Application Of Android-Based Sdidtk Development Stimulation Media On The Developmental Abilities Of Preschool

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ABSTRACT

A nation's future depends on children's success in achieving optimal growth and development. One of the efforts to achieve optimal development is screening and developmental stimulation. Implementation of development stimulation requires media. The media used is android-based media designed by researchers, including gross and fine motor stimulation, speech and language, as well as socialization and independence. The purpose of this study was to determine the effect of developmental stimulation media on the developmental abilities of preschoolers. The method used is a quasi-experimental design test analysis using univariate analysis (frequency distribution) and bivariate (Wilcoxon tests). The number of respondents was 75 (35 children in the intervention group and 35 children in the control group). In the intervention group, development stimulation was carried out using an android-based development stimulation media SDIDTK while in the control group used PPT material after the post-test. The results showed that there was a significant difference between average ability: gross movement, fine movement, speech and language, and socialization and independence of children in the intervention group and the control group after treatment (p-value < 0.005 and α= 0.05). IT-based stimulation media (android) can be used as an alternative in stimulating development in preschool-aged children.
***Keywords**: android media; development stimulation; preschool children*

ABSTRAK

Masa depan suatu bangsa tergantung pada keberhasilan anak dalam mencapai pertumbuhan dan perkembangan yang optimal. Salah satu upaya untuk mencapai perkembangan yang optimal dengan melaksanakan skrining dan stimulasi perkembangan. Pelaksanaan stimulasi perkembangan memerlukan media. Media yang digunakan merupakan media berbasis android yang dirancang oleh peneliti, meliputi stimulasi motorik kasar, halus, bicara dan bahasa, serta sosialisasi dan kemandirian. Tujuan penelitian ini adalah untuk mengetahui pengaruh media stimulasi perkembangan terhadap kemampuan perkembangan anak prasekolah. Metode yang

digunakan dengan desain kuasi eksperimen. Uji analisis dengan menggunakan analisis univariat (distribusi frekuensi) dan bivariat (uji wilcoxon). Jumlah responden 70 (kelompok intervensi 35 anak dan kelompok kontrol 35 anak). Kelompok intervensi dilakukan stimulasi perkembangan menggunakan media stimulasi perkembangan SDIDTK (Stimulasi, Deteksi, dan Intervensi Dini Tumbuh Kembang) berbasis android sedangkan pada kelompok kontrol menggunakan media ppt setelah *posttest*. Hasil penelitian ada perbedaan yang signifikan antara rerata kemampuan: gerak kasar, gerak halus, bicara dan bahasa, dan sosialisasi dan kemandirian anak pada kelompok intervensi dan kelompok kontrol sesudah perlakuan (p value< 0.005 dan α 0.05). Media stimulasi berbasis android dapat dijadikan media alternatif dalam stimulasi perkembangan pada anak usia prasekolah.

Kata kunci: media android; stimulasi perkembangan; anak prasekolah

INTRODUCTION

Improving the health of children carried out early and continuously can achieve optimal growth and development of children's health (Hockenberry, 2017). Achieving optimal growth and development is supported by good and correct parenting consists of responsive parenting, providing good and sufficient nutrition, appropriate stimulation, good health status, and a safe environment (Ministry of Health of the Republic of Indonesia, 2022a).

Nationally, coverage of health services for babies, toddlers, and preschoolers in 2021 is likely to decrease due to the impact of the COVID-19 pandemic. Efforts to fulfill the main essential services for babies and toddlers are providing exclusive breastfeeding, vitamin A, and monitoring growth and development. The percentage of children under five who are monitored for growth and development in Indonesia in 2021 is 69.6% of the Strategic Plan target of 70%. The percentage of toddlers served by SDIDTK (Stimulation, Detection and Early Intervention of Child Growth and Development) at the national level in 2021 is 57.6%. Differences in data on the percentage of growth and development monitoring and toddlers served by SDIDTK vary greatly between provinces. SDIDTK services for toddlers in DKI Jakarta Province are 69.7% and in West Java 63.6% (still below 70%) (Ministry of Health of the Republic of Indonesia, 2022b).

