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

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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

<table>
<thead>
<tr>
<th>Author</th>
<th>Purpose</th>
<th>Research design</th>
<th>Target population</th>
<th>Psychosocial assessment</th>
<th>Result</th>
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</thead>
<tbody>
<tr>
<td>Douglas H. Clements et al. 1999</td>
<td>Preschoolers can utilize the examined criteria to tell members of a class of forms apart from other figures.</td>
<td>Survey method</td>
<td>3-6 years old children</td>
<td>Hands on activities (shapes)</td>
<td>“The study revealed that young new borns initially establish schemas based on visual shape feature analysis. While these schemas are evolving, youngsters continue to differentiate forms largely by visual matching.”</td>
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<tr>
<td>Terry D et al. 1999</td>
<td>To investigate the connection between cognitive growth and taking part in an organized music programmed.</td>
<td>Experimenta l study</td>
<td>4-6 years old children</td>
<td>1.A pre- and post-tested with six subtests of the Stanford-Binet</td>
<td>“This study discovered a link between early music instruction and spatial-temporal cognitive ability.”</td>
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<td>Intelligence Scale</td>
<td>2. Music Skills Assessment (MSA)</td>
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**Rasol Abdullah Mirzaie et al. 2009**

To investigate how science-related activities affect the development of creative thinking in male preschoolers.

*Experimentation*

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.”

**Filiz Erbay 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-year-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-year-old children

