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The Effectiveness of the KOMPAK Learning Model in Enhancing Learning Engagement among Children with Autism Spectrum Disorder in Inclusive Elementary Schools

Tuti Haryati[1*], Pamuji Raharjo[2], GH Sugeng Koco Purnomo[3], RA. Sri Turwati Sulasminingsih[4]
[1,2,3,4]Universitas Negeri Surabaya, Surabaya, Indonesia

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ABSTRACT

Purpose: This study examines the effectiveness of the KOMPAK Learning Model in improving learning engagement among children with Autism Spectrum Disorder (ASD) in inclusive elementary school settings. The investigation focuses on three core components of engagement attention, active participation, and responsiveness to instructional cues which frequently present challenges for students with ASD during classroom learning. **Methods:** A quantitative approach employing a one-group pretest–posttest quasi-experimental design was used. Thirty children diagnosed with ASD were selected through purposive sampling. Learning engagement data were gathered using an observational instrument previously validated for reliability. A paired-sample t-test was conducted to compare engagement levels before and after implementation of the KOMPAK model. **Findings:** The results indicate a statistically significant increase in learning engagement within the sample following the intervention. Mean scores rose from 56.30 at pretest to 78.45 at posttest. The paired-sample t-test yielded $p < 0.001$, and the effect size (d = 0.85) fell within the large range. While these findings suggest that the KOMPAK Learning Model may enhance attention, participation, and responsiveness among students with ASD, they should be interpreted within the limitations of a single-group design. **Research implications:** The study provides preliminary empirical support for the KOMPAK Learning Model as an adaptive instructional strategy in inclusive elementary schools. Its application may assist teachers in fostering more consistent engagement among students with ASD, thereby contributing to improved inclusive learning quality and supporting students' social–academic development. **Originality:** This research contributes to the field of inclusive education by offering empirical evidence on a learning model tailored to the distinct characteristics of children with ASD. Its emphasis on learning engagement rather than solely academic or behavioral outcomes distinguishes it from prior studies.

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INTRODUCTION

Inclusive education is an approach that ensures the right of every learner, including those with special educational needs, to access equitable and meaningful learning within the same educational environment. It emphasizes the principles of equity, participation, and accessibility for all students regardless of their developmental, physical, or cognitive differences. This commitment is reinforced globally through the Salamanca Statement, which urges schools to accommodate all children, including those requiring specialized support. In Indonesia, inclusive education has gained increasing urgency as national policies encourage regular schools to admit and serve students with disabilities. These policies highlight that inclusion is not merely a normative mandate but also a practical necessity for achieving educational justice. However, the implementation of inclusive practices remains uneven across school contexts due to limited teacher preparation and instructional adaptations. As a result, students with diverse needs often face barriers in participating effectively in learning activities. This situation underscores the importance of developing instructional models that provide structured and responsive support for learners with diverse characteristics.

Among the students served in inclusive classrooms, children with Autism Spectrum Disorder (ASD) receive particular attention due to their distinctive developmental profiles. ASD is defined by persistent difficulties in social communication, restricted patterns of behavior, and challenges in flexibility of thought, as described by the *Diagnostic and Statistical Manual of Mental Disorders* (Maye et al., 2022; Oberman & Kaufmann, 2020). These

characteristics often interfere with students' ability to sustain attention, follow classroom instructions, and respond appropriately to learning cues. Research shows that students with ASD may struggle with transitions, exhibit limited initiation in learning tasks, and depend heavily on predictable routines (Sevin et al., 2015; Tøhaug et al., 2025). Such challenges can reduce their opportunities to participate meaningfully in inclusive learning environments. Furthermore, children with ASD typically benefit from structured, consistent, and individualized instructional approaches tailored to their sensory and cognitive needs. Without such adaptations, their engagement in classroom learning tends to be limited. Therefore, addressing the learning needs of students with ASD requires instructional designs that are systematic, clear, and supportive of their unique processing patterns.

