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Mentoring Program for Early Childhood Education: A Community-Based Intervention at Himawari Learning Center

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ABSTRACT

This community service program implemented a science play activities mentoring initiative at Himawari Early Childhood Education Center (TPA-KB-TK Himawari) in Semarang, Indonesia. The program aimed to introduce basic science concepts to young children through enjoyable play-based activities while providing parental education on supporting science learning at home. The intervention involved 30 participants including children, parents, and educators. The program utilized simple, safe materials for hands-on experiments such as color mixing, light refraction with CDs, and creating mini lava lamps. Results demonstrated high engagement from children and positive responses from parents regarding the importance of early science introduction. The initiative successfully bridged the gap between theoretical knowledge and practical application in early childhood science education while strengthening university-community partnerships. This program contributes to community development by enhancing educational quality and promoting scientific literacy from an early age.

Keywords:
Early childhood education, science play activities, community engagement, parental involvement, STEM education.

Introduction

Early childhood education (ECE) serves as a crucial foundation for cognitive, affective, and psychomotor development in young children. During this critical period, learning should be approached through methods that are both enjoyable and aligned with children's developmental characteristics. One particularly effective approach involves play-based learning activities, especially those that introduce basic science concepts in simple and engaging ways. Research consistently demonstrates that playful experiences lead to deeper learning when they are joyful, actively engaging, meaningful, iterative, and socially interactive (Parker & Thomsen, 2019).

Science play activities possess the capacity to stimulate children's curiosity, develop critical thinking skills, and naturally introduce scientific processes into daily life experiences. Current research indicates that young children have the capacity for constructing conceptual learning and the ability to use the practices of reasoning and inquiry (National Research Council, 2012). However, the implementation of science activities in ECE environments, including childcare centers (TPA), playgroups (KB), and kindergartens (TK), remains suboptimal. This limitation stems from resource constraints, including educators who are not yet familiar with scientific approaches for early childhood education and limited access to child-friendly learning tools and media.

Parental involvement plays a particularly significant role in enhancing educational outcomes for young children. Extensive research indicates that parental involvement plays a more influential role in a child's academic success compared to socioeconomic status, race, ethnicity, or educational background (Wilder, 2014). When parents are more engaged with teachers and show greater school involvement in ECE settings, their children demonstrate better kindergarten readiness (Arnold et al., 2008; Powell et al., 2010). Furthermore, research evidence suggests that during early years, parents play the central role in creating home environments that support brain development and learning (National Academies of Sciences, Engineering, and Medicine, 2016).

The integration of science education with play-based learning approaches addresses multiple developmental needs simultaneously. Play-based learning in early childhood education has been recognized as an effective pedagogical approach that supports holistic child development while maintaining engagement and enjoyment. This approach aligns with contemporary educational frameworks that emphasize active learning, hands-on exploration, and meaningful experiences that connect to children's everyday lives.

This community service initiative was designed to address the identified gap in science education implementation at the early childhood level while simultaneously empowering parents as active partners in their children's learning journey. The program represents a collaborative effort between higher education institutions and community-based educational organizations to enhance the quality and effectiveness of early childhood education through evidence-based practices.

Methods

Program Design and Planning

The Science Play Activities Mentoring Program was developed by faculty members from the Physics Department at Universitas Islam Negeri (UIN) Walisongo Semarang, namely Istikomah, M.Sc. and Wenty Dwi Yuniarti, M.Kom, along with undergraduate student Niswatul Fauziah. The program was designed as a community service initiative targeting early childhood education enhancement through science-based play activities.

Program preparation involved extensive coordination with Himawari Learning Center management to establish scheduling and ensure facility and participant readiness. The team developed comprehensive materials covering two primary focus areas: science play activities for young children and educational parenting sessions for parents. All experimental materials were selected based on household availability and safety considerations, including water, cooking oil, food coloring, and other child-safe materials.

Participants and Setting

Participants included children enrolled at the learning center, their parents, and the educational staff. The total number of participants was approximately 30 individuals across all categories. The learning center provided the venue and basic facilities, while the university team supplied specialized materials and expertise.

