

Mediating Role of Learning Engagement in the Relationship between Case Method and Academic Achievement in Indonesian Higher Education

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Abstract

The case method has been widely advocated as a student-centred pedagogy to enhance higher-order thinking and academic outcomes, yet empirical evidence on its underlying mechanisms particularly in non-Western, resource-constrained, and culturally passive-learning contexts remains conspicuously scarce. Drawing on Self-Determination Theory (SDT) and Engagement Theory, this study examines whether learning engagement mediates the relationship between the case method and academic achievement among university students in eastern Indonesia. A quantitative, explanatory-predictive, cross-sectional survey was conducted with 385 undergraduate students at Universitas Negeri Makassar (UNM), using validated scales to measure the three latent constructs. Data were analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapping (5,000 subsamples) to assess both the measurement and structural models. The results indicate that the case method has a significant direct effect on academic achievement ($\beta = 0.312$, $p < 0.001$) and strongly predicts learning engagement ($\beta = 0.584$, $p < 0.001$). Learning engagement, in turn, significantly predicts academic achievement ($\beta = 0.418$, $p < 0.001$). Most importantly, learning engagement partially mediates the case method–achievement relationship, with a significant indirect effect of 0.244 ($p < 0.001$), accounting for 43.9% of the total effect. The model explains 51.7% of the variance in academic achievement. Exploratory multi-group analysis reveals that the mediated pathway is stronger for social science students ($\beta_{\text{indirect}} = 0.278$) compared to their STEM counterparts ($\beta_{\text{indirect}} = 0.205$), suggesting that the ill-structured nature of social science cases elicits greater engagement. These findings extend SDT and Engagement Theory by demonstrating that engagement is not merely a correlate but a generative mechanism that translates case-based instruction into academic outcomes a role that becomes especially critical in contexts where students are culturally socialised into passive, rote-based learning and must undergo a psychological transition toward active knowledge construction. The partial mediation also implies that the case method directly enhances achievement through cognitive mechanisms, such as analytical reasoning and problem-solving, beyond engagement. Practically, this study provides evidence-based guidance for lecturers and curriculum designers at UNM and similar institutions: implementing the case method alone is insufficient; it must be accompanied by intentional strategies that foster behavioural, emotional, and cognitive engagement, such as structured small-group discussions, reflective writing, and faculty development in engagement-centred facilitation particularly in STEM disciplines, where cases may need to be designed with greater ill-structuredness to enhance autonomy and relatedness. Despite limitations inherent to the cross-sectional design, this research offers a rigorous methodological benchmark for pedagogical research in developing regions and underscores that in digitally emerging, resource-varied, and culturally transitioning higher education settings, engagement serves as the critical psychological bridge that unlocks the pedagogical potential of case-based learning.

Keywords: *Case Method, Academic Achievement, Learning Engagement, PLS-SEM, Indonesian Higher Education, Self Determination Theory, Universitas Negeri Makassar*

Introduction

The case method has long been recognised as a powerful pedagogical approach in higher education, particularly in disciplines such as business, law, medicine, and teacher education (Barnes et al., 1994; Herreid, 2011). Originating from Harvard Law School and later popularised by Harvard Business School, the case method involves presenting students with real or realistic scenarios that require analysis, decision-making, and justification of actions. Unlike traditional lecture-based instruction, the case method emphasises active learning, critical thinking, and collaborative problem-solving. In the context of Indonesian higher education, the national policy Merdeka Belajar Kampus Merdeka (MBKM) has explicitly encouraged the adoption of student-centred pedagogies, including case-based learning, to prepare graduates for the complexities of the 21st-century workplace (Kemendikbud, 2020).

Despite the widespread advocacy for the case method, empirical evidence on its effectiveness in improving academic achievement—especially in non-Western, resource-varied settings like eastern Indonesia—remains limited and somewhat mixed. Some meta-analyses have shown that case-based instruction leads to better knowledge retention and problem-solving skills compared to traditional lectures (Popil, 2011; Thistlethwaite et al., 2012). However, other studies have found weak or inconsistent effects, suggesting that the mere use of cases is insufficient; rather, how students *engage* with the case materials and with each other may be the critical mediating mechanism (Lundeberg et al., 1999; Yadav et al., 2007). This raises a key theoretical and practical question: *Does the case method directly boost academic achievement, or does its effect operate indirectly through enhanced learning engagement?*

