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Original Research Paper

# The Effect of Educational Interventions Through Animated Video and Booklet on Parents' Knowledge Regarding Cognitive Stimulation in Preschool-Aged Children

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**Abstract**

**Background:** Cognitive stimulation supports preschool children's learning and development, yet parents may need accessible guidance for providing age appropriate stimulation at home. **Objective:** To evaluate whether education using an animated video combined with a booklet was associated with greater short-term improvement in parents' knowledge of cognitive stimulation than leaflet education. **Methods:** A quasi experimental pretest posttest control group study included 120 parents recruited purposively from different early childhood education institutions (60 intervention; 60 control). The intervention group received a 2-minute animated video plus booklet for one week, whereas the control group received a leaflet. Knowledge was scored from 0 to 25. **Results:** Mean knowledge increased from 11.72±3.17 to 18.03±3.31 in the intervention group and from 11.27±3.93 to 13.52±3.37 in the control group. The between group difference in mean change was 4.06 points (95% CI, 3.25-4.87; p<0.001; Cohen d=1.14). **Conclusion:** The multimedia intervention was associated with a larger short-term knowledge gain than leaflet education, although nonrandom site allocation limits causal interpretation.

**Keywords:** animated video; booklet; cognitive stimulation; parental knowledge; preschool children.

## Introduction

The preschool years are a sensitive period for cognitive, language, socioemotional, and executive development. Early experiences and nurturing care influence developmental trajectories and later learning opportunities[1,2,3]. Everyday family activities such as talking, reading, singing, playing, and responsive interaction provide practical stimulation that is associated with early learning outcomes across diverse settings[4]. From a developmental perspective, Piaget's theory also emphasizes that children construct knowledge through active interaction with people, objects, and experiences appropriate to their stage of development[5].

Parents are therefore central agents of cognitive stimulation because they provide repeated learning opportunities within daily routines. Evidence from low and middle income countries shows that stimulation interventions can improve the home caregiving environment, parent child interaction, and parental knowledge of early child development[6]. A global systematic review likewise reported benefits of parenting interventions for parenting knowledge and practices as well as child developmental

outcomes[7]. Healthcare-based early-childhood interventions have also demonstrated improvements in cognitive stimulation and parental knowledge, supporting the integration of parent education into accessible community services[8].

The effectiveness of parent education depends not only on the accuracy of the message but also on how information is delivered and reinforced. In Healthy Tadulako Journal, community education using booklet and leaflet materials has been associated with improved knowledge in child health contexts[9], while video based education has been used to strengthen health literacy through accessible audiovisual information[10]. Printed leaflet education can also influence health related behavior[11]. These findings support direct comparison between a richer multimedia package and a printed media comparator rather than assuming that either medium is inherently effective.

Indonesian studies provide additional evidence for combining complementary learning formats. Booklet and audiovisual education has improved parents' knowledge in a child health setting[12], video education has increased parenting-related knowledge[13], and booklet-based education has improved mothers' knowledge regarding stimulation of preschool development[14]. Broader evidence also indicates that visual interventions can improve comprehension of health information[15], and a recent meta analysis found that video based health education can improve knowledge acquisition across health disciplines[16]. Systematic reviews have similarly reported that video education often improves patient knowledge[17], although evidence comparing videos with written information can be heterogeneous[18]. Parent targeted eHealth reviews suggest that short, engaging videos may support parental knowledge[19], and video-assisted education has improved maternal knowledge, attitudes, or practices in child health interventions[20]. However, evidence remains limited on a combined animated video and booklet intervention specifically focused on cognitive stimulation for preschool aged children.

Based on this gap, the study addressed the following research question: Does health education using animated videos and booklets improve parents' knowledge of cognitive stimulation for preschool aged children more than leaflet based education? The primary outcome was the change in the total parental knowledge score from pretest to posttest. The study therefore aimed to estimate the short term between-group difference in knowledge change after the multimedia intervention.

The findings are expected to inform practical parent education strategies in early childhood settings. A brief animated video may present developmental guidance in an engaging and standardized format, while a booklet can provide material that parents can revisit during the intervention period. Evaluating the combination against leaflet education may help health professionals and early childhood educators select feasible educational media while recognizing that improvement in knowledge is an intermediate outcome and does not by itself demonstrate sustained changes in parenting practice or child development.

