



## Effectiveness of Board Book and Pop-Up Book Media in Health Education for Toilet Training among Children with Intellectual Disabilities

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### ABSTRACT

**Background:** Children with intellectual disabilities often face challenges in carrying out toilet training due to limitations in cognitive abilities and adaptive skills. Therefore, alternative learning media such as board books and pop-up books, which have proven effective in visual learning, are needed. This study aims to determine the differences in the effectiveness of health education using board book media and pop-up book media on toilet training in children with intellectual disabilities.

**Methods:** This study used a *quasi-experimental* design with a two-group pretest–posttest approach. A total of 23 children with intellectual disabilities were included using a total sampling technique. Participants were divided into two groups based on class, namely the board book group and the pop-up book group. Data were collected using questionnaires and observation sheets, then analyzed using *Wilcoxon signed-rank* and *Mann Whitney U*.

**Results:** The *Wilcoxon* test results showed a significant improvement in knowledge, attitudes, and toilet training skills before and after health education in both groups ( $p < 0.001$ ). Meanwhile, the *Mann Whitney* test showed no statistically significant difference in effectiveness between the board book and pop-up book media ( $p\text{-value} > 0.05$ ).

**Conclusion:** This study concludes that both board book and pop-up book media are effective in improving knowledge, fostering positive attitudes, and enhancing toilet training skills among children with intellectual disabilities. Statistical analysis also showed no difference between the two intervention media, indicating that each medium has comparable potential for use in health education programs.

**Keywords:** Board book; Health Education; Disabilities; Pop up Book; Toilet Training

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## Introduction

Intellectual disability is a condition that affects an individual's cognitive abilities and capacity to adapt to everyday life. Individuals with this condition commonly experience difficulties in learning, communication, social interaction, and performing daily activities independently. These limitations generally develop during childhood and are identified before the individual reaches 18 years of age.<sup>1</sup> children with intellectual disability is toilet training.

Toilet training activities are taught to toddlers including children with disabilities, in fact many of them still have difficulty doing toilet training. Students at SLB Al-Falah Sembayat still cannot do toilet training independently so the teacher must always be on standby when they want to urination or defecation.

In the learning process, lecture-based methods are commonly used; however, these approaches tend to reduce engagement and interest among students with intellectual disabilities, particularly in reading activities.<sup>2</sup> To overcome this problem, board book and pop up book media can be applied. Research by examining the use of pop-up book media in health education related to myopia demonstrated a significant improvement in participants' knowledge after the educational intervention was provided compared with their knowledge levels before the intervention.<sup>4</sup> Other research related to board book media, such as that conducted by stated that the development of Al-Qur'an Hadiths learning media in the form of board book material for hijaiyah letters significantly increased understanding of the material.<sup>8</sup>

The use of appropriate educational media is essential to support learning among children with intellectual disabilities, particularly in developing adaptive skills such as toilet training. Interactive and visually engaging media, such as board books and pop-up books, can enhance attention, comprehension, and learning outcomes. The use of appropriate educational media is essential to support learning among children with intellectual disabilities, particularly in developing adaptive skills such as toilet training.

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## Methods

A quantitative research approach was employed in this study through the use of a *quasi-experimental* design involving two groups with pretest and posttest measurements. The research involved 23 children with disabilities from SLB Al-Falah. Because the number of participants was limited, all eligible students were included in the study through a total sampling technique. After the participants were recruited, they were grouped according to their existing classroom arrangements. One class received education using board book media, while the other class was provided with pop-up book media as the intervention.

In this study, the independent variables are health education through board book media and pop up book media. While the dependent variable is the level of knowledge, attitudes and abilities of children with Intellectual disability about toilet training. The educational media used in this study, including board book and pop-up book, were developed by the researchers based on toilet training materials for children with intellectual disabilities. The media were then evaluated through expert judgment to assess their content validity, clarity, and suitability before being used in the intervention. The instruments in this study include the Counseling Event Unit (SAP), questionnaire sheet, and toilet training ability observation sheet.

This research was conducted at SLB Al-Falah Sembayat on December 16, 2024 - January 30, 2025. The procedures used to collect data include pre-implementation and implementation. For data processing techniques include editing, coding, entering data, and tabulation. Then, the research data were analyzed using the *Wilcoxon* test and the *Mann-Whitney* test.

Prior to data collection, this study obtained ethical approval from the Research Ethics

Commission of Muhammadiyah Gresik University under approval number 113/KET/II.UMG/KEP/A/2024. Ethical considerations implemented throughout the study included obtaining informed consent

from participants or their guardians, maintaining participant anonymity, ensuring data confidentiality, and complying with established ethical research standards.