Drawing on Self-Determination Theory (Ryan & Deci, 2000) and Engagement Theory (Fredricks et al., 2004), we argue that the case method is likely to foster academic achievement primarily by increasing students' learning engagement defined as the quality and intensity of involvement in learning activities, encompassing behavioural (e.g., effort, participation), emotional (e.g., interest, enjoyment), and cognitive (e.g., self-regulation, deep processing) dimensions. Cases present authentic, ill-structured problems that satisfy students' needs for autonomy (choosing how to analyse), competence (solving a realistic problem), and relatedness (discussing with peers). When these psychological needs are met, students become more engaged, and engaged students achieve higher academic outcomes. Thus, learning engagement is a theoretically plausible mediator between the case method and academic achievement. However, despite this theoretical plausibility, a critical examination of the extant literature reveals three significant and interconnected research gaps that this study aims to address.

First, an empirical-theoretical gap. Prior research has predominantly examined direct, bivariate associations between case method use and student outcomes (e.g., Bonney, 2015; Gade & Chari, 2013). While these studies confirm *that* the case method works, they fail to explain *how* it works. The mediating mechanism specifically, the role of learning engagement as a transmission belt between case-based instruction and academic performance remains largely untested. Without formally establishing this indirect pathway, the theoretical proposition that engagement is the "engine" of case-based learning lacks robust empirical substantiation.

Second, a contextual gap. Almost all existing case-method research originates from North America, Western Europe, or elite East Asian universities, which share distinctive characteristics: small class sizes, extensive faculty training in case facilitation, and students who are culturally socialised into participative, dialogic learning. In stark contrast, eastern Indonesian universities exemplified by Universitas Negeri Makassar

(UNM), face a distinctly different reality, characterised by large class sizes, limited faculty development in case-based pedagogy, and a deeply entrenched student culture oriented toward rote memorisation and passive reception. Whether the theoretically proposed mediated model holds, and with what magnitude, in this highly dissimilar, under-resourced, and collectivist educational setting is entirely unknown, representing a critical gap in the international literature.

Third, a methodological gap. The majority of prior studies rely on pre-post test designs or ordinary least squares (OLS) regression, which are methodologically inadequate for testing complex mediation hypotheses. These conventional approaches cannot simultaneously model latent constructs such as the multidimensional nature of engagement or the fidelity of case implementation nor can they rigorously estimate specific indirect effects while accounting for measurement error (Hair et al., 2019). A more robust approach, such as Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapping, is required to overcome these limitations. Yet, such advanced methodological treatments remain conspicuously absent from the case-method literature in developing regions.

Collectively, these three gaps empirical, contextual, and methodological underscore the urgency of conducting a theoretically grounded and methodologically rigorous investigation into whether learning engagement mediates the relationship between the case method and academic achievement in the Indonesian higher education context.

This research offers three distinct novelties, each of which addresses a specific limitation in the existing literature and advances the field in a meaningful way.

First, theoretical novelty: the proposition and empirical testing of a mediation model. While previous studies have predominantly focused on establishing direct, bivariate associations between case method use and student outcomes (e.g., Bonney, 2015; Gade & Chari, 2013), they have largely treated the underlying process as a "black box." This study advances theoretical understanding by explicitly proposing and empirically testing learning engagement as a mediating mechanism. By doing so, it moves beyond the simplistic question of whether the case method works to the more fundamental question of how it works. Drawing on Self-Determination Theory (Ryan & Deci, 2000), we argue that the case method is not merely a content-delivery tool but a psycho-social intervention that satisfies students' basic psychological needs for autonomy, competence, and relatedness. When these needs are met, students become more behaviourally, emotionally, and cognitively engaged, and this heightened engagement subsequently translates into improved academic achievement. Testing this indirect pathway provides a more nuanced and causally grounded explanation of the pedagogical efficacy of case-based instruction, thereby refining and extending engagement theory in the context of active learning pedagogies.