## Materials and Methods

### *Study Design*

This study employed a quasi-experimental pretest posttest control group design to evaluate changes in parents' knowledge following two educational approaches. Participants were recruited purposively and allocation occurred by educational institution rather than by individual randomization. Parents from ABA


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Kembaran Kindergarten and ABA Kembaran Playgroup formed the intervention group (n=60), whereas parents from Asiah Kalibayem Playgroup and ABA Godegan Kindergarten formed the control group (n=60). Because intervention status was linked to institution, the design cannot fully separate the effect of the educational media from site specific or contextual differences. Data were collected online using Google Forms distributed through WhatsApp. The prespecified primary outcome for the revised analysis was the pretest to posttest change in the total parental knowledge score, with the principal effect expressed as the between group difference in change.

The intervention group received a two-minute animated educational video and a companion booklet, whereas the control group received a leaflet. The animation contained three age-specific segments for children aged 36-47, 48-59, and 60-72 months. The stimulation messages were based on the Indonesian Ministry of Health guidance for stimulation, early detection, and intervention of child growth and development (SDIDTK)[21]. The video and booklet were distributed after completion of the pretest and remained available to participants for one week; the posttest was administered on day 8. Participants could rewatch the animation and reread the booklet during this period. The study documentation did not record the number of video views or booklet readings for each participant, did not preserve a reproducible description of the educator who delivered or monitored the intervention, and did not provide a detailed dose/content comparison for the control leaflet. Cross institution contamination was not formally measured. These fidelity characteristics are therefore reported as limitations rather than being inferred.

***Sample***

The study population consisted of parents of preschool aged children enrolled in participating early childhood education institutions in Bantul Regency. Purposive sampling was used. Inclusion criteria were having a child enrolled in a playgroup or kindergarten, being able to read and understand Indonesian, having access to a smartphone, and willingness to participate. Parents who did not complete both the pretest and posttest or were unavailable during the intervention period were excluded. The final sample comprised 120 parents, with 60 participants in each group. No formal a priori power calculation was documented in the available study records; recruitment was based on eligible parents in the selected institutions. As a sensitivity calculation, 60 participants per group provide approximately 80% power at a two sided alpha of 0.05 to detect a standardized between group effect of about d=0.52 under an equal sized independent-groups comparison. This sensitivity estimate does not replace prospective sample-size planning and is acknowledged as a methodological limitation.

***Data Collection Technique***

Data were collected online using Google Forms and WhatsApp. Parental knowledge was measured with a 25 item dichotomous (Guttman type) questionnaire. Correct responses were scored 1 and incorrect responses 0, yielding a total score from 0 to 25; higher scores indicated greater knowledge, and the score was analyzed as a continuous variable without imposing categorical cutoffs. The available study documentation identified six content domains: definition of cognitive stimulation, aims of stimulation, cognitive development, types of stimulation, stimulation procedures, and factors influencing cognitive development in preschool children. Earlier


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documentation referred to seven domains but did not specify a seventh domain, so an additional domain was not created in this revision. The study records described the instrument as having undergone validation; however, the source instrument, item level validity results, content validity process, and a reliability coefficient such as KR-20 or Cronbach's alpha were not available in the submitted material. Numerical psychometric values are therefore not invented, and the incomplete validation documentation is explicitly considered when interpreting the findings.

### *Data Analysis Technique*

Statistical analysis was performed using SPSS version 26 with a two sided significance level of $p<0.05$. Baseline characteristics were summarized and compared using the tests reported in Table 1. Normality and homogeneity were assessed before parametric analyses. Paired t tests described within group pretest posttest changes, and independent t tests compared group means at pretest and posttest. Because separate within group tests do not directly estimate an intervention effect, the primary revised contrast was the between-group difference in mean change (posttest minus pretest). Analysis of follow up outcomes should account for baseline information where possible[22]. Using the reported summary statistics, change score standard deviations were reconstructed from the paired test results, and the difference in change was tested between groups with a 95% confidence interval. A standardized pretest posttest control effect size was calculated by dividing the between group difference in mean change by the pooled pretest standard deviation, consistent with the approach recommended for pretest posttest control designs[23].

### *Ethical Consideration*

This study received ethical approval from the Ethics Committee of PKU Gamping Hospital (approval number 196/KEP-PKU/VI/2025). All participants received information about the study and provided informed consent before participation. Participation was voluntary, and respondents could decline participation without penalty. Data collected through the online forms were handled confidentially and reported in aggregate form without identifying individual participants. The study procedures were designed to minimize participant burden and to protect privacy throughout data collection and analysis.