Program Structure and Implementation

The intervention was structured into two parallel sessions to maximize effectiveness and engagement:

Session 1: Science Play Activities for Children Children participated in hands-on science experiments designed to stimulate curiosity about natural phenomena. Activities included color mixing experiments, light refraction demonstrations using compact discs, and creating miniature lava lamps using cooking oil, water, and effervescent tablets. Each activity was carefully supervised by team members and classroom teachers to ensure safety and learning effectiveness.

Session 2: Parental Education Workshop Parents attended an educational session covering the importance of early science introduction, parental roles in supporting play-based learning, and practical examples of science activities that could be conducted at home. The session employed interactive discussion formats, encouraging parents to share experiences and ask questions about supporting their children's learning (Figure 1).

Materials

All experimental materials were selected based on accessibility, safety, and educational value. Materials included common household items such as water, cooking oil, food coloring, compact discs, effervescent tablets, and various containers. This approach ensured that parents could replicate activities at home without requiring specialized or expensive equipment.

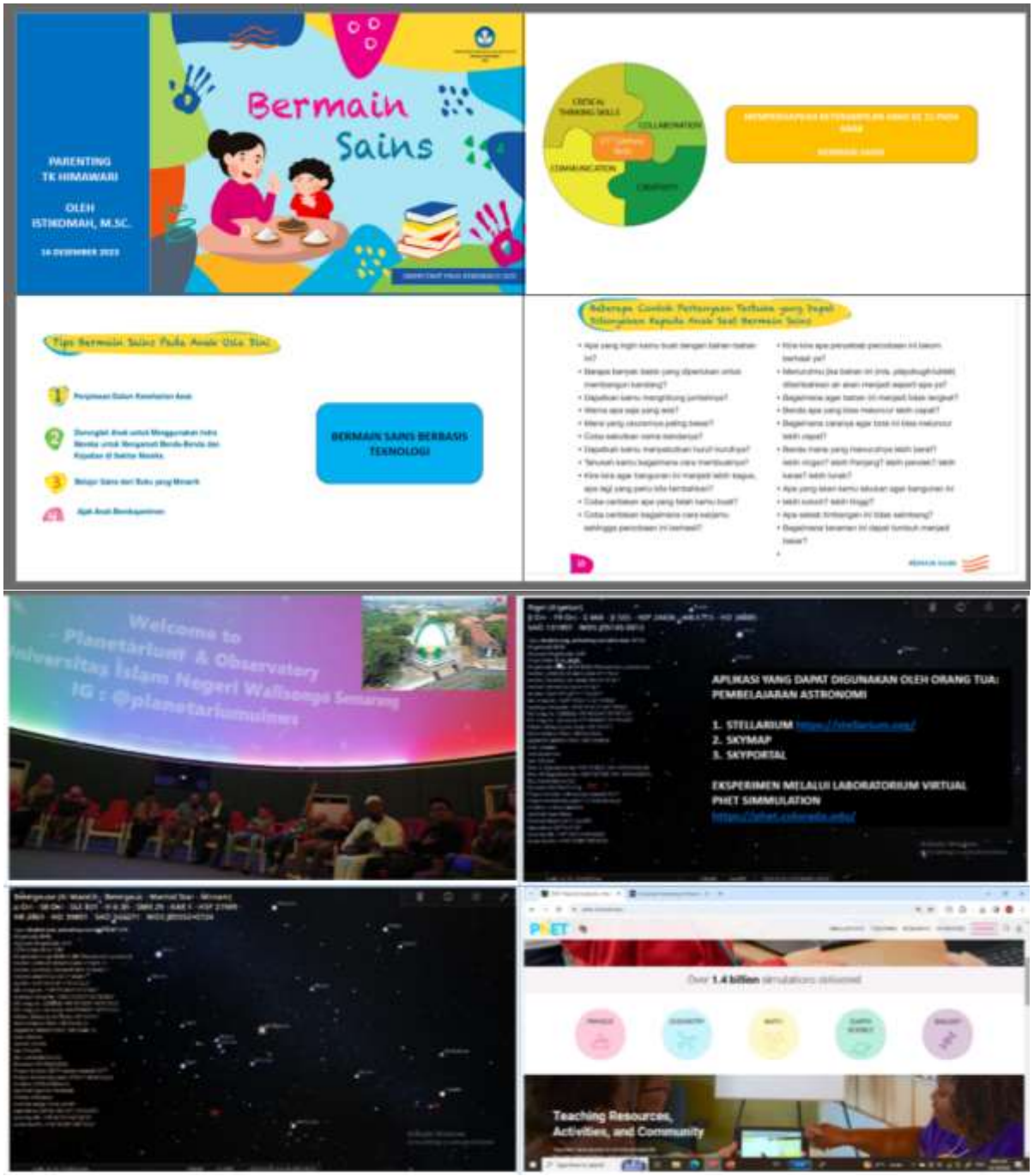

Figure 1. Material provided in the community service

Results and Discussions

Program Outcomes and Engagement

The Science Play Activities Mentoring Program demonstrated significant success in achieving its primary objectives. Children exhibited high levels of enthusiasm and active participation throughout all experimental activities. Their natural curiosity was evident as they eagerly engaged with each demonstration, asked questions, and attempted to understand the scientific principles underlying each experiment. This high level of engagement aligns with research indicating that play-based approaches effectively capture young children's attention while providing meaningful learning experiences (Pramling et al., 2019).

Figure 2. The parental education

The hands-on nature of the activities proved particularly effective in maintaining children's focus and promoting active learning. The color mixing experiments allowed children to observe chemical and physical changes firsthand, while the light refraction demonstrations using compact discs provided visual and tactile experiences that enhanced understanding of optical principles. The mini lava lamp creation combined multiple scientific concepts including density, chemical reactions, and fluid dynamics in an age-appropriate and engaging format.

Parental Response and Engagement

The parental education component received exceptionally positive responses from participants (figure 2). Parents demonstrated active engagement through questions, discussions, and sharing of personal experiences related to supporting their children's learning at home. Many participants expressed appreciation for learning practical strategies they could implement to extend science learning beyond the classroom environment.

The interactive discussion format proved effective in creating a supportive learning community among parents. Participants shared challenges they faced in supporting their children's education and learned collaborative solutions from both facilitators and fellow parents. This peer-to-peer learning component enhanced the overall effectiveness of the intervention and created lasting connections among community members.