One of the health efforts carried out on children to improve children's health is developmental stimulation. Stimulation is an activity that stimulates the basic abilities of children aged 0-6 years so that children grow and develop optimally. Every child needs to get regular stimulation as early as possible and continuously at every opportunity. Proper and adequate stimulation will stimulate the child's brain so

that the development of movement, speech and language skills, socialization and independence, as well as behavior and emotions in children, takes place optimally according to their age (Ministry of Health of the Republic of Indonesia, 2022a).

Some research that has been carried out uses various technology-based media. Research conducted by Inggriani et al., explains that Android-based applications can be used more easily and efficiently in monitoring the growth and development of children aged 0-6 years and detecting growth and development disorders routinely with the Denver Developmental Screening Test II (DDST II) (sensitivity 90 .1% and specificity 98.7%) (Inggriani et al., 2019). Other research uses an Android application with DDST II that can be used by parents to monitor the growth and development of children aged 0-5 years. Parents' knowledge about children's growth and development increased significantly between pretest and posttest (p-value <0.001) (Purnamasari & Selvia, 2023).

Research conducted on students explains that the Developmental Pre-Screening Questionnaire (KPSP) application needs improvements in the aspect of novelty, limitations in appearance, content and language of this application need to be modified to make it more interactive and up-to-date according to user interests (Fauzi et

al., 2021). Research on growth and development education was conducted on mothers of toddlers. The research used booklet media, SDIDTK application media (Stimulation, Detection and Early Growth and Development Intervention), and SDIDTK booklet+application media. The research results showed that the average family independence score was very good in the health education intervention group using booklet media + the SDIDTK application (Marwasariaty et al., 2019). The results of developing books on stimulation and detection of early childhood growth and development based on Information Communication and Technology (ICT) are very valid with respective feasibility percentages of 95.45% and 89.58%. The development of a guidebook for stimulation and early detection of growth and development for children aged 0-6 years is very valid to be tested as a guidebook for teachers and parents in stimulating and detecting the growth and development of children aged 0-6 years (Rantina et al., 2021).

Based on a preliminary study conducted with the leadership of one of the kindergartens in DKI Jakarta in August 2022, it was explained that due to the conditions of the COVID-19 pandemic, growth and development screening for

children had not been carried out. Growth and development screening with KPSP should be carried out at the beginning of learning every year. Growth and development screening is not only carried out at Posyandu, but is also carried out in kindergartens or PAUD (Early Childhood Education).

This research aims of this research is to determine the impact of implementing SDIDTK developmental stimulation media on the developmental abilities of preschool children. The research question is: can Android-based SDIDTK developmental stimulation media improve the developmental abilities of preschool-age children?

METHOD

The research design used was quasi-experimental with control. The population is preschool-age children who have parents. Inclusion criteria: children aged 5-6 years; cooperative; parents and children are willing to be respondents; Mom has an Android cellphone. Exclusion criteria: children with special needs. Sampling in this study was carried out using a random consecutive sampling technique. The sample was calculated using unpaired numerical analysis from previous research results. The calculation results anticipate a 10% drop out event. The number of samples in the intervention group was 35 children and the control group was 35 children. The total sample was 70 children accompanied by their parents. In the intervention group, children were stimulated with SDIDTK development using developmental stimulation media via Android cellphones. The control group was given PPT as a medium for stimulating development after the posttest. Independent variables: child characteristics and parent characteristics. Child characteristics include age, gender, weight, height, head circumference, nutritional status, and KPSP screening results. Parental characteristics include education and employment. Dependent variable: child's developmental abilities. The time of the research was carried out in October-November 2022. The research location for the intervention group was carried out at a kindergarten in the East Jakarta area and the control group was carried out at a kindergarten in the Cirebon area, West Java. The reason for choosing the location was because that SDIDTK implementation data had not yet reached 70% of the national target due to the impact of the COVID-19 pandemic.