A recurrent challenge in inclusive education for students with ASD is their low level of learning engagement, which encompasses behavioral, emotional, and cognitive dimensions. Learning engagement refers to the observable attentiveness, active participation, and cognitive investment that students demonstrate during learning activities (Peng, 2017; You, 2022). Prior studies have documented that children with ASD often display reduced engagement manifested through limited eye contact, minimal interaction with peers, and passive participation in tasks (Drysdale et al., 2018; Godin et al., 2019). Low engagement has been linked to poorer academic outcomes and weaker social development, particularly in settings where individualized supports are insufficient. Interventions such as structured teaching, peer-mediated instruction, and activity-based learning have demonstrated some success in enhancing engagement among students with ASD in inclusive environments. However, evidence from these interventions indicates variability in outcomes due to contextual differences and the lack of models explicitly designed around everyday functional learning. Moreover, many existing models do not fully integrate contextual, structured, and interactive elements simultaneously, which are essential for sustaining engagement in ASD populations. Consequently, there remains a strong need for instructional approaches that combine structure, relevance, and opportunities for active learning within inclusive classrooms.

The KOMPAK Learning Model was conceptualized as an instructional framework intended to strengthen learning engagement by emphasizing structured, contextual, and functional learning components. Operationally, KOMPAK consists of five core stages: *Kontekstualisasi*, *Organisasi kegiatan*, *Modeling*, *Partisipasi aktif*, dan *Konfirmasi*, which together guide teachers in scaffolding learning tasks. Each stage focuses on connecting learning materials to students' daily experiences, systematically organizing tasks, demonstrating expected behaviors, engaging students in hands-on activities, and providing feedback. This structure aligns with principles of structured teaching that promote predictability and clarity for learners with ASD (Holmes, 2021; Nowell & Hume, 2023). It also resonates with the Universal Design for Learning framework, which encourages multiple means of engagement, representation, and expression (Anastasiou et al., 2025; Seymour, 2024). Unlike more traditional, teacher-centered instructional models, KOMPAK requires teachers to balance explicit structure with opportunities for active student participation. The model aims to support sustained attention, promote meaningful interaction, and increase responsiveness during learning tasks. Despite its conceptual strengths, KOMPAK has received limited empirical testing, especially in inclusive elementary school contexts.

Given the persistent challenges related to low engagement among students with ASD and the limited empirical research on structured-contextual learning models, the effectiveness of KOMPAK warrants investigation. Previous interventions have shown partial improvements in engagement, yet few studies have examined models that intentionally combine structure, contextual relevance, and active participation. Moreover, no existing research has specifically evaluated the KOMPAK model's impact on behavioral engagement indicators among children with ASD in inclusive elementary settings. This gap highlights the need for empirical evidence on whether KOMPAK can meaningfully improve attention, participation, and responsiveness in such classrooms. Therefore, this study adopts a quasi-experimental one-group pretest–posttest design to examine engagement changes before and after KOMPAK implementation. The research focuses on determining the magnitude of improvement in engagement scores and identifying which engagement components are most responsive to the intervention. Based on the theoretical foundations of structured and contextual learning, the study hypothesizes that the KOMPAK Model will significantly enhance learning engagement among students with ASD. Through this examination, the study aims to contribute to evidence-based practices that strengthen inclusive instructional quality.

METHOD

Research Design

This study employed a quantitative quasi-experimental design to examine the effectiveness of the KOMPAK Learning Model in improving learning engagement among children with Autism Spectrum Disorder (ASD) in inclusive elementary schools. A one-group pretest–posttest design was used, in which a single cohort was assessed before and after the intervention. This design allows for the detection of changes over time within the same group, although it does not permit causal inferences with the same level of rigor as designs with control groups. Pretest measurements established baseline engagement, after which the KOMPAK model was implemented as the primary instructional intervention across a series of lessons. Posttest data were subsequently collected to assess changes in engagement following implementation. The study acknowledges that the absence of a comparison group limits

internal validity and susceptibility to alternative explanations for observed changes. Nonetheless, this design provides preliminary evidence for evaluating the model's potential effectiveness in naturalistic inclusive classroom settings.