**Result**

**Table 1. Knowledge of Children Disabilities about Toilet Training Before and After Health Education Using Media Board Book and Pop Up Book**

Toilet Training Knowledge	<i>Board Book</i>				<i>Pop Up Book</i>			
	Before		After		Before		After	
	N	%	n	%	n	%	n	%
Less	4	17,4	4	17,4	2	8,7	6	26,1
Simply	16	69,6	13	56,5	20	87	16	69,6
Good	3	13,0	6	26,1	1	4,3	1	4,3
<b>Total</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>
<i>Wilcoxon Test</i>	<i>p</i> = 0,000				<i>p</i> = 0,000			

The findings of this study indicated an increase in participants' knowledge following the intervention provided during the research process, attitudes, and toilet training skills among children with intellectual disabilities in both the board book and pop-up book groups after the intervention. The *Wilcoxon signed-rank* test conducted in each intervention group demonstrated significant differences between pre-intervention and post-intervention scores, with *p-values* below 0.05 in both groups. These findings suggest that the implementation of health education through both board book and pop-up book media contributed positively to improvements in participants' knowledge, attitudes, and toilet training skills.

In addition, the results of the *Mann-Whitney U* test indicated that there was no meaningful difference between the board book group and the pop-up book group regarding improvements in knowledge, attitudes, and toilet training abilities (*p-value* > 0.05). This suggests that neither media demonstrated superior effectiveness over the other. Although descriptive analysis showed that the board book group tended to have higher improvements in knowledge, attitudes, and skills compared to the pop-up book group, these differences were not statistically significant. Therefore, both media can be considered equally effective in supporting toilet training education among children with intellectual disabilities.

**Table 2. Attitudes of Children Disabilities about Toilet Training Before and After Health Education Using Media Board Book and Pop Up Book**

Toilet Training Attitude	<i>Board Book</i>				<i>Pop Up Book</i>			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
Negative	11	47,8	6	26,1	12	52,2	11	47,8
Positive	12	52,2	17	73,9	11	47,8	12	52,2
<b>Total</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>
<i>Wilcoxon Test</i>	<i>p</i> = 0,000				<i>p</i> = 0,000			

Board Book Group: Before the intervention, 52.2% of respondents held a "Positive" attitude. After the intervention, this significantly increased to 73.9%. The "Negative" attitude decreased from 47.8% to 26.1%. The *Wilcoxon* Test confirmed this change was statistically significant ( $p$ -value = 0.000).

Pop Up Book Group: Initially, the majority (52.2%) had a "Negative" attitude. Following the intervention, there was a slight improvement, with "Positive" attitudes rising

from 47.8% to 52.2%. The *Wilcoxon* Test also yielded a significant result ( $p$ -value = 0.000).

Both Board Books and Pop Up Books are statistically effective tools for improving the knowledge and attitudes of children with disabilities regarding toilet training ( $p$ -value < 0.05). However, the Board Book demonstrated a more substantial impact on achieving "Good" knowledge levels and fostering "Positive" attitudes compared to the Pop Up Book.

**Table 3. Ability of Children Disabilities about Toilet Training Before and After Health Education Using Media Board Book and Pop Up Book**

Toilet Training Skills	<i>Board Book</i>				<i>Pop Up Book</i>			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
Low	3	13	0	0	5	21,7	0	0
Medium	19	82,6	4	17,4	17	73,9	7	30,4
High	1	4,3	19	82,6	1	4,3	16	69,6
<b>Total</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>23</b>	<b>100</b>
<i>Wilcoxon Test</i>	$p = 0,000$				$p = 0,000$			

Table 3 evaluates the practical abilities and motor skills of children with disabilities in performing toilet training tasks before and after receiving health education. Board Book Group Performance: Pre-Education: Initially, only 4.3% (1 child) demonstrated a "High" skill level, while the majority (82.6%) were at a "Medium" level. Post-Education: There was a remarkable surge in performance, with 82.6% (19 children) reaching a "High" skill level. Improvement: Notably, the "Low" skill category was completely eliminated, dropping from 13% to 0%.

Pop Up Book Group Performance: Pre-Education: Only 4.3% (1 child) started with "High" skills, while 21.7% were in the "Low" category. Post-Education: Significant progress was observed as 69.6% (16 children) achieved a "High" skill level. Improvement: Similar to the first group, the "Low" skill category dropped to 0% following the intervention.