The research approval letter was issued from the ethics commission of the Ministry of Health Jakarta III Health Polytechnic no. LB.02.02/KEPK/063/2022. The display of the SDIDTK development stimulation media used is as follows.
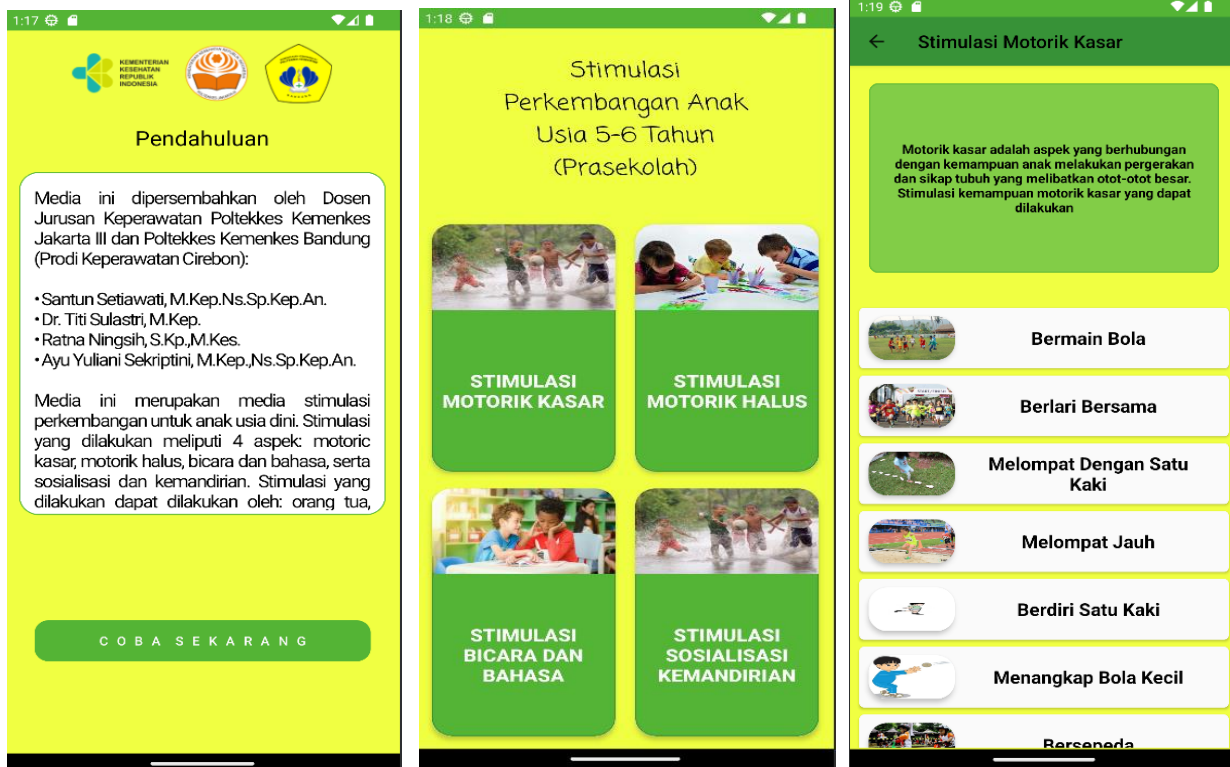
Data collection techniques used in the intervention group: the researcher at the beginning of the study carried out an informed consent to the mother. The researcher was assisted by 4 research assistants. The research assistant carried out growth screening including: weighing, height measurement, and head circumference measurement. The research assistant carried out developmental screening using KPSP. The researcher accompanied the research assistant during the growth and development screening. Researchers conducted a pretest on mothers regarding their child's developmental abilities by filling out a questionnaire. Researchers explain the developmental stimulation that parents will carry out at home. Four accompanying teachers followed the explanation. Researchers guide parents to install the SDIDTK development stimulation application that will be used. The accompanying teacher also installs the application. Researchers held discussions with parents and teachers regarding the applications used. The implementation time for the developmental stimulation intervention was carried out for 14 days at

Santun Setiawati, Titi Sulastri, Ratna Ningsih, Ayu Yuliani Skriptini, Agus Citra Dermawan, *Application Of Android-Based Sdidtk Development Stimulation Media On The Developmental Abilities Of Preschool*

14

home by the parents. Developmental stimulation is carried out for 14 days, after which a KPSP assessment is carried out to determine the child's development (Ministry of Health of the Republic of Indonesia, 2022a). Every day parents provide reports to accompanying teachers regarding developmental stimulation by sending videos or photos. Researchers observed the results of developmental stimulation that parents had given their children every day for 14 days. Developmental stimulation includes 4 aspects, namely: gross motor skills, fine motor skills, speech and language, as well as socialization and independence.