## Result

A total of 120 parents completed the pretest, intervention period, and posttest, with 60 participants in the intervention group and 60 in the control group. Table 1 summarizes baseline parent and child characteristics, Tables 2–5 present knowledge scores and statistical assumptions, and Table 6 compares knowledge scores between groups. The primary revised estimate additionally quantifies the between-group difference in pretest to posttest change. All participants with complete pretest and posttest data were included in the final analysis, with no difference in analyzed sample size between the two study groups. This presentation allows the intervention effect to be interpreted not only from posttest scores but also from the magnitude of knowledge improvement relative to baseline in each group.

Table 1 shows no statistically significant baseline differences between the intervention and control groups for the reported characteristics (all $p>0.05$), including parents' age, children's age, children's gender, education level, and occupation. These measured characteristics were therefore broadly comparable at baseline. However, the


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absence of statistically significant differences does not establish equivalence for unmeasured institutional or contextual factors because allocation was not randomized.

**Table 1.** Baseline Characteristics of Respondents Between Groups

| Characteristics | Intervention (N=60) | | Control (N=60) | | *X² Test/* Mann-Whitney U | *P-value* |
|---|---|---|---|---|---|---|
| | F | % | F | % | | |
| **Parents' Age** | | | | | | |
| Min-Max | | 24-52 | | 22-45 | 1470,5 | 0,083 |
| Mean ± SD | | 36 | | 34 | Z = -1,733 | |
| **Children's Age** | | | | | | |
| 36-47 months | 6 | 10,0 | 5 | 8,3 | 1,885 | 0,390 |
| 48-59 months | 9 | 15,0 | 15 | 25,0 | | |
| 60-72 months | 45 | 75,0 | 40 | 66,7 | | |
| **Total** | **60** | **100,0** | **60** | **100,0** | | |
| **Child's Gender** | | | | | | |
| Male | 36 | 60,0 | 28 | 46,7 | 2,143 | 0,143 |
| Female | 24 | 40,0 | 32 | 53,3 | | |
| **Total** | **60** | **100,0** | **60** | **100,0** | | |
| **Education Level** | | | | | | |
| No school – Junior High | 6 | 10,0 | 10 | 16,7 | 1,364 | 0,506 |
| Senior High School | 30 | 50,0 | 30 | 50,0 | | |
| Bachelor/Diploma | 24 | 40,0 | 20 | 33,3 | | |
| **Total** | **60** | **100,0** | **60** | **100,0** | | |
| **Occupation** | | | | | | |
| Unemployed/Housewife | 32 | 53,3 | 30 | 50,0 | 0,133 | 0,715 |
| Employed | 28 | 46,7 | 30 | 50,0 | | |
| **Total** | **60** | **100,0** | **60** | **100,0** | | |

***Source:*** *Primary Data 2025*

**Table 2.** Pre test and Post test Scores of Parents' Knowledge in the Control and Intervention Groups

| Variable | Group | N | Min | Max | Mean | SD |
|---|---|---|---|---|---|---|
| *Pre-test* | Intervention | 60 | 3 | 17 | 11,72 | 3,168 |
| | Control | 60 | 2 | 20 | 11,27 | 3,927 |
| *Post-test* | Intervention | 60 | 9 | 25 | 18,03 | 3,309 |
| | Control | 60 | 7 | 21 | 13,52 | 3,367 |

***Source: Primary Data 2025***

As shown in Table 2, the intervention group's mean knowledge score increased from 11.72±3.17 at pretest to 18.03±3.31 at posttest, a mean increase of 6.31 points. The control group's mean score increased from 11.27±3.93 to 13.52±3.37, a mean increase of 2.25 points. Thus, both groups improved, but the absolute gain was larger in the intervention group.

**Table 3.** Normality Test Results in the Intervention and Control Groups

| Variable | Group | P-value | Status |
|---|---|---|---|
| *Pre-Test* | Intervention | 0,200 | Normal |
| | Control | 0,183 | Normal |
| *Post-Test* | Intervention | 0,086 | Normal |
| | Control | 0,200 | Normal |

***Source:*** *Primary Data 2025*


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Table 3 shows that the reported normality test p values were above 0.05 for pretest and posttest scores in both groups (intervention: 0.200 and 0.086; control: 0.183 and 0.200). On the basis of these reported tests, the score distributions were treated as sufficiently compatible with the parametric analyses used in this study.