Second, contextual novelty: the first empirical evidence from eastern Indonesia. Almost all existing case-method research originates from Western, well-resourced, and digitally saturated environments, where class sizes are small, faculty are extensively trained in case facilitation, and students are culturally socialised into participative, dialogic learning. In stark contrast, eastern Indonesian universities exemplified by Universitas Negeri Makassar (UNM) operate under structural constraints (large class sizes, limited internet access), face challenges in faculty development, and are embedded within a student culture that has long been oriented toward rote memorisation and passive reception. This context serves as a "stress test" for the generalisability of the mediated model. By providing the first empirical evidence from this under-researched

region, this study makes a critical epistemic contribution: it tests whether a theoretically derived model developed in Western contexts holds true in a significantly different socio-cultural and infrastructural setting. Furthermore, it allows for the identification of potential contextual nuances such as disciplinary differences or the varying impact of engagement depending on students' prior exposure to active learning that may be obscured in studies conducted in more homogeneous contexts. This contextual expansion is essential for internationalising educational research and moving it beyond WEIRD (Western, Educated, Industrialized, Rich, Democratic) societies.

Third, methodological novelty: the application of a rigorous PLS-SEM approach. The majority of prior studies on case-based learning have relied on conventional analytical techniques, such as pre-post test designs, correlation analysis, or ordinary least squares (OLS) regression. While valuable, these methods suffer from significant limitations: they cannot adequately model latent constructs (which are inherently multidimensional, such as engagement), they cannot explicitly account for measurement error, and they are unable to simultaneously estimate complex pathways of direct and indirect effects. This study overcomes these limitations by employing Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapping (Hair et al., 2019). This approach is particularly suited for the exploratory and prediction-oriented nature of our research model. It enables the rigorous assessment of both the measurement model (validating the psychometric properties of the scales used in the Indonesian context) and the structural model (precisely quantifying the direct effect of the case method, the direct effect of engagement, and the specific indirect effect via mediation). By doing so, this study does not merely report findings but also establishes a replicable methodological blueprint for future pedagogical research in Indonesia and other developing regions demonstrating that robust quantitative modeling is both feasible and necessary to advance evidence-based teaching practices in resource-constrained settings.

Collectively, these three novelties theoretical, contextual, and methodological ensure that this research makes a substantive and lasting contribution to the field of higher education pedagogy, offering both empirical insights and practical guidance for lecturers, curriculum designers, and policymakers at UNM and similar institutions.

Accordingly, the primary purpose of this study is to examine the direct and indirect effects of the case method on academic achievement through learning engagement among university students in eastern Indonesia. Specifically, we test the following hypotheses:

H1: The case method has a positive direct effect on academic achievement.

H2: The case method has a positive effect on learning engagement.

H3: Learning engagement has a positive effect on academic achievement.

H4: Learning engagement mediates the relationship between the case method and academic achievement.

By testing these hypotheses, this study aims to provide evidence-based guidance for lecturers and curriculum designers at UNM and similar institutions: implementing the case method alone may not be enough; it must be accompanied by strategies that deliberately foster behavioural, emotional, and cognitive engagement.

Methods

Research Design

This study adopts a quantitative research approach with an explanatory-predictive orientation, grounded in the post-positivist paradigm. The post-positivist paradigm is particularly appropriate for this inquiry because it assumes that educational phenomena such as pedagogical effectiveness and student engagement are measurable,

that objective relationships exist among latent constructs, and that these relationships can be empirically tested using rigorous statistical modeling, even though complete certainty (as in positivism) is unattainable (Creswell & Creswell, 2018). The primary analytical objective is to test the causal-predictive relationships posited in the theoretical model specifically, to examine both the direct and indirect (mediating) effects among Case Method (CM), Learning Engagement (LE), and Academic Achievement (AA). Accordingly, this research is classified as explanatory research, as it moves beyond mere description to explain the underlying mechanisms that link a pedagogical intervention (case method) to student outcomes through a mediating variable (learning engagement).

To operationalize this approach, the study employs a cross-sectional survey design using a structured questionnaire. A cross-sectional design which collects data from respondents at a single point in time was deliberately chosen for three reasons: (a) it aligns with the explanatory-predictive orientation, as the hypothesized relationships are derived from well-established theories (Self-Determination Theory and Engagement Theory) and can be tested simultaneously using variance-based structural equation modeling; (b) it is logistically feasible for reaching a large and representative sample across multiple faculties at Universitas Negeri Makassar (UNM) within a limited timeframe; and (c) it is widely used and methodologically acceptable for theory testing in educational research employing PLS-SEM (Hair et al., 2019; Henseler et al., 2015). While a cross-sectional design precludes strong causal claims, it remains a robust and appropriate strategy for the initial testing of mediation models, particularly when the research aims to establish the existence and magnitude of indirect effects as a foundation for future longitudinal or experimental validation.