Using an experimental research approach, a three-month instructional program 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.”
<table>
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<tr>
<th>Authors</th>
<th>Title</th>
<th>Methodology</th>
<th>Participants</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilge Taskin-Can 2013</td>
<td>To look at the impact of creative drama-based training on scientific process abilities and light and sound unit learning.</td>
<td>quasi-experimental design</td>
<td>Preschool children</td>
<td>“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.”</td>
</tr>
<tr>
<td>Saroja Dhanapal and Evelyn Wan Zi Shan 2014</td>
<td>To assess the value of hands-on experiments in learning Science</td>
<td>Mix method, Comprising of qualitative and quantitative research method</td>
<td>4-year-old students</td>
<td>“The results showed that certain students performed better because they learned and recalled information better through practical experiments.”</td>
</tr>
<tr>
<td>Valerie Carson et al 2015</td>
<td>To conduct a thorough evaluation of all observational and experimental research looking at the connection between early childhood physical exercise and cognitive development.</td>
<td>Systematic study</td>
<td>Below five years children</td>
<td>“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.”</td>
</tr>
<tr>
<td>Marina Ebert 2015</td>
<td>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.</td>
<td>Experimenta study</td>
<td>6-12 years old children</td>
<td>“The program was well-received by the kids, and they expressed interest in future chances for art-based learning.”</td>
</tr>
<tr>
<td>Cecilia O. Ekwueme et al. 2015</td>
<td>The effect of the hands-on approach on students’ academic achievement and their perceptions of this activity-based methodology were examined.</td>
<td>quasi-experimental research design</td>
<td>60 students</td>
<td>“The study found that students’ performance and involvement in math and science activities had improved.”</td>
</tr>
<tr>
<td>Authors</td>
<td>Title</td>
<td>Research Question</td>
<td>Methodology</td>
<td>Participants</td>
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<tr>
<td>Tam, Po Chi, 2016</td>
<td>This study attempts to look into a group of toddlers' creative learning of theatrical education.</td>
<td>Observation and case study</td>
<td>4-5 years old</td>
<td>Data from the draw-and-tell activity was utilized to help kids artistically recount and reimagine their dramatic experiences as a final reflection.</td>
</tr>
<tr>
<td>Jessica D. Hoffmann and Sandra W. Russ, 2016</td>
<td>Research has shown that play skills improvement programmed can be successful.</td>
<td>Pilot 1. Experimental study</td>
<td>5-8 years old</td>
<td>1. Intervention 2. The Alternate Uses Test (Wallach &amp; 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.</td>
</tr>
<tr>
<td>N Rao et al, 2017</td>
<td>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.</td>
<td>Meta-analysis research design</td>
<td>Children below 8 years</td>
<td>Compared and evaluate to published intervention studies</td>
</tr>
<tr>
<td>Günseli Yıldırım and Güzin Öz Yılmaz Akamca, 2017</td>
<td>To research how preschoolers’ cognitive, motor, linguistic, and social-emotional development is affected by outdoor activities.</td>
<td>Quasi-experimental research design</td>
<td>Preschool children</td>
<td>Pre-test and post-test model constructed by researcher</td>
</tr>
<tr>
<td>Sanja Simlesa et al, 2017</td>
<td>To investigate the association between language comprehension in preschoolers and several executive processes (inhibitory control,</td>
<td>Correlational study</td>
<td>4-5 years old children</td>
<td>The measuring instruments for assessment of the children’s executive functions were Grass/Snow task; Inhibition task</td>
</tr>
<tr>
<td>Authors</td>
<td>Research Question</td>
<td>Methods</td>
<td>Sample</td>
<td>Findings</td>
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<tr>
<td>Sedighe Momeni et al, 2017</td>
<td>To investigate how youngsters between the ages of 4 and 6 are affected creatively by theatre.</td>
<td>Experimental and Descriptive study 1. Workshop 2. Creativity level measured using the creativity test of Jean-Louis Callier</td>
<td>4-6 years old</td>
<td>“The findings showed that youngsters aged 4 to 6 had much more inventiveness after participating in creative theatre.”</td>
</tr>
<tr>
<td>Rukiyah et al., 2017</td>
<td>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.</td>
<td>Case study design</td>
<td>5-6 years</td>
<td>observational forms and child worksheets</td>
</tr>
<tr>
<td>Zeynep Deere, 2019</td>
<td>To identify the kid’s creativity in the preschool.</td>
<td>Experimental study</td>
<td>3-6 years</td>
<td>1. Torrance Creative Thinking Test (TCTT), 2. Intervention (pretest, Posttest)</td>
</tr>
<tr>
<td>Reza Nawafella Alya Parangu, 2019</td>
<td>To examine the place of digital storytelling in kindergarten teaching.</td>
<td>Evaluative and qualitative study</td>
<td>3-7 years</td>
<td>1. Interview schedule 2. Reviewed the previous studies</td>
</tr>
<tr>
<td>Ilham A.E. Zaeni et al., 2020</td>
<td>To create color and shape learning media for kindergarten students.</td>
<td>The Research and Development (R&amp;D) method</td>
<td>5-6 years</td>
<td>Development model for this learning media (the Arduino, TCS3200 color sensor, DF Player, and color card)</td>
</tr>
<tr>
<td>Jenny Yun-Chen Chan and Nicole R. Scalise, 2022</td>
<td>To investigate the connection between early childhood numeracy and executive function.</td>
<td>Descriptive and correlation research</td>
<td>3-6 years</td>
<td>1. Minnesota Executive Function Scale 2. Training sessions</td>
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### Table

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<thead>
<tr>
<th>Name</th>
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<th>Methodology</th>
<th>Age</th>
<th>Data Collection</th>
<th>Conclusion</th>
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</thead>
<tbody>
<tr>
<td>Megan Foulkes et all. 2022</td>
<td>To assess the effects of kid-led household activities for early numeracy, such as child number talk and impromptu concentration on numerosity (SFON).</td>
<td>Mixed method research design</td>
<td>3-5 years</td>
<td>questionnaire, Play-based observation</td>
<td>“The composite numeracy score was not substantially correlated with child-led abilities.”</td>
</tr>
<tr>
<td>Indrani Nath et al</td>
<td>To examine how slum children's primary education is impacted by their living situation, their house and neighborhood, their parents' education, and their schooling.</td>
<td>Mix method, quantitative and qualitative research design</td>
<td>6-14 years age group</td>
<td>Schedule on socio-economic status and physical facilities of primary school</td>
<td>“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.”</td>
</tr>
</tbody>
</table>

### 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 assist the student's continued growth and development 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, geoboard, 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 parents and their schooling.

### References

**Journals**


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