

# Traffic Simulation-Based Learning to Foster Discipline and Academic Performance in Children

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## Abstract

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Purpose     | : Discipline and academic achievement are essential foundations for children's cognitive, moral, and behavioral development in early childhood education. However, many preschool children experience difficulties in internalizing rules and structured learning behaviors, particularly in classroom settings that lack experiential and engaging learning strategies. This study was conducted in response to these challenges and aims to examine the effectiveness of traffic simulation-based learning as an instructional strategy to improve discipline and academic achievement among preschool children. By integrating play-based simulation with rule-oriented activities, the study seeks to provide a contextually relevant pedagogical approach that supports both character formation and learning outcomes in early childhood education |
| Methodology | : This study employed a Classroom Action Research (CAR) design following the Kurt Lewin model, consisting of two cycles with four stages: planning, action, observation, and reflection. The participants were 12 children in Group B at Raudhatul Atfhal As'adiyah Pengkendekan during the 2021/2022 academic year. Data were collected through discipline observation checklists, learning outcome tests, and teacher activity observation sheets. The data were analyzed using descriptive quantitative analysis, focusing on percentage-based developmental criteria commonly used in early childhood assessment to evaluate changes across the pre-cycle, Cycle I, and Cycle II.                                                                                                                                                                    |
| Results     | : The findings reveal a consistent and significant improvement in both children's discipline and academic achievement following the implementation of traffic simulation activities. Children's discipline increased from 32% in the pre-cycle to 42% in Cycle I, and reached 83% in Cycle II, categorized as <i>very well developed</i> . Academic achievement also showed substantial improvement, rising from 49% in Cycle I to 84% in Cycle II. In addition, teacher instructional activity improved from 90% to 95%, indicating enhanced teaching effectiveness and classroom engagement during the intervention.                                                                                                                                                                                                                                   |
| Conclusions | : The study concludes that traffic simulation-based learning is an effective pedagogical strategy for enhancing discipline and academic achievement in early childhood education. By providing concrete, experiential, and rule-based learning experiences, traffic simulation supports children's self-regulation, understanding of social rules, and learning engagement. These findings contribute to early childhood education research by highlighting the value of simulation-based and play-oriented approaches as practical tools for integrating character education and academic development in preschool settings.                                                                                                                                                                                                                            |

**Keywords:** early childhood education, traffic simulation, discipline, academic achievement, play-based learning

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## 1. Introduction

Early childhood, as defined by the National Association for the Education of Young Children (NAEYC), refers to the developmental period spanning from birth to eight years of age (Montroy et al., 2016; Whitebread et al., 2009). This stage represents a critical phase of growth and development across multiple domains within the human life course. Educational practices during early childhood must therefore be carefully aligned with children's developmental characteristics and needs at each stage of growth (Susanto, 2017). Early childhood education is widely recognized as a golden period in which appropriate guidance, stimulation, and character formation play a decisive role in shaping children's future development. Consequently, it is essential to provide balanced educational experiences that foster positive character development while supporting children's cognitive, social, emotional, and moral growth in accordance with their age (Hasana, 2018; Liana, 2024). As future members of families and society, children's success in both formal and non-formal education becomes a source of pride and hope for parents and communities alike.

In the Indonesian context, early childhood education is legally regulated under Article 28 of the National Education System Law, which stipulates that early childhood education is

organized prior to basic education and may be delivered through formal, non-formal, and informal pathways. Non-formal early childhood education includes playgroups and childcare centers, while informal education is provided through family and community environments. Further provisions regarding the implementation of early childhood education are regulated through government policies (Sisdiknas, 2008).

Children at an early age are highly receptive to new experiences, whether positive or negative. This sensitivity highlights the importance of early self-regulation development (Bay, 2023; Silva Moreira et al., 2024). For this reason, the internalization of positive values, including discipline, is particularly crucial during this developmental stage. Undisciplined behavior cannot be transformed instantaneously; rather, it requires a gradual process of habituation, guidance, and meaningful learning experiences. Discipline not only relates to obedience to rules but also encompasses self-regulation in learning activities (Dör-r & Perels, 2019; Jacob et al., 2020). Children who develop disciplined behaviors tend to demonstrate improved learning outcomes, as discipline supports sustained attention, task completion, and responsible behavior.

