Volume 10, Issue 11, November – 2025 International Journal of Innovative Science and Research Technology
ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1416

From Awareness to Action: A Situational Judgment Framework for Assessing Inclusive Leadership Competencies in Engineering Education

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Publication Date: 2025/12/02

Abstract:

- ***Purpose***

This paper proposes a transformative framework for diversity, equity, and inclusion (DEI) training within engineering education and practice, shifting the pedagogical focus from passive knowledge acquisition to active competency assessment. It critiques the prevalence of "check-the-box" diversity training in technical fields, which largely fails to mitigate bias or foster genuine inclusion due to its disconnection from technical realities. Instead, this research introduces a Situational Judgment Test (SJT) model designed to evaluate how engineering leaders navigate complex, real-world equity scenarios. The study aims to bridge the gap between abstract DEI concepts and the high-stakes decision-making required in high-reliability organizations (HROs), specifically addressing the intersectional nuances of the Global South.

- ***Design/Methodology/Approach***

The study employs a qualitative content analysis and reconstruction of 50 specific workplace scenarios, derived from a Critical Incident Technique (CIT) review of anonymous engineering failures, exclusion reports, and discrimination grievances in the technology sector. These scenarios—originally structured as static knowledge checks—are re-engineered into dynamic "work tasks" and categorized into a taxonomy of four core competencies: Structural Equity Engineering, Interpersonal Allyship and Micro-Interventions, Inclusive Design and Accessibility, and Strategic Authenticity. The methodology integrates psychometric principles of SJT development with critical diversity studies to ensure content validity and ecological relevance.

- ***Findings***

The analysis reveals that effective DEI intervention in engineering requires a paradigmatic shift from defining terminology (e.g., "what is intersectionality?") to applied problem-solving (e.g., "how to restructure a promotion rubric to mitigate affinity bias"). The paper presents a validated matrix for assessing leadership responses to critical issues such as invisible disabilities, caste and gender intersectionality in recruitment, and the dangers of groupthink in safety-critical environments. The findings suggest that "inclusive intelligence" can be operationalized and measured akin to technical competencies, moving beyond self-reported attitudes to demonstrated behavioral intent.

- ***Originality/Value***

This paper bridges the disciplinary gap between organizational behavior theory and engineering education. It contributes to the literature by converting standard DEI curricula into complex, scenario-based work tasks that address the specific "say-do" gap in technical leadership. Furthermore, it integrates a critical perspective on the "myth of meritocracy" prevalent in engineering cultures, specifically addressing the intersectional nuances of caste and gender within the Indian context, thereby expanding the discourse beyond Western-centric frameworks.

Keywords: *Situational Judgment Tests, Inclusive Leadership, Engineering Education, Diversity Competency, Structural Equity, Groupthink, Intersectionality, Caste.*

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1416

How to Cite: Arnab Sen (2025) From Awareness to Action: A Situational Judgment Framework for Assessing Inclusive Leadership Competencies in Engineering Education. *International Journal of Innovative Science and Research Technology*, 10(11), 2151-2159. https://doi.org/10.38124/ijisrt/25nov1416

I. INTRODUCTION

The engineering profession stands at a critical juncture where the imperatives of technical excellence and social equity are increasingly understood not as separate domains, but as inextricably linked components of professional competence. Despite decades of stated commitment to diversity initiatives, engineering remains one of the most homogenous and socially stratified professional fields globally.[1] While many organizations have implemented mandatory diversity, equity, and inclusion (DEI) training, empirical research suggests that much of this training is "performative"—focused on legal compliance, vocabulary acquisition, and reputation management rather than deep behavioral or structural change.[3] This performativity is particularly problematic in the context of high-reliability organizations (HROs), such as those in aerospace, civil infrastructure, and applied mechanics, where the failure to foster genuine psychological safety and inclusion is not merely a human resources concern; it is a safety-critical risk factor.

Past industrial failures provide stark reminders of the consequences of homogenous decision-making environments where dissenting voices are silenced. The "normalization of deviance"—whereby unsafe practices become accepted as standard due to the absence of immediate negative consequences—often thrives in cultures where junior engineers or those from marginalized backgrounds feel unable to challenge the consensus.[6] In such instances, the lack of an inclusive culture—where team members feel safe to challenge the status quo without fear of retribution—can directly contribute to technical oversight. Thus, for the engineering profession, inclusion is not a "soft skill" peripheral to the core mission; it is a central component of engineering ethics and risk mitigation.

This paper addresses the critical gap between *knowing* inclusive concepts and *doing* inclusive work. It argues that standard multiple-choice assessments and vocabulary quizzes—commonplace in corporate and academic DEI training—are insufficient for measuring an engineer's ability to lead diverse teams or design equitable systems. An engineer may be able to define "implicit bias" or "microaggression" on a test yet fail to recognize and interrupt these dynamics in a high-pressure design review. To close this "say-do" gap, we propose converting static knowledge checks into dynamic "work tasks" through the development of Situational Judgment Tests (SJTs).

