



JURNAL ASESMEN DAN INTERVENSI ANAK BERKEBUTUHAN KHUSUS

Jurnal homepage: <https://ejournal.upi.edu/index.php/jassi/index>



Development of Self-Care Skills in Children with Intellectual Disability Through Repeated Simple-Media Interventions in a Project-Based Self-Care Course

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ABSTRACT

This study examined the development of self-care (*bina diri*) skills among children with intellectual disability during repeated interventions delivered by special education pre-service teachers in a project-based learning course. A one-group, repeated-measures design without a control group was used. Of 189 children in six course classes, 154 with valid baseline and final scores were analyzed (88 mild, 58 moderate, 6 severe, and 2 unspecified intellectual disability). Scores (percentages) were recorded at baseline and across up to 12 sessions and analyzed with descriptive statistics, a paired *t*-test, Cohen's *d*, and normalized gain (N-gain). Mean scores rose from 40.7% to 86.1% ($t(153) = 24.97, p < 0.001, d = 2.01$), with a mean N-gain of 0.74 (high). Gains occurred across all disability levels and self-care elements, and children with lower baseline scores tended to gain more ($r = -0.34, p < 0.001$). The novelty lies in using routinely recorded course data to trace session-by-session progress across many children. The findings imply that repeated, concrete, simple-media practice is associated with substantial gains, although the absence of a control group precludes causal claims.

ARTICLE INFO

Article History:

Submitted/Received 00 xxx 2021

First Revised 00 xxx 2021

Accepted 00 xxx 2021

First Available online 00 xxx 2021

Publication Date 00 xxx 2021

Keyword:

Self-care skills;

Intellectual disability;

Merdeka Curriculum;

Learning media;

Project-based learning;

Normalized gain

1. INTRODUCTION

Self-care (*bina diri*) skills are the foundation of independence in daily life for children with intellectual disability. These skills cover helping oneself, taking care of oneself, grooming oneself, and simple skills, and they determine how far a child can participate at home, at school, and in the community without depending fully on others (Burns et al., 2019; Schalock et al., 2021). In Indonesia's Merdeka Curriculum, self-care is defined as a learning-outcome element that progresses from Phase A to Phase F, so teachers must adjust goals and strategies to each child's baseline ability (Badan Standar, Kurikulum, dan Asesmen Pendidikan [BSKAP], 2022; Nurul Nisa, 2024; Wulandari et al., 2024).

Improvement in self-care skills can be understood through two frameworks. The behavioral perspective on daily living skills holds that the ability to look after one's personal needs grows through gradual, repeated practice with prompting that is faded step by step (Burns et al., 2019; Liu et al., 2024). Self-determination theory places competence and autonomy among the basic psychological needs that drive engagement and development (Ryan & Deci, 2000). Both frameworks fit the practice of self-care teaching, namely repetition in real situations, gradually faded prompting, and the use of concrete objects. Earlier reviews show that self-determination interventions are effective for students with disabilities (Burke et al., 2020), but the evidence remains limited for students who need extensive support (Alsaeed et al., 2023).

Children with intellectual disability generally need repetition, direct examples, and media close to their own experience (Febriana & Widajati, 2022; Mahmudah et al., 2025; Ningsih & Huda, 2016; Robeni & Tarsidi, 2017). Simple media such as picture cards, toy money, clothing, or inexpensive eating utensils are cheap and easy for teachers to prepare. In the field, however, this practice is often not documented as analyzable data, so a picture of children's progress is hard to obtain in many cases.

Project-based learning (PBL) in a self-care course for special education students produces exactly this kind of data (Guo et al., 2020; Kokotsaki et al., 2016). Before the midterm exam, each pre-service teacher assesses one child and discusses an intervention program with the course lecturer. In course meetings 8 to 16, pre-service teachers deliver repeated interventions and record the score of every session together with video documentation. These data have rarely been analyzed as a whole, although they can reveal patterns of score development across dozens of children with different levels of disability and different self-care elements. Previous studies have reviewed interventions for daily living skills in intellectual disability (Alias et al., 2024; Burns et al., 2019; Dereje & Zeleke, 2023; Liu et al., 2024; Taconet et al., 2023) and PBL in teacher education (Du Toit et al., 2016; Pistorio & Hendricks, 2024). In our limited literature search, we did not find a study describing the development of children's self-care scores from special education students' projects within a single course.