The *Wilcoxon* Test yielded a  $p$ -value of 0.000 for both media groups. This indicates that both the Board Book and the Pop Up Book are highly effective tools for significantly improving the practical toilet training skills of

children with disabilities. However, the Board Book resulted in a higher percentage of children reaching the maximum skill level (82.6%) compared to the Pop Up Book (69.6%).

Based on the results of testing the knowledge of retarded children about toilet training before and after health education shows the mean rank in the board book group of 26.17 with a sum of rank of 602.00 while the mean rank in the pop up book group is 20.83 with a sum of rank of 479.00. The results of the statistical analysis test using the *Mann-Whitney* test obtained Sig. of 0.135 > 0.05 so that H1 is rejected, which means that there is no difference in health education knowledge through board book media and pop up book media on toilet training in children with disabilities.

Based on the results of testing the attitudes of children with Intellectual disability about toilet training before and after health education shows the mean rank in the board book group of 25.43 with a sum of rank of 585 while the mean rank in the pop up book group is 21.57 with a sum of rank of 496. The results of the

statistical analysis test using the *Mann-Whitney* test obtained Sig. of  $0.203 > 0.05$  so that H1 is rejected, which means that there is no difference in the attitude of health education through board book media and pop up book media towards toilet training in children with disabilities

The findings related to toilet training abilities among children with intellectual disabilities showed that the board book group obtained a mean rank of 23.93 with a total rank score of 550.5, whereas the pop-up book group achieved a mean rank of 23.07 with a sum of ranks of 530.5. Statistical analysis using the *Mann-Whitney* test produced a significance value of 0.769, which was higher than 0.05. These results indicate that there was no statistically significant difference between the effectiveness of board book media and pop-up book media in improving toilet training abilities among children with intellectual disabilities.

The *Wilcoxon* test showed that both educational media significantly improved knowledge, attitudes, and toilet training skills within each group ( $p\text{-value} < 0.05$ ). However, the *Mann-Whitney* test indicated no statistically significant difference between the board book and pop-up book groups ( $p\text{-value} > 0.05$ ).

## Discussion

The results of this study demonstrate a consistent improvement in knowledge, attitudes, and toilet training skills among children with intellectual disabilities following health education interventions delivered through both board book and pop-up book media. Statistical analysis using the *Wilcoxon* test confirmed that these improvements were significant within each group, indicating that both types of educational media effectively contributed to positive learning outcomes.

In the domain of knowledge, both media facilitated children's understanding of toilet training concepts. This finding can be explained by the use of structured visual materials, which are particularly suitable for children with intellectual disabilities as they enhance information processing and

comprehension.<sup>9</sup> Although descriptive analysis revealed that a greater proportion of children in the board book group achieved a "sufficient" level of knowledge compared to those in the pop-up book group, the *Mann-Whitney* test showed that this difference was not statistically significant. This suggests that, despite slight variations in distribution, both media possess comparable effectiveness in improving cognitive outcomes.

A similar pattern was observed in the attitude variable. Post-intervention results indicated that children in both groups exhibited more positive attitudes toward toilet training. The interactive and visually engaging nature of the media likely played a role in increasing children's motivation and participation during the learning process, thereby influencing their attitudes in a favorable direction.<sup>2</sup> While the board book group demonstrated a higher proportion of positive attitudes descriptively, the absence of a statistically significant difference between the two groups indicates that both media are equally capable of fostering attitudinal change.

Regarding practical skills, the findings showed that toilet training abilities improved in both groups after the intervention. This supports the notion that appropriately designed educational media can enhance not only cognitive and affective domains but also psychomotor skills in children with intellectual disabilities.<sup>9</sup> Although the board book group again showed slightly higher descriptive outcomes, the *Mann-Whitney* test confirmed that these differences were not statistically significant, reinforcing the comparable effectiveness of both media.

Overall, the results of this study demonstrate that both board book and pop-up book media can be effectively used to enhance knowledge, attitudes, and toilet training skills in children with intellectual disabilities. Since no significant differences were identified between the two intervention methods, both types of educational media may serve as suitable alternatives for toilet training education based on the learning environment, participant needs, and available resources.

## Conclusions

This study demonstrates that health education using both board book and pop-up book media significantly improves knowledge, attitudes, and toilet training skills among children with intellectual disabilities. However, no statistically significant difference was found between the two media. These findings suggest that both media can be effectively utilized as educational tools in supporting toilet training interventions for children with intellectual disabilities. Future research is recommended to explore other interactive media and involve larger samples.

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