**Table 4.** Paired Sample T Test Results in the Intervention and Control Groups

| Variable | Group | Test | Mean | Std. Deviation | Paired T-test | P- Value | 95% CI | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower | Upper |
| Knowledge | Intervention | *Pre-test* | 11,72 | 3,168 | -19,781 | 0,001 | -6,956 | -5,678 |
| | | *Post-test* | 18,03 | 3,309 | | | | |
| | Control | *Pre-test* | 11,27 | 3,927 | -8,803 | 0,001 | -2,761 | -1,739 |
| | | *Post-test* | 13,52 | 3,367 | | | | |

***Source:*** *Primary Data 2025*

Table 4 shows statistically significant within-group increases in knowledge. In the intervention group, the score rose from 11.72±3.17 to 18.03±3.31 (paired t=-19.781; p=0.001; 95% CI for the pretest-minus-posttest difference, -6.956 to -5.678). In the control group, the score increased from 11.27±3.93 to 13.52±3.37 (paired t=-8.803; p=0.001; 95% CI, -2.761 to -1.739). These paired analyses describe change within each group but do not by themselves test whether the intervention group improvement exceeded the control group improvement.

**Table 5.** Homogeneity Test Results in the Intervention and Control Groups

| Variable | F | p-value (sig.) | Description |
|---|---|---|---|
| Knowledge | 3,270 | 0,073 | Homogeneous (equal variances assumed) |

***Source:*** *Primary Data 2025*

Based on Table 5, the homogeneity test produced F=3.270 with p=0.073. Because the reported p-value exceeded 0.05, equal variances were assumed for the independent-group comparisons reported in the manuscript.

**Table 6.** Independent Sample T-Test Result in the Intervention and Control Groups

| Variable | Group | Mean | Std. Dev | t-test | P- Value | 95% CI | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| *Pre-test* Knowledge | Intervention | 11,72 | 3,168 | 0,691 | 0,491 | -0,84 | 1,74 |
| | Control | 11,27 | 3,927 | | | | |
| *Post-test* Knowledge | Intervention | 18,03 | 3,309 | 7,411 | 0,001 | 3,31 | 5,72 |
| | Control | 13,52 | 3,367 | | | | |

***Source:*** *Primary Data 2025*

Table 6 shows that the intervention and control groups did not differ significantly in mean pretest knowledge (11.72±3.17 vs 11.27±3.93; t=0.691; p=0.491; 95% CI, -0.84 to 1.74). At posttest, the intervention group had a higher mean score than the control group (18.03±3.31 vs 13.52±3.37; t=7.411; p=0.001; 95% CI, 3.31 to 5.72). The posttest comparison is supportive but does not on its own account for each group's baseline score.

The direct between group difference in mean change was therefore calculated. Knowledge increased by 6.31 points in the intervention group and 2.25 points in the control group, giving a difference in change of 4.06 points. Using change score variability


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reconstructed from the reported paired-test statistics, this contrast was statistically significant (t=9.93; 95% CI, 3.25-4.87; p<0.001). Standardizing the difference in change by the pooled pretest standard deviation yielded an effect size of Cohen d=1.14. This difference in change estimate is the primary inferential result because it directly compares the magnitude of improvement between groups.

## Discussion

The principal finding is that parents who received the animated video plus booklet showed a substantially larger short term increase in knowledge than parents who received a leaflet. The intervention group improved by 6.31 points compared with 2.25 points in the control group, and the direct difference in change was 4.06 points (95% CI, 3.25-4.87; p<0.001), with a large standardized effect (d=1.14). This direct contrast is more informative than interpreting the two paired t-tests separately because it tests whether improvement differed between groups. Nevertheless, the result should be interpreted as an association with the educational package rather than definitive proof of causation. Participants were recruited purposively and assigned by institution, so school or community level characteristics may have contributed to the observed difference even though the measured baseline variables in Table 1 were similar.

The direction of the finding is consistent with evidence that combining visual and printed information can strengthen knowledge acquisition. Community education using booklet or leaflet formats has improved knowledge in child health programs[9], while HTJ research has also demonstrated the feasibility of video based education for improving health literacy[10]. Indonesian studies report knowledge gains after combined booklet-audiovisual education[12], video based parent education[13], and booklet education on preschool stimulation[14]. At a broader level, visual based interventions can improve comprehension of health information[15], and video-based health education has shown beneficial effects on knowledge acquisition across disciplines[16]. Systematic evidence from chronic-disease education likewise suggests that video tools are particularly consistent in improving knowledge[17]. These converging findings provide a plausible educational explanation for the larger gain observed when parents could watch a concise animation and then revisit related material in a booklet.