The gross motor stimulation carried out in the intervention group included 7 items, namely: playing ball together, running, jumping on one leg, jumping far, standing on one leg without holding on for 6 seconds or more, catching a small ball the size of a tennis ball/ball with both hands, and cycling. The fine motor stimulation carried out in the intervention group included 19 items, namely: writing names, counting, grouping things, cutting, pointing to numbers, making something from wax, playing around selling, learning to be a craftsman, learning to cook, knowing the month/week/day. ,

knowing the time of morning/afternoon/evening/night, learning to measure with a ruler or meter, learning to determine which is longer and shorter, drawing (+), drawing boxes, drawing people (3 body parts), and drawing people (6 body parts).

Speech and language stimulation in the intervention group included 12 items, namely: children often see and read books, know the differences, for example: radio and TV; spoon and fork, knowing the similarities for example: bicycle and tricycle; ships and airplanes, practice remembering the names of objects, practice answering questions: why do we brush our teeth? eat? cars have wheels?, practice recognizing traffic signs: mentioning red/yellow/green lights/no parking/no stopping signs, getting to know money: mentioning the nominal coins/banknotes, practicing answering: how many lights are there in the house? pets? Or other questions, practice answering: if you get cold what do you do; what to do if you are hungry; what to do if they are tired, the child points or says a red/yellow/green/blue rectangle, trains to answer if the horse is big then the mouse; if fire is hot then ice, practice: put paper on the floor, under a chair, in front of you, behind

you, practice answering: spoons made from what? shoes from what? doors from what?

The stimulation of socialization and independence skills carried out in the intervention group included 12 items: children can dress themselves without help, children clean up their own toys after playing, children like to help clean the bed at home, children like to help cook at home, children like to help clean the house, children like to eat together at home, children like to talk about school at home, restrictions on watching TV, children are given the opportunity to play with their friends, parents often communicate with children, children and parents agree on the rules that apply, children are calm and not fussy when left. Developmental stimulation is carried out for 14 days, then growth and development screening is carried out. Research assistants carry out growth and development screening with the assistance of researchers. Researchers carried out a posttest on children's developmental abilities for parents using a questionnaire.

Data collection techniques were carried out in the control group. At the beginning of the study, researchers carried out informed consent to parents. The researcher was assisted by 4 research assistants. The research assistant carried out growth screening including: weighing, height measurement, and head circumference measurement. The research assistant carried out developmental screening using KPSP. The researcher accompanied the research assistant during the growth and development screening. Researchers conducted a pretest on parents regarding their child's developmental abilities by filling out a questionnaire. Researchers explained that they would carry out growth and development screening after 14 days. Research assistants carry out growth and development screening with the assistance of researchers. Researchers carried out a posttest on children's developmental abilities for parents using a questionnaire. Researchers explained the results of the growth and development screening that had been carried out and provided development stimulation media in the form of PPT. The researcher then explains what needs to be done regarding developmental stimulation that parents can do at home. The researcher collaborates with the teacher, if there is still something that is not understood, it can be discussed again with the researcher.

Data analysis was carried out using univariate and bivariate data analysis. The existing data was tested for normality. The normality test results showed that the data was not normal, a nonparametric test was

carried out using the Wilcoxon test. Bivariate analysis was carried out using the Wilcoxon test.

RESULTS AND DISCUSSION

Table 1. Characteristics of Respondents Based on Age, Weight, Height, Head Circumference

Variable	Intervention Group			Control Group		
	Mean	SD	Min-Max	Mean	SD	Min-Max
Weight (months)	71.2	3.83	64-76	65.89	3.24	60-72
Weight	20.74	5.62	13-36	17.09	4.33	12-34
Height	114.34	6.16	99-130	110.89	6.34	100-130
Head Circumference	50.37	1.88	46-55	49.71	1.2	48-52

The results of the analysis showed that the average age of children in the intervention group was 71 months, weight 20 kg, height 114 cm, and head circumference 50 cm, while in the control group, the average age of children was 65 months, weight 17 kg, height 110 cm, and head circumference 49 cm.