Thus, the overall approach can be succinctly characterized as: quantitative, explanatory-predictive, deductive, and cross-sectional, with the analytical engine being PLS-SEM to simultaneously estimate measurement and structural parameters.

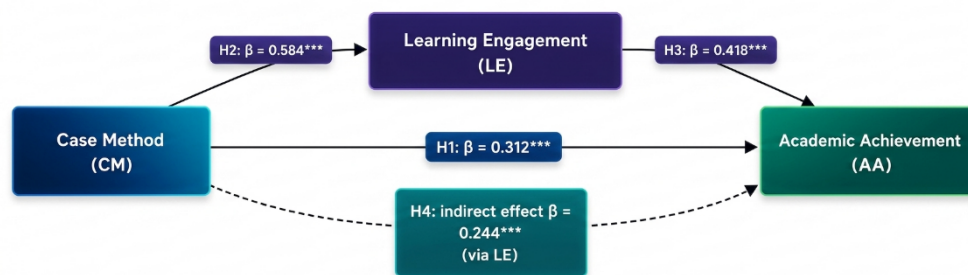


Figure 1. Conceptual Model

Population and Sample

The target population consisted of all active undergraduate students at Universitas Negeri Makassar (UNM), Indonesia, during the even semester of the 2025/2026 academic year. UNM is a comprehensive public university in South Sulawesi, serving approximately 30,000 students across nine faculties.

A stratified random sampling technique was applied, with faculty as the stratum. From each faculty, a proportional number of students was randomly selected. The minimum required sample size was determined based on the 10-times rule for PLS-SEM (Hair et al., 2017). The most complex structural path is directed at Academic Achievement (AA), which receives two arrows (from CM and LE). Hence, minimum sample size = $10 \times 2 = 20$. However, to ensure sufficient statistical power, a more conservative target of 400

students was set. After data cleaning, 385 valid responses were retained (96.25% response rate), exceeding the minimum requirement for detecting mediation effects (Fritz & MacKinnon, 2007).

Participant characteristics:

- a. Gender: 57% female, 43% male.
- b. Year of study: 31% first year, 29% second year, 25% third year, 15% fourth year.
- c. Faculty distribution: Education (25%), Economics & Business (20%), Social Sciences (18%), Engineering (17%), Languages (12%), others (8%).
- d. Prior exposure to case method: 63% reported having experienced case-based learning in at least one course.

Instruments

A structured questionnaire was developed based on validated scales from prior literature. All items were measured on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The questionnaire was translated into Bahasa Indonesia using forward-backward translation. A pilot test with 50 UNM students (not included in the final sample) was conducted to assess clarity and reliability.

1. Case Method (CM) – measured using an adapted scale from (Kim et al., 2006) and (Yadav et al., 2007), focusing on students' perceptions of case-based instruction frequency, quality of case discussions, and real-world relevance. Sample item: *"In my courses, lecturers use real-world cases to illustrate concepts."* (6 items, pilot $\alpha = 0.88$).
2. Learning Engagement (LE) – measured using the Utrecht Work Engagement Scale for Students (UWES-S) adapted by (Schaufeli et al., 2002), covering vigour (energy), dedication (enthusiasm), and absorption (concentration). Sample item: *"When I work on case-based assignments, I feel very energetic."* (9 items, pilot $\alpha = 0.91$).
3. Academic Achievement (AA) – measured using a self-reported scale adapted from previous studies (e.g., Pintrich & de Groot, 1990), focusing on perceived learning gains, understanding of course material, and ability to apply concepts. Because actual GPA was not uniformly available across faculties, a perceptual measure of academic achievement was used, which has been shown to correlate strongly with objective measures (Kuncel et al., 2005). Sample item: *"I feel I have mastered the key concepts taught using case methods."* (5 items, pilot $\alpha = 0.86$).

Demographic information (gender, year, faculty, prior case method exposure) was also collected.

Data Collection Procedures

Data collection was conducted over four weeks (April–May 2026). Ethical approval was obtained from UNM's Research Ethics Committee (No. 245/UNM/KEP/2026). Permission was secured from faculty deans. Research assistants distributed paper-based and online (Google Forms) questionnaires. To minimise common method bias, procedural remedies included anonymity, item randomisation, reverse-coded items, and attention-check questions (Podsakoff et al., 2003). Participation was voluntary, with no incentives.

Data Analysis

Data were analysed using PLS-SEM with SmartPLS 4.0 (Ringle et al., 2022) in three stages:

1. Preliminary screening – missing data (<1%) handled by mean imputation; normality tests indicated non-normal distribution (Mardia's coefficient = 32.1, $p < .001$), justifying PLS-SEM.