SJTs present respondents with realistic, complex scenarios and ask them to identify the most appropriate response from a set of plausible options. Unlike tests of cognitive ability, SJTs measure "procedural knowledge"—the tacit understanding of how to handle interpersonal and professional dilemmas effectively.[8] By grounding DEI assessment in the specific realities of engineering practice—such as safety reviews, code inspections, and project allocation—we can move the conversation from abstract morality to professional competency.

Furthermore, this paper interrogates the specific cultural barriers within engineering education that resist inclusive transformation. The pervasive ideology of "depoliticization" in engineering [1] creates a false dichotomy between "social" concerns and "technical" work, reinforcing a meritocratic myth that obscures systemic inequalities. This is particularly relevant in the context of the Global South, specifically India, where the intersectionality of caste and gender creates unique mechanisms of exclusion within elite institutions.[11] A truly robust framework for inclusive leadership must be sensitive to these local hierarchies while upholding global standards of equity.

The following sections will review the limitations of current awareness-based training, detail the methodology for developing engineering-specific SJTs, and present a comprehensive framework of four domains of inclusive leadership. This framework is illustrated through detailed scenarios that compel leaders to demonstrate their competence in engineering equity, rather than merely professing it.

II. LITERATURE REVIEW

A. The Failure of Awareness-Based Training and the "Deficit Model"

For decades, the dominant approach to diversity intervention in both corporate and academic engineering settings has relied on the "deficit model" of training. This model assumes that discriminatory behavior stems primarily from a lack of information or awareness. The logic follows that if individuals are taught the definitions of bias, privilege, and discrimination, they will rationally correct their behavior to be more equitable. However, a growing body of longitudinal research contradicts this assumption.

Dobbin and Kalev (2018) analyzed data from over 800 firms and found that mandatory diversity training often fails to increase the representation of women and minorities in management. In many cases, it triggers a "backfire effect," where dominant groups perceive the training as a threat to their autonomy or meritocratic standing, leading to increased resentment and resistance toward DEI initiatives.[3] Similarly, Chang et al. (2019) demonstrated through a large-scale field experiment that while online diversity training can produce short-term changes in attitude, its effect on actual behavior is minimal and often limited to those who were already supportive

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1416

of diversity goals.[14]

In the engineering context, this failure is exacerbated by the discipline's cultural norms. Engineers are trained to value objectivity, quantitative data, and technical rationality. Abstract sociological concepts presented in traditional DEI workshops can feel disconnected from the "real work" of engineering. Cech and Waidzunas (2021) highlight how the "culture of disengagement" in engineering education socializes students to view public welfare and social justice as distinct from, and often secondary to, technical problem-solving.[1] Consequently, when DEI training is presented as a compliance exercise or a moral lecture, it is frequently dismissed by engineering professionals as irrelevant to technical excellence.

B. Situational Judgment Tests (SJTs): From Selection to Development

To address the limitations of awareness-based training, industrial-organizational psychologists have increasingly turned to Situational Judgment Tests (SJTs). SJTs are low-fidelity simulations that present respondents with work-related dilemmas and a set of alternative courses of action. They measure a construct often termed "practical intelligence" or "tacit knowledge"—the ability to apply general knowledge to specific, context-dependent problems.[8]

Patterson et al. (2016) have extensively documented the validity of SJTs in medical selection, demonstrating that they are superior predictors of professional attributes such as empathy, integrity, and resilience compared to cognitive ability tests or personality inventories.[9] In the medical field, SJTs are used to assess how a candidate might handle a patient confidentiality breach or a conflict with a senior consultant. These scenarios mirror the ethical complexity of the profession.

Applying this to engineering, SJTs offer a mechanism to measure "inclusive competence." Instead of asking an engineer "Do you believe in diversity?", an SJT asks, "You are a lead engineer. During a design review for a new interface, a female junior engineer suggests a modification based on anthropometric data for smaller body types. A senior male engineer dismisses it, saying, 'We design for the 95th percentile man, that's the standard.' What do you do?" This shift from attitudinal surveying to behavioral simulation allows for the assessment of *actionable* leadership skills: the ability to interrupt bias, cite regulatory or safety standards (e.g., inclusive design principles), and manage team dynamics without escalating conflict unproductively.

C. The Engineering Context: Meritocracy, Safety, and Exclusion

The design of an effective SJT framework for engineering must be rooted in the specific cultural and structural realities of the profession. Three critical themes emerge from the literature: the myth of meritocracy, the imperative of psychological safety, and the nuances of intersectionality in global engineering contexts.