Importantly, the control group also improved, indicating that printed education should not be treated as an inactive comparator. Leaflet-based education has produced measurable changes in community health behavior[11], and booklet based approaches have improved knowledge in community and child development settings[9,14]. Evidence directly comparing videos with written information is not uniformly conclusive[18], which reinforces the need to interpret the present result within its specific context rather than generalize that multimedia will always outperform print. Parent-targeted eHealth reviews indicate that short, engaging videos may improve parental knowledge or confidence but also note heterogeneity and limitations in the evidence[19]. Similarly, a systematic review of video assisted education for mothers of young children reported improvements in knowledge, attitudes, or practices while emphasizing the need for stronger long term outcome evaluation[20]. Thus, the observed advantage may reflect the combination of modalities, the ability to revisit content, or contextual differences between sites.


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The clinical and community relevance of improving parental knowledge lies in its potential to support more appropriate stimulation at home. Family stimulation activities are associated with multiple domains of early development[4], and parenting interventions can improve parental knowledge, caregiving practices, and developmental outcomes[6,7]. However, knowledge is an intermediate outcome. The present study did not directly observe how parents stimulated their children, whether behavior changed after the one week intervention, or whether child developmental outcomes improved. Longer term evidence on early parenting interventions shows that immediate benefits do not always persist with the same magnitude over time[24]. Audio visual learning has also been used to support cognitive development learning in early childhood education[25], illustrating the relevance of engaging media while not establishing long term behavioral effects. For this reason, implementation of multimedia education should be accompanied by follow up support and future evaluation of sustained parenting practices and child outcomes rather than relying solely on immediate posttest knowledge scores.

Several limitations should guide interpretation. First, nonrandom allocation by institution creates selection and site confounding; measured baseline similarity cannot exclude unmeasured differences in school culture, communication patterns, socioeconomic context, prior exposure to developmental information, or other characteristics shared by families within the same institution. Because each educational approach was delivered in different institutions, the intervention effect cannot be fully disentangled from the site effect. A future study should randomize participants or, when delivery must occur by institution, use a cluster randomized or appropriately adjusted multilevel design. Second, although the study documentation described the 25 item questionnaire as validated, the source, item level validity evidence, complete domain blueprint, and reliability coefficient were not available for reporting, limiting reproducibility of the primary outcome measurement. Future validation should document expert content review, item level validity results, pilot testing or cognitive review with parents, and an internal consistency estimate appropriate for dichotomous items, such as KR-20, before the instrument is used as the principal outcome measure. Third, intervention fidelity was incompletely documented: individual viewing frequency, booklet reading frequency, detailed control leaflet dose, educator characteristics, and contamination between sites were not formally monitored. Implementation research emphasizes the importance of consistently reporting intervention delivery characteristics because these factors affect replication and scale-up[26]. Future protocols should use a standardized delivery script, record when the video and booklet are opened or reviewed where feasible, document the exact leaflet content, and prospectively assess cross group contamination. Fourth, the follow up period was only one week and the outcome was knowledge rather than observed behavior or child development. The revised difference in change analysis directly compares improvement between groups, but participant level ANCOVA or a group by time model would allow stronger baseline adjustment and, if site level data are available, explicit modeling of clustering[22,23]. Fifth, no formal a priori power calculation was documented, and purposive recruitment from a limited geographic area restricts generalizability. The sensitivity calculation presented in the Methods only indicates the approximate effect size


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detectable with the achieved sample and should not be interpreted as prospective justification. Future studies should prespecify a clinically meaningful knowledge difference, calculate sample size before recruitment, retain complete psychometric and fidelity records, and include longer term outcomes such as observed parental stimulation practices and standardized measures of child development.

## Conclusion

Education using an animated video combined with a booklet was associated with a larger short term improvement in parents' knowledge of cognitive stimulation than leaflet education. The intervention group gained 6.31 points and the control group 2.25 points, producing a between-group difference in change of 4.06 points (95% CI, 3.25-4.87; p<0.001; Cohen d=1.14). Because participants were allocated by institution rather than randomized individually, the result should be interpreted cautiously and may partly reflect site-related differences. Multimedia parent education is promising for strengthening knowledge, but future studies should confirm the effect using stronger allocation and baseline adjusted analyses, documented instrument validity and intervention fidelity, and longer term measures of parenting practice and child development.

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