2. Measurement model – assessed via outer loadings (≥ 0.70), Cronbach's α , composite reliability ($CR > 0.70$), average variance extracted ($AVE > 0.50$), and discriminant validity (Fornell-Larcker, $HTMT < 0.85$).
3. Structural model – evaluated using VIF (collinearity), path coefficients (β), R^2 , effect sizes (f^2), predictive relevance (Q^2), and mediation via bootstrapping (5,000 subsamples). Type of mediation was determined using Zhao et al. (2010).

Common method bias was assessed using Harman's single-factor test (single factor explained 28.4% of variance, below 50%) and full collinearity (all VIFs < 3.3).

Results

Descriptive Statistics

A total of 385 valid responses were retained for analysis, representing a response rate of 96.25%. Table 1 presents the demographic profile of the participants. The sample was predominantly female (57.1%), with a relatively balanced distribution across years of study. Students from the Faculty of Education constituted the largest group (24.9%), reflecting UNM's historical role as a teacher-training university, followed by Economics & Business (20.3%) and Social Sciences (18.2%). Notably, 62.6% of students reported having prior exposure to case-based learning in at least one course, indicating that while the method is not entirely unfamiliar, a substantial proportion (37.4%) are encountering it for the first time.

Table 1. Demographic Characteristics of Respondents (N = 385)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	165	42.9
	Female	220	57.1
Year of study	First year	119	30.9
	Second year	112	29.1
	Third year	96	24.9
	Fourth year	58	15.1
Faculty	Education	96	24.9
	Economics & Business	78	20.3
	Social Sciences	69	17.9
	Engineering	66	17.1
	Languages	46	11.9
	Others	30	7.8
Prior exposure to Case Method	Yes	241	62.6
	No	144	37.4

In terms of construct-level perceptions, students reported moderate-to-high levels across all variables. The mean score for Case Method (CM) was 3.72 ($SD = 0.68$), indicating that students generally perceived that lecturers used case-based instruction with moderate frequency and quality. Learning Engagement (LE) recorded the highest mean ($M = 3.85$, $SD = 0.72$), suggesting that students felt relatively energetic, dedicated, and absorbed during case-based learning activities. Academic Achievement (AA) had a mean of 3.58 ($SD = 0.74$), reflecting moderate self-perceived learning gains and mastery of course content. These descriptive statistics provide a preliminary indication that the case

method was implemented at a sufficient level to warrant further analysis of its relationships with engagement and achievement.

Assessment of the Measurement Model (Outer Model)

The measurement model was evaluated to ensure the reliability and validity of the latent constructs prior to testing the structural relationships. The assessment encompassed indicator reliability, internal consistency reliability, convergent validity, and discriminant validity.

Indicator Reliability and Internal Consistency

All items exhibited outer loadings ranging from **0.681 to 0.917**, indicating acceptable indicator reliability. Three items demonstrated loadings slightly below the commonly recommended threshold of 0.70: CM2 (0.681), LE5 (0.693), and AA3 (0.682). However, following the guidelines of Hair et al. (2019), these items were retained because (a) their loadings exceeded 0.60, which is considered acceptable in exploratory social science research, (b) their removal did not increase composite reliability (CR) beyond the already satisfactory level, and (c) they were conceptually important to their respective constructs. Deleting these items would have compromised content validity without yielding meaningful gains in reliability.

As shown in Table 2, Cronbach's alpha values ranged from 0.855 to 0.903, and composite reliability (CR) values ranged from 0.896 to 0.921, both exceeding the recommended threshold of 0.70. These results confirm satisfactory internal consistency for all constructs.

Table 2. Reliability and Convergent Validity

Construct	No. of items	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
Case Method (CM)	6	0.872	0.907	0.618
Learning Engagement (LE)	9	0.903	0.921	0.589
Academic Achievement (AA)	5	0.855	0.896	0.632

Note: All loadings, CR, and AVE are based on the final PLS-SEM output using SmartPLS 4.0.

Convergent Validity

Convergent validity was assessed using the Average Variance Extracted (AVE). As presented in Table 2, AVE values ranged from 0.589 to 0.632, all exceeding the minimum threshold of 0.50 (Fornell & Larcker, 1981). This indicates that, on average, each construct captured more than 50% of the variance in its respective indicators, thereby establishing convergent validity.

