersed in what they are learning, participating in hands-on classroom games and activities. According to scientists, when kids engage all of their senses, the brain develops connections that make it simpler and faster for them to remember knowledge. In reality, including interactive games and activities into the classroom may help children of all ages. Hands-on classroom games and activities may be added to and modified for any curriculum, whether you're studying math or science, history or language arts.

References

Journals

1. Saroja Dhanapal and Evelyn Wan Zi Shan (2014). A STUDY ON THE EFFECTIVENESS OF HANDS-ON EXPERIMENTS IN LEARNING SCIENCE AMONG YEAR 4 STUDENTS. International Online Journal of Primary Education, 3(1).

2. Munevver Can Yasar, Neriman Aral (2012). Drama Education on the Creative Thinking Skills of 61-72 Months Old Pre-school Children. US-China Education Review A 6, 568-577.

3. Filiz Erbay and S. Sunay Yildirim dogru (2010). The effectiveness of creative drama education on teaching the social communication skills in mainstreamed students. Procedia Social and Behavioral Sciences 2, 4475–4479.

4. Elena Chronopoulou and Vasiliki Riga (2012). The Contribution of Music and Movement Activities to Creative Thinking in Pre-School Children. Creative Education, 3(2).

5. Sharon M. Ramshay (2013). Cognitive Development in Preschool: Case Study of a Class of Four-Year-Old Children in a Head Start Program. Cognitive Development in Preschool.

6. Sanja Simlesa, Maja Cepanec, Marta Ljubesic (2017). The Role of Executive Functions in Language Comprehension in Preschool Children. Psychology, 8.

7. Gunseli Yildirim and Guzin Ozyılmaz Akamca (2017). The effect of outdoor learning activities on the development of preschool children. South African Journal of Education, 37(2).

8. Rasol ABDULLAH MIRZAIE, Farideh HAMIDI, Ashraf ANARAKI (2009). A Study on the Effect of Science Activities on Fostering Creativity in Preschool Children. Journal of TURKISH SCIENCE EDUCATION, 6 (3).

9. Rao Nirmala, Sun Jin, Chen Eva E, Ip Patrick (2017) Effectiveness of early childhood interventions in promoting cognitive development in developing countries: A systematic review and meta-analysis. Hong Kong Journal of Paediatrics, 22, (1).
10. Jayne Trickett, Sophie Batchelor, Bonnie Brittle, Megan Foulkes, Jayne Pickering, Felicity Slocombe, Camilla Gilmore (2022). The role of parent-led and child-led home numeracy activities in early mathematical skills. Cognitive Development 63.
11. Rukiyah, Marlina, Mohammad Kanedi (2017). Child Science Skill Improvement through Hands-On Learning Activities in Kindergarten with Limited Human Resources and Facilities. American Journal of Educational Research 5(5).
12. Ilham A.E. Zaeni, M. Iqbal Akbar Kartika. Kirana Dessy. Anzani (2020). Development of Color and Shape Learning Device for Kindergarten Students. Advances in Social Science, Education and Humanities Research 487.
13. Bilge Taskın-Can (2013). The Effects of Using Creative Drama in Science Education on Students' Achievements and Scientific Process Skills. Elementary Education Online 12(1).
14. Valerie Carson, Stephen Hunter, Nicholas Kuzika, Sandra A. Wiebe, John C. Spencea, Alinda Friedmanc, Mark S. Tremblay, Linda Slater, Trina Hinkleyg (2015). Systematic review of physical activity and cognitive development in early childhood. Journal of Science and Medicine in Sport 30(30).
15. Tam, Po Chi (2016). Children's creative understanding of drama education: A Bakhtinian perspective. Thinking Skills and Creativity, 29-39.
16. Marina Ebert, Jessica D. Hoffmann, Zorana Ivcevic, Christine Phan and Marc A. Brackett (2015). Teaching Emotion and Creativity Skills through Art: A Workshop for Children. The International Journal of Creativity & Problem Solving, 25(2).
17. Maila D. H. Rahiem (2021). Storytelling in early childhood education: Time to go digital
International Journal of Child Care and Education Policy 15(4).
18. Jessica D. Hoffmann, Sandra W. Russ (2016). Fostering Pretend Play Skills and Creativity in Elementary School Girls: A Group Play Intervention. Psychology of Aesthetics, Creativity, and the Arts, 10(1).
19. Jenny Yun-Chen Chan and Nicole R. Scalise (2022). Numeracy skills mediate the relation between executive function and mathematics achievement in early childhood. Cognitive Development, 62.
20. Jessica Hoffmann and Sandra Russ (2012). Pretend Play, Creativity, and Emotion Regulation in Children. Psychology of Aesthetics, Creativity, and the Arts, 6(2).
21. Cecilia O. Ekwueme, Esther E. Ekon & Dorothy C. Ezenwa-Nebife (2015). The Impact of Hands-On-Approach on Student Academic Performance in Basic Science and Mathematics. Higher Education Studies, 5(6).
22. Sedighe Momeni, Mohammadreza Khaki, Rahmat Amini (2017). The Role of Creative Drama in Improving the Creativity of 4-6 Years Old Children. Journal of History Culture and Art Research, 6(1).
23. Terry D. Bilhartz, Rick A. Bruhna, Judith E Olson (1999). The Effect of Early Music Training on Child Cognitive Development. Journal of Applied Developmental Psychology, 20(4).
24. Douglas H. Clements, Sudha Swaminathan, Mary Anne Zeitler Hannibal, Julie Sarama (2014). Young Children's Concepts of Shape. Journal for Research in Mathematics Education, 30(2).

Webliography

1.https://www.academia.edu/27382886/Elementary_Education_of_Slum_Children_An_Attempt_to_Reach_the_Un_reached_Nimai_Chand_Maiti
2. https://www.scitepress.org/Papers/2018/88188/88188.pdf
3. (ncbi-nlm.nih.gov/books/NBK216774)
4. (appletreekindergarten.com/blog/benefit-s-hands-learning-children/
5. funearlylearning.com/importance-pre-k-learning/
6. theedadvocate.org/importance-of-hands-on-learning-in-early-education/
7. Kidz-village.ac.th/hands-on-activities-for-young-children-and-their-benefits/