This study therefore aims to (1) describe the development of self-care scores of children with intellectual disability during repeated interventions, (2) describe final scores and N-gain by level of disability and by self-care element, and (3) analyze the relationship between baseline scores and N-gain. *Method*: we used a quantitative descriptive, one-group repeated-measures design and analyzed the project records of 154 children with a paired *t*-test, Cohen's *d*, and N-gain. *Novelty*: to our knowledge, this is among the first analyses of course-embedded PBL records that trace session-by-session self-care progress across many children, disability levels, and self-care elements. *Implication*: the findings inform special education

programs and teachers about the use of repeated, concrete, simple-media practice and about how course project data can be standardized to monitor children's progress.

2. METHODS

2.1. Design and participants

This study used a quantitative descriptive approach with a one-group, repeated-measures design and no control group (Knapp, 2016). Data were collected from the projects of special education pre-service teachers in the Self-Care course across six course classes. Data were available for 189 children with intellectual disability. The analysis used 154 children who had a readable baseline score and a readable final score, consisting of 88 children with mild, 58 with moderate, and 6 with severe intellectual disability, and 2 children whose category was not recorded.

Children's identities are recorded as initials only.

2.2. Procedure and instrument

The project was organized in two stages. Before the midterm exam, each pre-service teacher selected one child, conducted a baseline assessment, and discussed the program with the course lecturer, including the phase, the self-care element (helping oneself [*menolong diri*], taking care of oneself [*mengurus diri*], grooming oneself [*merawat diri*], or simple skills [*keterampilan sederhana*]), the learning outcome, and the media. In course meetings 8 to 16, pre-service teachers delivered the intervention twice a week, with up to 12 recorded intervention sessions per child, using media of their own choice such as picture cards, toy money, clothing, or eating utensils. The score of each session was recorded as a percentage based on indicators of attainment, accompanied by a video link and a note.

2.3. Data processing and analysis

Scores had been written in various formats (fractions, percentages, and text), so they were standardized to a 0–1 scale. Spellings of disability category, self-care element, and media were harmonized. Unreadable cells were excluded, and children without a baseline or a final score were not analyzed. The final score is the last available session score of each child.

The analysis comprised descriptive statistics, a paired-samples *t*-test for baseline and final scores (with a Wilcoxon signed-rank test for comparison; Wilcoxon, 1945), Cohen's *d* for paired data (the mean difference divided by the standard deviation of the differences) as the effect size (Cohen, 1988; Lakens, 2013; Sullivan & Feinn, 2012), and N-gain (Hake, 1998; Marx & Cummings, 2007). N-gain was calculated with the equation below and categorized as high (≥ 0.70), medium (0.30–0.69), or low (< 0.30) following Hake (1998). Differences between levels of disability and between self-care elements are reported descriptively. The relationship between baseline score and N-gain was tested with Pearson and Spearman correlations. Because the design has no control group, the results are read as a description of progress that accompanied the intervention, not as evidence of a causal effect (Knapp, 2016).

$$\text{N-gain} = \frac{S_{\text{final}} - S_{\text{baseline}}}{S_{\text{max}} - S_{\text{baseline}}} \quad (1)$$

where S_{max} is the maximum possible score (100%, or 1 on the 0–1 scale), and S_{baseline} and S_{final} are the child's baseline and final scores.

3. RESULTS AND DISCUSSION

3.1. Score development during the intervention

The self-care scores of the 154 children rose from a mean of 40.7% ($SD = 16.8$) at baseline to 86.1% ($SD = 14.2$) at the final score. This mean difference of 45.4 points was statistically significant ($t(153) = 24.97, p < 0.001$; Wilcoxon $p < 0.001$) with a large effect size ($d = 2.01$). The mean N-gain was 0.74 (median 0.82); 104 children (67.5%) were in the high category, 35 (22.7%) in the medium category, and 15 (9.7%) in the low category.