Early childhood is also a period in which children are vulnerable to the development of undesirable moral behaviors, particularly in relation to discipline. This condition is often influenced by limited guidance from parents and educators regarding the importance of disciplined behavior. In practice, educators and parents frequently prioritize cognitive development while overlooking moral and character education, including discipline. However, moral values—especially discipline—are fundamental and should be cultivated from an early age. When children are taught to behave in a disciplined manner, they gradually develop an understanding of rules and social norms that govern everyday life (Yufina, 2020).

Discipline is commonly associated with compliance with rules and effective time management. An individual is considered disciplined when tasks and responsibilities are completed in a timely and orderly manner. Within Islamic teachings, discipline is strongly emphasized through numerous verses of the Qur'an and prophetic traditions that encourage obedience to established rules and authority. For instance, Surah An-Nisa (4:59) instructs believers to obey Allah, His Messenger, and legitimate authority, highlighting discipline and adherence to rules as foundations of moral conduct. Similarly, a hadith narrated by Bukhari emphasizes the obligation of obedience in matters that do not involve wrongdoing, reinforcing the ethical basis of discipline in daily life (Anhar, 2021; Selian, 2023).

Children's discipline reflects both observable behavior and their willingness to comply with established rules. However, discipline does not emerge spontaneously; it must be intentionally cultivated through educational processes. Children are newcomers to the social world and initially lack an understanding of manners, norms, and rules. In this regard, teachers play a pivotal role in fostering discipline within school settings, as they directly shape children's habits and behaviors through consistent guidance, modeling, and reinforcement (Yufina, 2020).

According to Law Number 20 of 2003 on the National Education System, early childhood education constitutes a structured effort to support children from birth to six years of age through educational stimulation that promotes both physical and psychological development, preparing them for subsequent levels of education (Sisdiknas, 2003). Engaging and meaningful learning processes are therefore essential to achieving optimal learning outcomes. Learning methods that provide concrete and experiential learning opportunities are particularly effective in early childhood settings. This aligns with recent evidence that play-based, simulation-oriented, and project-based learning enhances engagement, disciplinary behavior, and learning outcomes in early childhood education (Fyffe et al., 2024; Bredikyte & Brandisauskiene, 2023; Setyowati et al., 2023; Chookah et al., 2023; Cremin & Chappell, 2021).

Both school environments and public spaces operate under rules that can foster discipline and personal responsibility. However, children differ in character and learning readiness, requiring educators to adopt strategies that accommodate these differences. In kindergarten settings, children are gradually introduced to rules through daily routines and habituation, such as placing shoes in designated areas or refraining from eating during instructional time.

Based on interviews with a Group B teacher at RA As'adiyah Pengkendekan, it was revealed that many children were newly enrolled in the 2021/2022 academic year and had not yet adapted

to school rules or classroom routines. As a result, their disciplinary behaviors were relatively underdeveloped, and their learning outcomes were categorized as beginning to develop. These conditions indicate the need for engaging and contextually relevant learning activities that can simultaneously enhance discipline and academic achievement.

In response to these challenges, the present study proposes the implementation of traffic simulation activities as an instructional strategy to habituate children to rules in classroom, school, and real-life contexts. Accordingly, this research investigates the effectiveness of traffic simulation-based learning in improving discipline and academic achievement among Group B children at RA As'adiyah Pengkendekan.

## 2. Methodology

This study employed a Classroom Action Research (CAR) methodology, consistent with classroom-based qualitative approaches that integrate meaningful learning models such as project-based and experiential techniques in early childhood settings (Aisyah, Utamimah, & Baharun, 2025). focusing on classroom-based instructional activities aimed at identifying weaknesses in the teaching-learning process and implementing practical solutions for improvement. The research design followed the Kurt Lewin action research model, which consists of four iterative components: planning, action, observation, and reflection, organized systematically into cyclical stages (Lewin, 1946). Similar iterative intervention approaches have been shown to improve instructional quality and learner outcomes in early childhood settings (Vasseleu et al., 2024).