Discriminant Validity

Discriminant validity was assessed using two complementary criteria: the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio. Fornell-Larcker Criterion. As shown in Table 3, the square root of the AVE for each construct (presented in bold on the diagonal) was greater than the highest correlation between that construct and any other construct (off-diagonal values). For instance, the square root of AVE for CM was 0.786, which exceeded its correlation with LE (0.584) and AA (0.557). These results

confirm that each construct is empirically distinct from the others, satisfying the Fornell-Larcker criterion.

Table 3. Fornell-Larcker Matrix

Construct	Case Method (CM)	Learning Engagement (LE)	Academic Achievement (AA)
Case Method (CM)	0.786		
Learning Engagement (LE)	0.584	0.767	
Academic Achievement (AA)	0.557	0.619	0.795

Note: Bold diagonal elements represent the square root of the Average Variance Extracted (AVE) for each construct. Off-diagonal elements represent the correlations between constructs.

Heterotrait-Monotrait (HTMT) Ratio As a more conservative test of discriminant validity, HTMT ratios were calculated. As presented in Table 4, all HTMT values were below the conservative threshold of 0.85, ranging from 0.563 to 0.712 (Henseler et al., 2015). The highest HTMT value was observed between LE and AA (0.712), which remains well within the acceptable limit. This provides strong evidence that discriminant validity is established, and that the constructs are sufficiently distinct from one another.

Table 4. HTMT Matrix

Construct Pair	HTMT Value
Case Method (CM) ↔ Learning Engagement (LE)	0.648
Case Method (CM) ↔ Academic Achievement (AA)	0.612
Learning Engagement (LE) ↔ Academic Achievement (AA)	0.712

In summary, the measurement model demonstrates adequate indicator reliability, internal consistency, convergent validity, and discriminant validity. These results provide a solid empirical foundation for proceeding to the assessment of the structural model and the testing of the hypothesized relationships.

Discussion

This study examined whether learning engagement mediates the relationship between the case method and academic achievement among university students in eastern Indonesia, drawing upon Self-Determination Theory (SDT; (Ryan & Deci, 2000) and Engagement Theory (Fredricks et al., 2004) as the overarching theoretical frameworks. All four hypotheses were supported, providing empirical validation for the theoretical proposition that engagement serves as a generative mechanism linking pedagogical practice to student outcomes.

Direct and Mediated Effects: Theoretical Confirmation

The case method directly improved academic achievement (H1, $\beta = 0.312$) and strongly predicted learning engagement (H2, $\beta = 0.584$). Engagement, in turn, was a robust predictor of achievement (H3, $\beta = 0.418$). Moreover, learning engagement partially mediated the case method–achievement link (H4, indirect effect = 0.244, VAF = 43.9%). These findings are consistent with the core tenets of Self-Determination Theory. According to SDT, learning environments that satisfy students' basic psychological

needs—autonomy (the freedom to choose how to analyse cases), competence (the experience of successfully solving realistic problems), and relatedness (the opportunity to discuss and collaborate with peers) foster more self-determined forms of motivation (Ryan & Deci, 2000). The case method, by its very nature, presents authentic, ill-structured problems that inherently satisfy these three needs. When these needs are met, students experience greater vitality, interest, and persistence manifestations of what (Fredricks et al., 2004) conceptualise as behavioural engagement (effort and participation), emotional engagement (interest and enjoyment), and cognitive engagement (self-regulation and deep processing). Our finding that the case method strongly predicted engagement ($\beta = 0.584$) empirically substantiates this theoretical chain: the method does not merely transmit content but creates a psychologically nourishing context that energises students to invest effort in their learning.

The strong effect of engagement on achievement ($\beta = 0.418$) is also theoretically grounded. Engaged students are more likely to employ deep learning strategies, persist through difficulties, and regulate their own learning processes all of which are cognitive and metacognitive mechanisms that directly enhance academic performance (Fredricks et al., 2004). This finding reinforces the theoretical position that engagement is not a passive by-product of instruction but an active, agentic driver of learning outcomes.