The ages of children in the intervention group and control group were mostly 65-71 months (5.5-6 years). The age range is in the preschool age group. Preschool age is children aged 3-6 years (Ball, et al., 2017). Age has an influence on a person's grasping power and thinking patterns. Increasing age can also make a person's mindset more mature in accepting the information provided or following the examples given (Syaputry et al., 2023).

Table 2. Characteristics of Respondent Based on Gender, Nutritional Status, and Head Circumference Status

Variable	Intervention Group		Control Group	
Gender	N	%	N	%
-Female	16	45.7	23	65.7
-Male	19	54.3	12	34.3
Total	**35**	**100**	**35**	**100**
Nutritional Status				
-Normal	26	74.3	27	77.2
-Not Enough	5	14.3	6	17.1
-More	4	11.4	2	5.7
Total	**35**	**100**	**35**	**100**
Head Circumference				
-Normal	32	91.4	35	100

-Microcefal	2	5.7	-	-
-Makrocefal	1	2.9	-	-
Total	**35**	**100**	**35**	**100**

The results of the analysis showed that the highest proportion of respondents in the intervention group was male (54.3%) while in the control group were female (65.7%), normal nutritional status in the intervention group (74.3%) and control group (77.2%), status head circumference was normal in the intervention group (91.4%) and control group (100%).

Nutritional status is an indicator of a toddler's growth, because toddler growth can be assessed from nutritional status (Hartaty, 2017). Normal growth and development screening results are influenced by the child's good nutritional status (Ulfa et al., 2023). However, on the other hand, if a child's nutritional status is poor or stunting occurs, it is related to the child's growth and development. Stunting can cause a decline in the quality of human resources (Laily & Indarjo, 2023). Periodic follow-up measurements of weight and height are important to monitor growth and assess nutritional status in preschool children. Education about nutrition is needed to prevent nutritional problems in children (Aryani et al., 2023).

Table 3. Characteristics Mother Based on Education and Work

Variable	Intervention Group		Control Group	
Mother's Education	N	%	N	%
-Junior High School	3	8.6	11	31.4
-Senior High School	15	42.9	17	48.6
-College	17	48.6	7	20
Total	**35**	**100**	**35**	**100**
Mothers's Work				
-Civil Servants	3	8.6	2	5.7
-Private	9	25.7	3	8.6
-Self-Employed	-	-	1	2.9
-Housewife	23	65.7	29	82.8
Total	**35**	**100**	**35**	**100**

The results of the analysis showed that the proportion of mother respondents in the intervention group had college maternal education (48.6%), while the mother's education in the control group was high school (48.6%). The occupation of mothers in the intervention and control groups was a housewife (65.7%).

Santun Setiawati, Titi Sulastri, Ratna Ningsih, Ayu Yuliani Skriptini, Agus Citra Dermawan, *Application Of Android-Based Sdidtk Development Stimulation Media On The Developmental Abilities Of Preschool*

18

Parents need to be equipped with the knowledge and skills to understand and be skilled in carrying out child care so that they can have a positive attitude in guiding children's development (Pratiwi et al., 2023). Education greatly influences family parenting patterns in providing good stimulation for children's growth and development (Ulfa et al., 2023). Education can influence a person's knowledge and actions. The higher the level of education, the easier it will be for someone to receive information, so that the level of knowledge they have will be better (Syaputry et al., 2023). Higher education among parents increases parents' understanding of the importance of stimulation (Praweswari & Herwanto, 2023).

Table 4. Characteristics Respondent Based of KPSP

Variable	Intervention Group		Control Group	
KPSP Before Intervention	N	%	N	%
-Not Enough	13	37.1	6	17.1
-Good	22	62.9	29	82.9
Total	**35**	**100**	**35**	**100**
KPSP After Intervention				
-Not Enough	-	-	6	17.1
-Good	35	100	29	82.9
Total	**35**	**100**	**35**	**100**