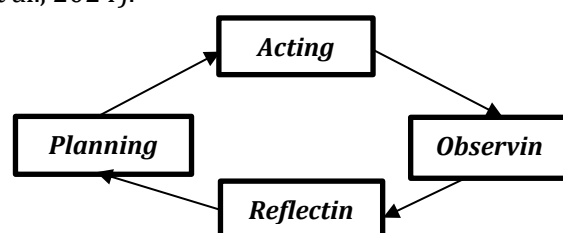


**Figure 1.** Stages of Classroom Action Research Based on Kurt Lewin's Model (Lewin, 1946)

The study involved 12 children from Group B at RA As'Adiyah Pengkendekan during the 2021/2022 academic year and was conducted over a one-month period in October 2021. The research was implemented in two cycles, with each cycle comprising four instructional meetings and encompassing the four stages of action research. The first cycle focused on identifying the initial levels of children's discipline and learning outcomes related to traffic education, while the second cycle aimed to deepen children's understanding and internalization of traffic rules through improved instructional strategies.

Research instruments included observation sheets in checklist format to monitor children's disciplinary behaviors during traffic simulation activities and learning outcome tests administered at the beginning and end of each cycle. The observation instrument assessed four indicators of discipline: (1) children's understanding of traffic sign rules, (2) comprehension of behavioral regulation systems, (3) ability to follow increasingly complex instructions based on traffic rules, and (4) orderly compliance with traffic regulations during simulation activities. The learning outcome test measured children's abilities to identify traffic signs, distinguish signs based on shape and color, classify mandatory and prohibition signs, and verbally recount traffic simulation activities using simple vocabulary.

Data collection techniques consisted of direct classroom observation, documentation, and testing to evaluate learning progress and the effectiveness of traffic simulation-based instruction. The data were analyzed using descriptive quantitative analysis, employing percentage-based calculations to interpret both process and outcome measures.

Instrument validity was established through expert judgment, with two validators assessing each instrument using a four-point Likert scale. Content validity was calculated using

Aiken's V formula, while reliability was determined through the percentage of agreement method.

Data analysis included the evaluation of teacher instructional activity and children's learning and disciplinary behaviors using percentage scores. Teacher activity was categorized from Very Poor (0–25%) to Very Good (75–100%). Children's developmental outcomes were classified into four categories: Not Yet Developed (0–25%), Beginning to Develop (25–50%), Developing as Expected (50–75%), and Very Well Developed (75–100%). Learning outcome test results were interpreted using the same percentage-based criteria to assess improvements across research cycles.

### 3. Results

This section presents the empirical findings of the Classroom Action Research (CAR) implemented through traffic simulation-based learning activities in an early childhood education setting. The findings are derived from systematic observations and learning assessments conducted throughout the intervention, providing an overview of children's behavioral and academic development during the research process.

The results are structured to reflect three key dimensions of analysis: (1) children's initial conditions prior to the intervention, (2) changes in learning outcomes across the action research cycles, and (3) developments in children's disciplinary behavior alongside teacher instructional activity. This organization allows for a clear examination of progressive improvements resulting from the implementation of traffic simulation as an experiential and rule-based learning strategy.

#### 3.1. Initial Conditions

Prior to the implementation of the traffic simulation-based intervention, children demonstrated a limited understanding of traffic rules and disciplined behavior within the classroom context. Observations during the pre-cycle phase revealed that most children were unfamiliar with structured rule-following activities and had not yet developed consistent self-regulatory behaviors related to learning routines.

The pre-cycle assessment results indicated that children's discipline was categorized as *Beginning to Develop*, with an average achievement of **32%**. This level suggests that disciplinary behaviors were present only sporadically and required frequent guidance from the teacher. Children often showed uncertainty when responding to instructions and had difficulty consistently complying with agreed-upon rules during learning activities.