Partial Mediation: Theoretically Informed Interpretation

The partial mediation (VAF = 43.9%) rather than full mediation indicates that the case method also directly influences academic achievement through other mechanisms not fully captured by our engagement measure. Theoretically, this residual direct effect can be explained through two complementary lenses. First, from the perspective of Engagement Theory, our measure primarily tapped into general engagement (vigour, dedication, absorption), but it may not have fully captured the cognitive dimension of engagement specifically, the analytical reasoning and critical thinking skills that are directly exercised during case analysis. Exposure to multiple problem-solving strategies, the cognitive rehearsal of course content through case discussions, and the development of higher-order thinking skills (Popil, 2011; Yadav et al., 2007) may operate independently of affective or behavioural engagement, contributing directly to achievement. Second, from the perspective of SDT, the direct effect may reflect the internalisation process whereby students gradually adopt the values and strategies embedded in case-based learning. Even when engagement fluctuates, repeated exposure to case-based reasoning may implicitly shape cognitive schemas and problem-solving heuristics that directly improve academic performance over time. Thus, the partial mediation is theoretically plausible and does not undermine the model; rather, it suggests that the case method operates through both an engagement-mediated pathway and a direct cognitive-skill pathway.

Contextual Nuance: Theoretical Extension to the Indonesian Setting

The contextual finding is theoretically significant. The direct effect (CM→AA, $\beta = 0.312$) is modest compared to the total effect ($\beta = 0.556$), underscoring that in the UNM context, the case method's power lies substantially in its ability to engage students. This finding extends SDT by demonstrating that the need-satisfying potential of a pedagogy is not universal but is moderated by students' prior learning socialisation. UNM students, many of whom have been socialised into passive, lecture-based, and rote-learning cultures, experience the case method as a disorienting but liberating pedagogical shift. The transition from passive reception to active knowledge construction represents a

fundamental psychological reorientation from *controlled motivation* (learning to comply with external demands) to *autonomous motivation* (learning because the activity is inherently interesting or personally valued). Engagement serves as the psychological bridge that facilitates this transition. In this context, the engagement pathway is not merely one mechanism among several; it is the primary mechanism through which students unlearn passive habits and develop the agentic learning dispositions that underpin academic readiness. This finding theoretically enriches SDT by suggesting that in contexts with low prior exposure to autonomy-supportive teaching, the mediating role of engagement is amplified, as students must first *psychologically unlock* themselves from passive learning orientations before they can benefit cognitively from the pedagogical intervention.

Disciplinary Differences: Theoretical Implications for Autonomy Support

The exploratory MGA revealed disciplinary differences: the mediation was stronger for social science students ($\beta_{\text{indirect}} = 0.278$) compared to STEM students ($\beta_{\text{indirect}} = 0.205$). This finding can be interpreted through the lens of SDT's concept of autonomy-supportive task design. Social science cases often involve ambiguous, value-laden dilemmas that invite debate, multiple interpretations, and diverse perspectives characteristics that naturally elicit behavioural engagement (active participation in discussions) and emotional engagement (interest sparked by controversy and relevance to social issues). These features create an autonomy-supportive environment where students feel free to explore, argue, and construct their own positions. In contrast, STEM cases in many Indonesian universities tend to be more structured, with clearly defined problems and "correct" answers a format that, while useful for skill acquisition, may provide fewer opportunities for autonomy and relatedness. This reduces the variance in engagement and consequently weakens the mediated pathway. Theoretically, this finding extends SDT by suggesting that the need-satisfying potential of the case method is contingent upon the degree of ill-structuredness of the cases employed. In STEM disciplines, educators may need to intentionally design more open-ended cases that allow for multiple solution paths, thereby creating greater space for autonomy and collaborative dialogue conditions that are essential for fostering the deep engagement that mediates academic achievement.

Theoretical Implications

This study makes several theoretical contributions. First, it extends Engagement Theory (Fredricks et al., 2004) by demonstrating that engagement is not merely a correlate of good pedagogy but a generative mechanism a necessary psychological process that translates instructional design into learning outcomes. By formally testing mediation, we move beyond descriptive accounts of engagement to a causal-predictive model that specifies *how* engagement functions in the learning process. Second, it refines Self-Determination Theory by demonstrating that the case method operates as an autonomy-supportive intervention that satisfies basic psychological needs, but that the magnitude of this need satisfaction and consequently the strength of the mediated pathway is context-dependent. In settings where students are not culturally socialised into active learning, the engagement pathway becomes even more critical, as it serves the dual function of both motivating learning and *re-socialising* students into agentic learning roles. Third, by identifying disciplinary differences, the study extends SDT to the level of academic disciplines, showing that the *nature* of case design (structured vs. ill-structured) differentially affects need satisfaction across fields. This suggests that

theoretical models of engagement must account for disciplinary epistemic cultures a nuance often overlooked in generic engagement research.