The results of the analysis showed that the results of developmental screening for children in the intervention group before treatment were mostly good (62.9%) and after treatment, all were good (100%); The control group's gross motor skills before and after treatment were mostly good (82.9%). Families have a role in improving children's growth and development. Support from the family for learning or stimulating growth and development is very necessary. Stimulation carried out by the family from both cognitive, affective and psychomotor aspects will have a positive impact on the development of toddlers. Parenting resources are very important support for children's growth and development (Hartaty, 2017). Mother's knowledge and motivation have an influence on the development of preschool children. Preschool-aged children need special attention from parents, especially mothers (Syaputry et al., 2023)

Table 5. Gross Motor Skill

Variable	Intervention Group		Control Group	
Gross Motor Skill Before Intervention	N	%	N	%
-Not Enough	14	40	15	42.9
-Good	21	60	20	57.1
Total	**35**	**100**	**35**	**100**
Gross Motor Skill After Intervention				
-Not Enough	-	-	10	28.6
-Good	35	100	25	71.4
Total	**35**	**100**	**35**	**100**

The results of the analysis showed that the gross motor skills of children in the intervention group before treatment were mostly good (60%) and after treatment, all were good (100%); The control group's gross motor skills before treatment were mostly good (57.1%) and after treatment mostly good (71.4%).

The challenge that must be faced is boredom, so that they are always enthusiastic about doing exercises to shape their body muscles (Indar Rahman & Khadijah, 2023). Rhythmic gymnastics for early childhood is a fun activity with simple movements and pleasant music that will encourage children to move their bodies (Silaban & P, 2023).

Teachers at school and parents at home can train children's motor skills from an early age, which has an impact on future motor skills (Dinanti et al., 2023). Another game that can train gross motor skills is catching and throwing a ball. Games are not only held within schools but can involve other schools. Teachers carry out learning activities better if they vary their learning, especially in throwing and catching the ball (Hasanah et al., 2023).

Table 6. Fine Motor Skills

Variable	Intervention Group		Control Group	
Fine Motor Skills Before Intervention	N	%	N	%
-Not Enough	13	37.1	15	42.9
-Good	22	62.9	20	57.1
Total	**35**	**100**	**35**	**100**
Fine Motor Skills After Intervention				
-Not Enough	1	2.9	11	31.4
-Good	34	97.1	24	68.6
Total	**35**	**100**	**35**	**100**

The results of the analysis showed that the fine motor skills of children in the intervention group before treatment were mostly good (62.9%) and after treatment were getting better (97.1%); The control group's fine motor skills before treatment were mostly good (57.1%) and after treatment mostly good (68.6%).

The game of marbles has a very significant influence on fine motor skills. Playing marbles can influence children's fine motor skills and the development of cognitive, language and social skills (Harahap et al., 2023). The ability to color can improve fine motor skills. Steps that can be taken are for the teacher to provide examples of coloring according to the theme and demonstrate how to color to the children repeatedly before the activity begins (Ulva et al., 2024).

Using the mosaic technique can improve fine motor skills. Origami paper and dry leaf media can be used. This activity can develop

fine motor aspects such as using scissors correctly, tearing, coordinating between eyes and hands and sticking mosaic pieces neatly. This research is said to be successful according to the success criteria achieved, namely 80% (Kurnia & Rosdianti, 2023). Folding paper games and puzzles on the development of children's fine motor skills can be considered that folding paper games and puzzles are able to have an effective impact on fine motor development in children aged 4-5 years. Further research could also consider other factors that might influence outcomes, such as the child's home environment, parental support, or teachers' teaching methods. In addition, research can explore other aspects of child development, such as cognitive, emotional, or social aspects which can also be influenced by certain types of play (Rahmatillah et al., 2023).

Table 7. Speech and Language Skills

Variable	Intervention Group		Control Group	
Speech and Language Skills Before Intervention	N	%	N	%
-Not Enough	16	45.7	12	34.3
-Good	19	54.3	23	65.7
Total	**35**	**100**	**35**	**100**
Speech and Language Skills After Intervention				
-Not Enough	-	-	11	31.4
-Good	35	100	24	68.6
Total	**35**	**100**	**35**	**100**

The results of the analysis showed that most of the speech and language abilities of the children in the intervention group before treatment were good (54.3%) and after treatment, all were good (100%); The control group's speech and language abilities before treatment were mostly good (65.7%) and after treatment were mostly good (68.6%).

Applying the storytelling method using finger puppets is an appropriate activity to improve children's language skills (Sriyanti et al., 2023).