Participants

The study involved 30 elementary-aged children diagnosed with Autism Spectrum Disorder who were enrolled in inclusive public schools. Participants ranged in age from 7 to 11 years (M = 8.6, SD = 1.2), with 22 males and 8 females, reflecting the gender prevalence typically observed in ASD populations. All participants had been formally diagnosed by licensed psychologists, pediatricians, or multidisciplinary clinical teams, and documentation was verified through school records. Inclusion criteria required that students: (a) demonstrated the ability to follow simple verbal or visual directions, (b) did not present severe sensory-processing difficulties that might interfere with classroom participation, and (c) attended regular inclusion classrooms for at least 70% of instructional time. Students with comorbid intellectual disability of severe degree or those receiving intensive one-on-one therapy during class time were excluded to maintain sample comparability. Participants were selected using purposive sampling in coordination with school administrators and special education coordinators. Written informed consent was obtained from parents or legal guardians, and verbal assent was obtained from students when developmentally appropriate.

Intervention: KOMPAK Learning Model

The KOMPAK Learning Model was delivered across eight instructional sessions over four weeks, with each session lasting approximately 45 minutes. The model consists of five operational components:

1. Kontekstualisasi – Teachers introduce the lesson using concrete examples, visual cues, or real-life scenarios to activate background knowledge and make learning meaningful.
2. Organisasi Kegiatan – Teachers provide a clearly structured sequence of tasks using visual schedules, step-by-step instructions, and predictable routines.
3. Modeling – Teachers demonstrate target skills or behaviors explicitly, using verbal explanation and visual modeling.
4. Partisipasi Aktif – Students engage in hands-on, guided practice activities designed to promote interaction, participation, and task engagement.
5. Konfirmasi – Teachers provide immediate feedback, reinforcement, and clarification to strengthen understanding and maintain engagement.

Two regular classroom teachers and one special education teacher were trained in a 6-hour workshop to administer the model consistently. Training included demonstrations, practice scenarios, fidelity checklists, and modeling by the research team. Throughout implementation, fidelity of the intervention was monitored using a structured checklist, with adherence rates consistently above 85%.

Instrument

Learning engagement was measured using the Learning Engagement Observation Rubric (LEOR), a structured observation tool consisting of four dimensions:

1. Attention (e.g., orienting toward task materials, maintaining gaze on instruction)
2. Active Participation (e.g., responding to teacher prompts, participating in activities)
3. On-Task Behavior (e.g., staying seated, manipulating learning materials appropriately)
4. Responsiveness (e.g., answering questions, following directions)

Each dimension comprises 3–5 observable indicators, rated on a 4-point scale (1 = very low engagement, 4 = high engagement). Higher scores indicate greater learning engagement. Content validity was established by three experts in special education and inclusive pedagogy, who evaluated each indicator for relevance, clarity, and representativeness. The Content Validity Index (CVI) across all items was 0.92, indicating high expert agreement. Reliability was assessed using Cronbach's alpha, yielding $\alpha = 0.87$ for the total scale, demonstrating high internal consistency. In addition, inter-rater reliability was assessed for 20% of observations using two independent raters, resulting in an agreement coefficient of Cohen's $\kappa = 0.82$, indicating strong reliability.

Procedure

The study followed three phases:

1. Preparation – Developing lesson plans aligned with the KOMPAK model, validating the engagement instrument, securing institutional permission, and training teachers.
2. Pretest – Observers conducted baseline engagement assessments during two regular classroom sessions prior to any intervention.
3. Intervention Implementation – Teachers implemented the KOMPAK model during eight scheduled lessons, with researchers monitoring fidelity.
4. Posttest – Engagement observations were conducted during the final two lessons using the same instrument and scoring procedures as the pretest. All observations were performed by trained raters who were blinded to the study objectives to reduce measurement bias.

Data Analysis

Data analysis consisted of both descriptive and inferential statistical procedures. Descriptive statistics (mean, standard deviation, range) were used to summarize engagement levels at pretest and posttest. Inferential analysis was conducted using a paired-sample *t*-test to examine whether engagement scores differed significantly before and after the intervention. Statistical significance was set at $\alpha = 0.05$. Effect size was calculated using Cohen's d to quantify the magnitude of the difference, with conventional thresholds of 0.20 (small), 0.50 (medium), and 0.80 (large). Assumptions of normality were assessed through Shapiro–Wilk tests and visual inspection of Q-Q plots. These analyses provided both statistical and practical interpretations of the intervention's impact.