These findings indicate that most children had not yet internalized basic traffic-related rules or broader behavioral expectations that support disciplined learning. The limited level of discipline observed in the pre-cycle phase underscores the need for structured, experiential, and engaging instructional strategies capable of supporting children's understanding of rules and promoting positive behavioral development in early childhood learning environments.

**Table 1.** Children's Initial Discipline Level (Pre-Cycle)

| Development Category         | Percentage (%) | Interpretation |
|------------------------------|----------------|----------------|
| Not Yet Developed (BB)       | –              | –              |
| Beginning to Develop (MB)    | 32             | Low discipline |
| Developing as Expected (BSH) | –              | –              |
| Very Well Developed (BSB)    | –              | –              |

As presented in Table 1, the pre-cycle assessment revealed that children's disciplinary behavior was predominantly categorized as Beginning to Develop (MB), with an average achievement of 32%. No children reached the Developing as Expected (BSH) or Very Well Developed (BSB) categories at this stage. This distribution indicates that disciplined behaviors were still emerging and had not yet been consistently demonstrated during classroom activities.

The dominance of the Beginning to Develop category suggests that children required frequent guidance and external reminders to follow basic rules and routines. Observational

data showed that children often hesitated when responding to instructions and exhibited inconsistent compliance with structured activities. These behaviors reflect a limited internalization of discipline-related norms, particularly those associated with rule-based learning contexts such as traffic education.

Overall, the findings in Table 1 highlight the necessity of implementing targeted instructional interventions to support the development of discipline in early childhood. The absence of higher developmental categories underscores the importance of introducing engaging, concrete, and experiential learning strategies capable of fostering children's understanding of rules and promoting more consistent disciplinary behaviors in subsequent learning cycles.

### 3.2. Learning Outcomes Across Research Cycles

Following the implementation of traffic simulation-based learning activities, children's academic learning outcomes demonstrated a gradual and consistent improvement from Cycle I to Cycle II. The findings indicate that the introduction of structured, play-based simulation supported children's understanding of traffic-related concepts and facilitated more active engagement during learning activities.

The observed improvement across cycles reflects the cumulative effect of experiential learning and instructional refinement. Such cumulative gains are consistent with findings from simulation-based early learning interventions (Dör-r & Perels, 2019). As children became more familiar with simulation procedures and classroom routines, their ability to comprehend, apply, and recall learning materials increased, resulting in higher achievement levels in subsequent cycles. These results suggest that traffic simulation-based learning provides an effective pedagogical framework for enhancing academic outcomes in early childhood education.

**Table 2.** Improvement of Children's Learning Outcomes

| Research Stage | Percentage (%) | Development Category      |
|----------------|----------------|---------------------------|
| Pre-Cycle      | 32             | Beginning to Develop (MB) |
| Cycle I        | 49             | Beginning to Develop (MB) |
| Cycle II       | 84             | Very Well Developed (BSB) |

As presented in Table 2, children's learning outcomes increased steadily across the research stages, reflecting the effectiveness of traffic simulation-based learning. In the pre-cycle phase, learning achievement was recorded at 32%, categorized as Beginning to Develop (MB). Following the implementation of the intervention in Cycle I, the average learning outcome rose to 49%, remaining within the same category but indicating meaningful initial progress in children's understanding of traffic-related concepts.

Further improvement was observed in Cycle II, where the average learning outcome reached 84%, categorized as Very Well Developed (BSB). At this stage, 8 children (67%) achieved the Very Well-Developed category, while the remaining 4 children (33%) reached the Developing as Expected (BSH) category. This substantial increase suggests that sustained and refined implementation of traffic simulation activities effectively supported children's academic development and learning mastery over time.

### 3.3. Children's Discipline and Teacher Activity

In addition to improvements in academic learning outcomes, the implementation of traffic simulation-based learning also contributed to notable changes in children's disciplinary behavior and teacher instructional activity. Systematic observations conducted across the research cycles revealed that children gradually demonstrated increased compliance with rules, greater consistency in following instructions, and improved self-regulation during learning activities. At the same time, teacher instructional performance showed progressive enhancement, particularly in classroom management, clarity of instruction, and the effective use of learning media. These parallel developments indicate that traffic simulation activities not only supported children's behavioral growth but also strengthened the overall quality of the

teaching–learning process, as reflected in both learner engagement and instructional effectiveness.