The singing method is a way to improve language skills in early childhood. The singing method is not the only way to improve language skills in early childhood. There are many other methods that can be used, such as reading stories, role playing, and talking to children directly. The singing method can be an effective alternative for improving language skills in early childhood (Hasni, 2023). Children's language abilities increase after being given action through the storytelling method (Sahadatunnisa et al., 2023).

The accuracy of animal-themed smart board learning media to support early childhood language development. The results of research on the implementation of star-themed smart board learning media to support early childhood language development were assessed by class teachers as having a score of 100% in the very practical category. Student learning outcomes after using animal-themed smart board learning media to support early childhood language development obtained a percentage of 88.39% in the very effective category (Salahuddin et al., 2023).

Table 8. Socialization and Independence Abilities

Variable	Intervention Group		Control Group	
Socialization and Independence Abilities	N	%	N	%
-Not Enough	10	28.6	13	37.1
-Good	25	71.4	22	62.9
Total	**35**	**100**	**35**	**100**
Socialization and Independence Abilities				
-Not Enough	-	-	11	37.1
-Good	35	100	24	62.9
Total	**35**	**100**	**35**	**100**

The results of the analysis showed that the socialization and independence abilities of children in the intervention group before treatment were mostly good (71.4%) and after treatment, all were good (100%); The control group's speech and language abilities before and after treatment were mostly good (62.9%).

The research that has been carried out is in line with research that has been carried out by other researchers. Learning methods that

can be carried out at an early age include habituation, conversation, question and answer, playing and giving assignments (Silranti & Yaswinda, 2019).

Table 9. Differences in The Developmental Capabilities of Respondents After Treatment

Variable	N	Mean R	Z	P Value
Gross Motor Skills				
Intervention and Control Group	70	0.00	-2.97	0.003
After Treatment		5.5		
Fine Motor Skills				
Intervention and Control Group	70	11	-4.25	0.001
After Treatment		15.3		
Speech and Language Skills				
Intervention and Control Group	70	4.5	-3.4	0.001
After Treatment		11.83		
Socialization and Independence Abilities				
Intervention and Control Group	70	5	-4.43	0.001
After Treatment		15.23		

The results of the analysis showed that there was a significant difference between the average gross motor skills of children in the intervention group and the control group after treatment (p-value 0.003 and α=0.05); there was a significant difference between the average fine motor skills of children in the intervention group and the control group after treatment (p-value 0.001 and α=0.05); there was a significant difference between

the mean speech and language abilities in the intervention group and the control group before and after treatment (p-value 0.000 and α=0.05); There is a significant difference between the mean socialization abilities and independence of children in the intervention group and the control group after treatment (p-value 0.001 and α=0.05). This research is in line with several other studies that use technology-based media to

stimulate growth and development. Learning using the interactive website-based picture story method is more effective in improving early childhood oral language and local culture skills compared to conventional learning which does not use the interactive website-based picture story method (Kartini et al., 2023). The use of the ePoK (e Posyandu Health) application has been proven to increase mothers' knowledge and skills in monitoring the growth and development of toddlers. It is hoped that routine monitoring of the growth and development of toddlers can detect early complications or disorders of growth and development (Damayanti et al., 2023). The application, which has been built in the form of a website, can help posyandu cadres, health workers, and parents of toddlers to detect the nutritional status of toddlers early (Ritonga & Muhandhis, 2024).

Pediatric nurses and community nurses can train parents in using IT-based developmental stimulation media, so that parents can stimulate development at home/in the surrounding environment.

CONCLUSION

1. There is a significant difference between the average gross motor skills of children in the intervention group and the control group after treatment.

2. There is a significant difference between the average fine motor skills of children in the intervention group and the control group after treatment.

3. There is a significant difference between the average speech and language abilities in the intervention group and the control group before and after treatment.

4. There is a significant difference between the average socialization abilities and independence of children in the intervention group and the control group after treatment.

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Santun Setiawati, Titi Sulastri, Ratna Ningsih, Ayu Yuliani Skriptini,
Agus Citra Dermawan, *Application Of Android-Based Sdidtk Development Stimulation Media
On The Developmental Abilities Of Preschool*

24

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