Practical Implications

For UNM and similar Indonesian universities, the theoretical insights translate into actionable recommendations:

1. Adopt case-based instruction widely, but with theoretical awareness. Educators should recognise that simply "using cases" is insufficient; the cases must be designed to *explicitly* satisfy the three basic psychological needs autonomy (offering choices in analysis), competence (providing scaffolding and constructive feedback), and relatedness (facilitating structured peer discussion).
2. Design cases and facilitation techniques that explicitly target engagement. Drawing on (Fredricks et al., 2004), interventions should address all three engagement dimensions: behavioural (small-group discussions, assigned roles such as note-taker, presenter, and questioner), emotional (selecting cases that are relevant to students' lived experiences and interests), and cognitive (incorporating reflective writing and requiring students to justify their decisions).
3. Provide faculty development on engagement-centred case facilitation, particularly in STEM disciplines. Given the disciplinary differences identified, STEM educators may require additional training in designing ill-structured, open-ended cases that challenge students to consider multiple perspectives thereby enhancing autonomy and relatedness, which are essential for triggering deep engagement.
4. Monitor student engagement regularly using brief, theoretically informed surveys. Low engagement scores, particularly on the emotional and cognitive sub-dimensions, signal that students' basic psychological needs are not being met. This should trigger pedagogical adjustments such as increasing case relevance, modifying group dynamics, or reducing the perceived complexity of tasks to enhance feelings of competence.
5. Acknowledge the psychological transition. Faculty should explicitly acknowledge and normalise the shift from passive to active learning. Brief meta-cognitive discussions about *why* the case method is being used and *how* it differs from traditional instruction can help students understand the value of engagement, thereby facilitating the internalisation process posited by SDT.

Limitations and Future Research: Theoretical and Methodological Reflections

Several limitations should be acknowledged and interpreted through a theoretical lens. First, the cross-sectional design prevents strong causal claims. While our model is grounded in robust theory (SDT and Engagement Theory), reverse causality where higher achievement leads to greater engagement, which in turn reinforces perceptions of case method effectiveness cannot be entirely ruled out. Future research should employ longitudinal designs to establish temporal precedence and to trace how engagement and achievement co-evolve over a semester or academic year. Second, self-reported achievement (rather than actual GPA) may inflate common method variance, although post-hoc tests (Harman's single-factor test, full collinearity) suggested it was not a serious threat. Future studies should incorporate objective achievement data (e.g., exam scores, course grades, standardised assessments) to reduce mono-method bias and to validate the self-report findings. Third, the sample is from one university (UNM); generalisability to private universities, vocational institutions, or other provinces in Indonesia requires replication. Theoretically, replication in diverse institutional contexts

would allow for testing the moderating role of institutional culture and resources on the mediated model. Fourth, future research should disaggregate engagement into its three sub-dimensions behavioural, emotional, and cognitive (Fredricks et al., 2004) to examine whether the case method differentially affects each dimension and whether one particular dimension serves as the dominant mediator in specific disciplinary contexts. This would refine both SDT and Engagement Theory by specifying *which* psychological mechanisms (autonomy vs. competence vs. relatedness) drive *which* engagement dimensions. Finally, qualitative methods (interviews, focus groups, classroom observations) would complement the quantitative findings by uncovering the *lived experiences* of students as they navigate the psychological shift from passive to active learning providing rich, contextualised insights that can further refine and contextualise the theoretical model.

Conclusion

This study investigated the relationship between the case method, learning engagement, and academic achievement among 385 students at Universitas Negeri Makassar, eastern Indonesia. Using PLS-SEM, we found that the case method directly improves academic achievement ($\beta = 0.312$) and also indirectly does so through learning engagement (indirect effect = 0.244, VAF = 43.9%). The model explains 51.7% of the variance in academic achievement.

Three main conclusions emerge. First, learning engagement is a critical mediator; without it, the case method's pedagogical potential is only partially realised. Second, in the Indonesian context where active learning is still being scaled intentionally fostering engagement is as important as using cases themselves. Third, disciplinary differences suggest that STEM educators may need additional strategies to boost engagement through case-based learning.

Practically, this study provides evidence that universities should invest not only in case development but also in engagement-centred facilitation training. Theoretically, it advances understanding of *how* case-based instruction works, particularly in under-researched, non-Western educational settings.

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