**Table 3.** Changes in Discipline and Teacher Activity

| Indicator             | Cycle I (%) | Cycle II (%) | Category            |
|-----------------------|-------------|--------------|---------------------|
| Children’s Discipline | 42          | 83           | Very Well Developed |
| Teacher Activity      | 90          | 95           | Very Good           |

As summarized in Table 3, both children’s disciplinary behavior and teacher instructional activity exhibited substantial improvement from Cycle I to Cycle II. Children’s discipline increased markedly from 42% in Cycle I, categorized as Beginning to Develop, to 83% in Cycle II, reaching the Very Well-Developed category. This improvement indicates that children became more consistent in following rules, responding to instructions, and maintaining orderly behavior during traffic simulation activities. Concurrently, teacher instructional activity improved from 90% to 95%, both categorized as Very Good, reflecting enhanced classroom management, clearer instructional delivery, and more effective facilitation of learning activities. This improvement aligns with research showing that teacher support, motivation, and professional self-efficacy significantly influence children’s academic performance and engagement over time (Affuso et al., 2023).

These findings suggest that sustained engagement with traffic simulation–based learning not only fostered children’s behavioral development but also strengthened instructional quality, contributing to a more structured, engaging, and effective early childhood learning environment.

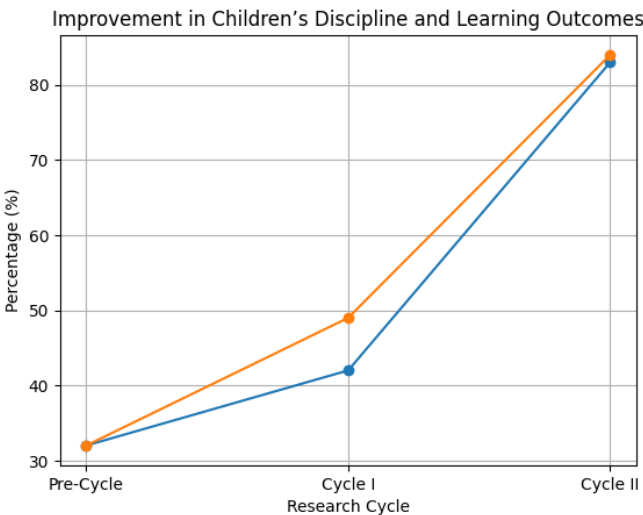


**Figure 2.** Improvement in Children’s Discipline and Learning Outcomes

Figure 2 illustrates the progressive improvement in children’s discipline and academic learning outcomes across the research cycles. Both indicators show a consistent upward trend from the pre-cycle phase to Cycle II, indicating the effectiveness of traffic simulation–based learning in enhancing behavioral and academic development in early childhood education.

**4. Discussion**

The findings of this study demonstrate that traffic simulation–based learning effectively enhanced both children’s discipline and academic achievement at RA As’adiyah Pengkendekan, an Islamic early childhood education institution oriented toward moral and academic development. The progressive improvement observed across the research cycles indicates that experiential, rule-based learning strategies are compatible with institutional missions emphasizing character formation and holistic child development.

The relatively low level of discipline observed in the pre-cycle phase (32%) reflects a common challenge in early childhood education, where young learners have limited capacity

for self-regulation in the absence of structured habituation. This condition is consistent with previous research suggesting that children require repeated exposure to rules and routines before disciplined behavior becomes internalized (Munfa'ati, 2018).

The introduction of traffic simulation activities in Cycle I resulted in a noticeable improvement in learning engagement and behavioral compliance. This outcome supports the argument that concrete and play-based learning media facilitate children's understanding by aligning instructional content with their developmental characteristics (Suryana, 2016). However, the persistence of partial confusion among some children suggests that initial exposure alone is insufficient for deep behavioral and cognitive consolidation.