Figure 1 shows that the mean score rose from 40.7% at baseline to 81.4% at Session 9, an average of about 4.5 points per session, after which it leveled off at about 83–84%.

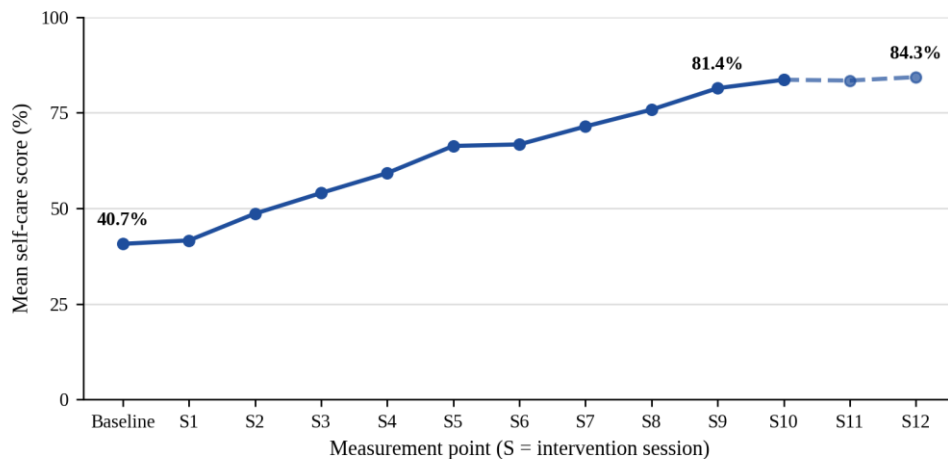


Figure 1. Mean self-care score at baseline and across intervention sessions (S1–S12). The number of children per time point ranged from 88 to 164 (all children with available data).

The dashed line (S10–S12) marks sessions reached by only about 90 children, so those means come from a smaller subset.

The results show that the self-care scores of children with intellectual disability rose from 40.7% to 86.1% after repeated interventions. The size of the gain ($d = 2.01$) and the proportion of children with a high N-gain (67.5%) suggest that repeated practice in real situations with simple media went hand in hand with skill mastery. This is consistent with the behavioral view that daily living skills are acquired through gradual, repeated practice (Burns et al., 2019; Liu et al., 2024) and with the view that experiences of competence foster engagement in learning (Ryan & Deci, 2000). It also agrees with studies reporting that audiovisual media, video, and teaching aids improved the self-care skills of children with intellectual disability (Febriana & Widajati, 2022; Mahmudah et al., 2025; Ningsih & Huda, 2016; Robeni & Tarsidi, 2017), and with a systematic review concluding that effective behavioral principles improve daily living skills in intellectual disability (Burns et al., 2019). Video modeling and prompting have likewise been used to teach functional skills (Astriani & Mufidah, 2022; Kellems et al., 2016), and a systematic review of independent living skills interventions found prompting and video modeling to be the most frequently used methods (Taconet et al., 2023); and a literature review of self-care and self-help approaches underlines the need for structured self-care training (Sunarwi et al., 2025).

The per-session pattern shows a steady rise up to Session 9 followed by a plateau. The plateau may reflect a ceiling effect (Šimkovic & Träuble, 2019), because many children were already close to the maximum score, and the fact that only about 90 children reached Sessions 11 and 12, so the means at the end of the curve come from a smaller subset. This suggests

that nine sessions may be sufficient for the skills practiced by most children, although this needs to be tested with more complete data.

3.2. Achievement by level of disability and self-care element

As shown in **Table 1**, scores improved in all groups. The highest N-gain appeared in helping oneself and simple skills, and the lowest in grooming oneself. The severe-disability group consisted of only 6 children and is therefore not interpreted separately.