Ethical Considerations

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of the university conducting the research. Participation was entirely voluntary, and parents received detailed information regarding the procedures, potential risks, and anticipated benefits. Students' confidentiality was protected through anonymized coding of data, and observations were conducted without disrupting instructional activities. Teachers were informed that the intervention was not expected to disadvantage any student and that participation would not affect academic evaluation.

RESULTS

Learning engagement was assessed using the Learning Engagement Observation Rubric (LEOR), which employs a 4-point scale (1 = very low engagement, 4 = high engagement) across four dimensions (attention, participation, on-task behavior, and responsiveness). For reporting purposes, scores were aggregated and transformed into a 0–100 scale to facilitate interpretation, where higher scores indicate greater engagement. Observations were conducted by two trained raters during structured classroom sessions. Raters underwent prior calibration sessions using video-based scoring and achieved acceptable agreement before data collection. During the study, 20% of observations were double-coded to ensure scoring consistency. Table 1 presents the descriptive and inferential statistics comparing pretest and posttest engagement scores.

Table 1. Pretest–Posttest Comparison of Learning Engagement (N = 30)

Measure	Pretest	Posttest	Mean Difference	t (df = 29)	p-value	95% CI of Difference	Effect Size (Cohen's d)
Mean Score	56.30	78.45	22.15	12.87	< 0.001	(18.62, 25.68)	0.85
Standard Deviation	8.45	7.20	-	-	-	-	-
Minimum–Maximum	42–70	65–90	-	-	-	-	-

The results indicate that mean engagement scores increased from 56.30 (SD = 8.45) at pretest to 78.45 (SD = 7.20) at posttest. The average increase of 22.15 points reflects a shift from moderate engagement toward high engagement on the applied scale. A paired-sample t-test revealed that this difference was statistically significant, $t(29) = 12.87$, $p < 0.001$. The 95% confidence interval for the mean difference ranged from 18.62 to 25.68, indicating that the true mean improvement in the population is likely to fall within this range. The calculated effect size (Cohen's $d = 0.85$) suggests a large magnitude of change according to conventional benchmarks.

DISCUSSION

The findings indicate that the implementation of the KOMPAK Learning Model was associated with a statistically significant increase in learning engagement within this sample of students with Autism Spectrum Disorder (ASD). Given the one-group pretest–posttest design, these results should be interpreted as evidence of improvement over time rather than definitive causal proof of effectiveness. The magnitude of change, as indicated by both the mean difference and effect size, suggests that the observed improvement is not trivial. However, alternative explanations such as maturation, repeated measurement effects, or contextual classroom factors cannot be ruled out. Therefore, the findings are best understood as preliminary empirical support for the potential usefulness of the KOMPAK model in inclusive classroom settings.

Several mechanisms may plausibly explain the observed increase in engagement, although these cannot be confirmed directly within the current design. First, the structured nature of the KOMPAK model may have contributed to improved attention and task orientation, consistent with structured teaching principles for learners with ASD (Brouwer, 2022; Udry & Berthele, 2025). Second, the integration of contextual and functional learning activities may have increased task relevance, which is known to support intrinsic motivation and engagement (Boekaerts, 2016; Oudeyer et al., 2016). Third, opportunities for active participation embedded in the model may have promoted behavioral engagement, aligning with engagement theory that emphasizes active involvement in learning processes (Carroll et al., 2021; LaDue et al., 2022). Additionally, the incorporation of flexible instructional strategies reflects principles of Universal Design for Learning, which aim to reduce barriers to participation

(Griful-Freixenet et al., 2017). While these explanations are theoretically grounded, they remain inferential and require further empirical testing using more rigorous designs.

The present findings are broadly consistent with prior intervention studies targeting engagement among students with ASD, although important differences should be noted. For example, reported that structured, evidence-based practices can improve engagement and adaptive behavior in children with autism (Will et al., 2018). Similarly, found that structured teaching approaches enhance attention and independence in classroom contexts (van de Pol et al., 2015). Studies by Dahary et al. (2023) and Cidav et al. (2023) also demonstrate that activity-based and socially mediated interventions can promote participation and interaction. However, unlike many previous studies that focus on isolated strategies (e.g., visual supports or reinforcement systems), the KOMPAK model integrates multiple components into a single instructional framework. While this integration may offer practical advantages, it also makes it more difficult to determine which specific elements are responsible for observed changes. Therefore, the current findings align with existing literature but should be interpreted as complementary rather than confirmatory.