Educational Impact and Learning Outcomes

The program successfully introduced basic science concepts through developmentally appropriate activities that aligned with early childhood learning principles. Children demonstrated improved understanding of cause-and-effect relationships, observation skills, and scientific vocabulary through their participation in experimental activities. The hands-on approach facilitated concrete learning experiences that support abstract concept development in young learners.

Parents reported increased confidence in supporting science learning at home and expressed intentions to continue engaging in similar activities with their children. Many participants requested additional sessions and expressed interest in expanding the program to include additional science topics and experiments.

Educational Quality Enhancement

The program contributed significantly to enhancing educational quality at Himawari Learning Center by introducing evidence-based science education practices and providing professional development opportunities for staff. Teachers observed new approaches to integrating science concepts into daily activities and gained practical experience with hands-on learning methodologies.

The initiative also raised awareness among parents and educators about the importance and feasibility of early science education. Many participants reported changed perspectives about young children's capacity for scientific learning and increased appreciation for play-based educational approaches.

Capacity Building and Empowerment
Parents gained practical skills and confidence for supporting their children's learning at home, creating potential for sustained impact beyond the immediate program timeframe. The provision of take-home activity guides and resources enabled families to continue science exploration independently while maintaining connection to program principles. Educators received informal professional development through observation and participation in the program activities. This exposure to university-level expertise and evidence-based practices contributed to overall capacity building within the learning center community.

Conclusion

The Science Play Activities Mentoring Program successfully achieved its primary objectives of introducing basic science concepts to young children through engaging play-based activities while providing parents with practical strategies for supporting science learning at home. The initiative demonstrated the effectiveness of university-community partnerships in addressing educational needs and creating sustainable improvements in community-based learning environments. The program's success was evident through high levels of participant engagement, positive feedback from parents and educators, and demonstrated learning outcomes among children. The collaborative approach that combined academic expertise with community resources created a replicable model for enhancing early childhood education quality through evidence-based practices. Key success factors included the use of developmentally appropriate, hands-on activities; the integration of parental education components; the utilization of accessible, safe materials; and the establishment of strong collaborative relationships among all stakeholders. These elements contributed to a comprehensive intervention that addressed multiple aspects of early childhood science education while building community capacity for sustained impact.

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