Table 1. Baseline score, final score, and N-gain by group

Group	<i>n</i>	Baseline (%)	Final (%)	N-gain
All children	154	40.7	86.1	0.74
<i>Level of intellectual disability</i>				
Mild	88	42.2	87.8	0.75
Moderate	58	40.5	83.7	0.72
Severe	6	23.0	80.5	0.72
<i>Self-care element</i>				
Helping oneself (menolong diri)	26	40.1	88.4	0.79
Simple skills (keterampilan sederhana)	43	38.5	87.1	0.77
Taking care of oneself (mengurus diri)	45	42.7	83.6	0.70
Grooming oneself (merawat diri)	32	43.3	83.4	0.64

Note. Table 1 excludes 2 children without a recorded disability category and 8 children whose self-care element was outside the four main elements.

N-gain was relatively uniform across the three levels of disability (0.72–0.75). This pattern suggests that, when targets and media are adjusted, children with mild, moderate, and severe disability can obtain similar relative gains. However, the severe group comprised only 6 children, so this finding cannot be generalized.

By element, N-gain was highest for helping oneself (0.79) and simple skills (0.77) and lowest for grooming oneself (0.64). This difference is probably related to the nature of the skills: topics that introduce concepts, such as recognizing money, animals, or occupations, can be practiced with picture cards, whereas sequential skills such as dressing or eating require motor coordination and more repetition. This interpretation is tentative because element, media, and class are entangled in these data.

3.3. Relationship between baseline score and N-gain

Baseline score correlated negatively with N-gain (Pearson $r = -0.34$, $p < 0.001$; Spearman $\rho = -0.30$, $p < 0.001$). Children with lower baseline scores tended to obtain a relatively larger gain.

The negative correlation between baseline score and N-gain ($r = -0.34$) indicates that children with low baseline scores had more room for improvement. Because N-gain expresses improvement relative to the remaining room, it is more suitable than the raw score difference for comparing children who start at different levels. The negative correlation should nevertheless be read cautiously: it may partly reflect a ceiling effect and regression toward the mean, since children with extreme baseline scores tend to score closer to the average on a later measurement even without any intervention (Barnett et al., 2005).

3.4. Implications

For special education programs, project data from pre-service teachers can be used to monitor children's progress if score recording and media are standardized. For teachers, the results support the use of repeated interventions with concrete objects and simple media that are easy to prepare. For researchers, the course-embedded records offer a feasible starting point for later studies with comparison groups, independent raters, and media comparisons.

3.5. Limitations

This study has several limitations. First, there was no control group, so the improvement cannot be established as an effect of the intervention; it may also be influenced by maturation, practice at home, and test familiarity (Knapp, 2016). Second, scores were assigned by the implementing pre-service teachers as part of coursework rather than by independent raters, and inter-rater reliability was not examined. Third, the number of sessions and the type of media differed between children, and media type was mixed with self-care element, so a fair comparison between media is not possible. Fourth, the scoring indicators were not tested for validity and reliability, and differences between levels of disability and between self-care elements were not tested inferentially. Fifth, some unreadable scores were excluded from the analysis, and the severe-disability group was very small.

4. CONCLUSION

Self-care scores of 154 children with intellectual disability rose from a mean of 40.7% to 86.1% after repeated simple-media interventions delivered by special education pre-service teachers ($d = 2.01$; mean N-gain = 0.74, high), and 67.5% of the children reached the high N-gain category. Gains were similar across mild and moderate disability (N-gain 0.75 and 0.72) and were highest for helping oneself (0.79) and simple skills (0.77) and lowest for grooming oneself (0.64). Children with lower baseline scores gained more ($r = -0.34$), a pattern that may partly reflect the ceiling effect and regression toward the mean. Scores rose steadily until about Session 9 and then plateaued. Because the design had no control group, these results describe progress that accompanied the intervention and do not establish that the intervention caused it.

The contribution of this study is a session-by-session record of progress across many children, disability levels, and self-care elements, drawn from routinely collected course data, which earlier reviews of daily living skills interventions do not provide. Three recommendations follow. Special education programs should standardize how scores, sessions, and media are recorded so that project data can be analyzed. Teachers can use repeated, concrete practice with simple media, planning about nine sessions and allowing more repetition for sequential skills such as grooming. Future studies should add comparison groups, independent raters with reliability checks, and comparisons of media within the same self-care element.

5. ACKNOWLEDGMENT

The authors thank the pre-service teachers who collected the project data, and the children, parents, and schools who took part.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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