From a theoretical perspective, the findings can be situated at the intersection of behaviorist, constructivist, and inclusive learning frameworks. Behaviorist theory suggests that structured instruction and reinforcement can shape observable engagement behaviors (Gomes et al., 2023; Xie et al., 2026). Constructivist perspectives emphasize the role of active participation and meaningful experience in knowledge construction (Dohn, 2016; Zajda, 2021). Meanwhile, Universal Design for Learning highlights the importance of flexible and accessible instruction for diverse learners (Cumming & Rose, 2022). The KOMPAK model appears to operationalize elements from these frameworks in a combined approach. However, the present study does not directly test theoretical mechanisms, and thus conclusions regarding theoretical validation remain tentative.

Several important limitations must be acknowledged. First, the use of a one-group pretest–posttest design limits internal validity, as changes in engagement cannot be conclusively attributed to the intervention (Van Simaeys et al., 2025). Without a control group, threats such as history, maturation, and testing effects remain plausible explanations. Second, the sample size (N = 30) is relatively small and drawn from a limited context, which restricts generalizability, particularly given the heterogeneity of ASD populations (Cruz Puerto & Sandín Vázquez, 2024). Third, the study relies on observational measures, which, despite efforts to ensure reliability, may be subject to rater bias and contextual influence. Although inter-rater agreement was established, observational data inherently depend on human judgment. Fourth, the duration of the intervention was relatively short, limiting conclusions about long-term effects and sustainability of engagement improvements (Wemyss et al., 2019). Finally, the integrated nature of the KOMPAK model makes it difficult to isolate the active components responsible for change. Future research should address these limitations by employing randomized or controlled designs, larger samples, longitudinal follow-up, and component-based analysis.

CONCLUSION

This study provides preliminary empirical support for the KOMPAK Learning Model in enhancing observed learning engagement among children with Autism Spectrum Disorder (ASD) in an inclusive elementary school setting. The findings indicate a statistically significant increase in engagement scores from pretest to posttest within this sample, with improvements evident across multiple dimensions, including attention, active participation, on-task behavior, and responsiveness. These results suggest that the KOMPAK model may be associated with positive changes in students' engagement during classroom learning activities. However, given the use of a one-group pretest–posttest design, the findings should be interpreted with caution and do not establish definitive causal effects. Rather, the study offers initial evidence that structured, contextual, and adaptive instructional approaches such as KOMPAK hold promise for supporting engagement among students with ASD. Further research employing more rigorous experimental designs, larger samples, and extended intervention periods is needed to confirm and generalize these findings.

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AUTHOR CONTRIBUTION STATEMENT

TH contributed to conceptualization, methodology, supervision, validation, writing – original draft, and writing – review & editing. PR contributed to methodology, formal analysis, investigation, resources, and writing – review & editing. GHSKP and RA.STS contributed to data curation, investigation, project administration, and writing – original draft. All authors have read and approved the final version of the manuscript.

AI DISCLOSURE STATEMENT

The authors used ChatGPT (OpenAI) during the preparation of this work for limited language editing and grammar improvement. After using the tool, the authors carefully reviewed and revised the manuscript and take full responsibility for the accuracy, integrity, and content of the publication.

***Tuti Haryati (Corresponding Author)**
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Kec. Lakarsantri, Surabaya, Jawa Timur 60213, Indonesia
Email: #tutiunesa123@unesa.ac.id

Pamuji Raharjo
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Kec. Lakarsantri, Surabaya, Jawa Timur 60213, Indonesia
Email: pamuji@unesa.ac.id

GH Sugeng Koco Purnomo
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Kec. Lakarsantri, Surabaya, Jawa Timur 60213, Indonesia
Email: 25011676007@mhs.unesa.ac.id

RA. Sri Turwati Sulasminingsih
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Kec. Lakarsantri, Surabaya, Jawa Timur 60213, Indonesia
Email: 25011676010@mhs.unesa.ac.id