The instructional limitations identified in Cycle I informed refinements in Cycle II, including clearer role assignments and improved learning media. These adjustments significantly enhanced children's participation and comprehension, reinforcing findings that structured role-play and active involvement strengthen learning motivation and behavioral consistency in early childhood contexts (Hidayati, 2019; Pratiwi, 2021).

From a developmental perspective, the improvement in disciplinary behavior aligns with Piaget's theory of heteronomous morality, which posits that children aged four to seven learn discipline through externally imposed rules and tangible experiences (Montroy et al., 2016; Espinet et al., 2013). Traffic simulation provided a concrete framework through which children could repeatedly practice rule adherence in a meaningful context.

In addition, the findings resonate with Vygotsky's constructivist theory, emphasizing that learning occurs through social interaction and guided participation. The collaborative nature of traffic simulation activities enabled children to negotiate rules, observe peer behavior, and receive scaffolding from teachers, thereby supporting social and moral development. Recent studies confirm that guided social play enhances rule internalization and self-control in preschool contexts (Bredikyte & Brandisauskiene, 2023; Fyffe et al., 2024).

The substantial increase in academic achievement—from 32% in the pre-cycle to 84% in Cycle II—reflects the integration of cognitive, affective, and psychomotor domains, as conceptualized in Bloom's Taxonomy. This integration suggests that simulation-based learning promotes comprehensive developmental outcomes rather than isolated cognitive gains (Hartini, 2021; Fyffe et al., 2024; Silva Moreira et al., 2024). This multidimensional impact is consistent with integrated learning models in early childhood education (Silva Moreira et al., 2024; Whitebread et al., 2009).

Furthermore, the concurrent improvement in teacher instructional activity highlights the effectiveness of the Classroom Action Research (CAR) approach as a reflective pedagogical model. Similar findings have been reported in intervention-based professional learning studies in early childhood education (Vasseleu et al., 2024). Consistent with Rukajat (2018), CAR enabled the teacher to refine instructional strategies, classroom management, and the use of learning media, contributing to improved learning conditions.

Overall, these findings confirm that traffic simulation-based learning functions as a robust pedagogical strategy for fostering discipline and academic competence in early childhood education. Beyond improving learning outcomes, this approach offers a practical framework for integrating character education within experiential learning, particularly in faith-based early childhood institutions seeking to balance moral development with academic achievement.

## **5. Conclusion**

Based on the analysis of data and discussion across two action research cycles, this study concludes that traffic simulation-based learning is effective in improving both discipline and academic achievement among Group B children at RA As'adiyah Pengkendekan. The findings demonstrate a clear and progressive improvement in children's learning and behavioral outcomes when engaging, rule-based, and play-oriented instructional activities are systematically implemented.

The initial condition revealed that children's discipline and learning achievement were relatively low, with an average percentage of 32%, categorized as Beginning to Develop.

Following the first cycle of intervention, children's discipline increased to 42%, remaining within the Beginning to Develop category, indicating early adaptation to traffic simulation activities. However, after instructional refinement in Cycle II, children's discipline improved substantially to 83%, reaching the Very Well-Developed category.

Similarly, children's academic learning outcomes showed significant progress. Learning achievement increased from 49% in Cycle I (Beginning to Develop) to 84% in Cycle II, classified as Very Well Developed. In addition, teacher instructional activity demonstrated consistent improvement, rising from 90% to 95%, both categorized as Very Good, reflecting enhanced teaching effectiveness and classroom management during the intervention.

These results indicate that traffic simulation activities provide meaningful, concrete, and experiential learning experiences that support children's understanding of rules, self-regulation, and academic engagement. Therefore, traffic simulation-based learning can be recommended as a practical pedagogical strategy for early childhood educators seeking to integrate character education, particularly discipline—with academic learning in early childhood education settings. These findings echo international evidence that simulation-based and play-oriented interventions effectively support early self-regulation and academic readiness (Fyffe et al., 2024; Jacob et al., 2020).

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