➢ *The Myth of Meritocracy and Depoliticization*

Engineering culture is heavily invested in the ideology of meritocracy—the belief that success is determined solely by individual ability and effort. However, critical scholarship has shown that this belief often functions as an "ideology of inequality" that legitimizes the status quo. Cech (2013) and Subramanian (2019) argue that the veneer of meritocracy in elite institutions often masks deep-seated caste and class privileges. In India, the "merit" of passing rigorous entrance examinations is often weaponized to stigmatize students from Scheduled Castes (SC) and Scheduled Tribes (ST) who enter via reservation quotas, framing them as "lesser" engineers despite their qualifications.[11] An inclusive leadership framework must therefore test a leader's ability to recognize and dismantle these "meritocratic" barriers that are actually proxies for privilege.

➢ *Psychological Safety and Engineering Failure*

The connection between inclusion and safety is profound in engineering. Edmondson's (2018) concept of "The Fearless Organization" posits that psychological safety—the belief that one will not be punished or humiliated for speaking up with ideas, questions, concerns, or mistakes—is essential for learning and error prevention.[21] Major industrial accidents often reveal a pattern of "groupthink," where engineers feel pressured to suppress their concerns about component performance or safety margins due to organizational pressure to launch or produce.[6] Inclusive leadership in engineering is thus a mechanism for risk mitigation: by ensuring that diverse perspectives (including dissenting technical opinions) are heard, leaders can prevent catastrophic failures.

➢ *Intersectionality: Global North and South Perspectives*

While much of the DEI literature focuses on race and gender in a Western context, engineering is a global profession. In India, the intersection of caste and gender creates unique barriers. Dalit women in engineering face a "double bind" of marginalization.[24] "Performative allyship"—where privileged individuals profess support for marginalized groups without taking material risks—is a critical issue in both contexts.[26] In the Indian corporate context, this might manifest as "Savarna allyship," where upper-caste individuals dominate the discourse on caste discrimination without ceding space or power to Dalit voices.[28] An effective SJT framework must be "culturally agile" (Caligiuri, 2013), capable of assessing whether a leader can navigate these specific structural hierarchies rather than applying a "one-size-fits-all" Western DEI model.

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III. METHODOLOGY: FROM "WORD QUIZ" TO COMPETENCY FRAMEWORK

The development of the Situational Judgment Framework involved a rigorous qualitative reconstruction of critical incidents in engineering workplaces. The methodology was designed to transform theoretical DEI knowledge into measurable, actionable work tasks.

A. Instrument Design and Content Validity

The content for the SJT scenarios was derived using the Critical Incident Technique (CIT).[29] This involved a comprehensive review of:

- Public Accident Investigation Reports: Analysis of widely available reports on industrial and aerospace failures to identify moments where exclusionary culture, silence, or hierarchical pressure contributed to technical failure.
- Discrimination Grievances: Review of public records regarding employment discrimination in the global technology sector to understand real-world manifestations of bias.
- Academic Literature: Synthesis of findings from Cech, Waidzunas, and studies on STEM inequality to identify persistent systemic barriers (e.g., the "broken rung" for women, the "bamboo ceiling" for Asians, caste-based networking).

This review yielded 50 distinct "critical incidents"—situations where a leader's action or inaction regarding equity had a significant impact on team performance, safety, or individual retention.

B. The Conversion Protocol: Re-Engineering the Scenario

A three-step protocol was developed to convert these incidents from passive "knowledge checks" (which ask "what is the definition of X?") into active "work tasks" (which ask "what would you *do* in situation X?").

➢ *Step 1: Identification of the Core Conflict.*

The conflict was isolated not as a "social issue" but as an organizational dysfunction. For example, "microaggressions against a female engineer" was re-framed as "a breakdown in technical communication and team cohesion."

➢ *Step 2: Operationalization of Response Options.*

Response options were drafted to reflect varying levels of inclusive competence:

- Ineffective/Counterproductive: Responses that ignore the issue, gaslight the victim, or reinforce the bias (e.g., "Tell her to have a thicker skin").
- Performative/Superficial: Responses that offer symbolic support without structural change (e.g., "Post a hashtag about women in STEM").
- Competent/Structural: Responses that address the immediate behavior and the underlying system (e.g., "Intervene in the moment using a 'call-in' strategy, and subsequently review the meeting protocol to ensure equitable floor time").

➢ *Step 3: Validation with Subject Matter Experts (SMEs).*

Consistent with best practices for SJT development 31, the scenarios were reviewed by a panel of Subject Matter Experts. This panel included engineering professors, DEI practitioners in STEM, and senior engineering managers. They evaluated the "content validity" of the scenarios, ensuring they were realistic to the engineering environment and that the distinction between "effective" and "ineffective" responses was grounded in evidence-based management theory rather than subjective opinion.

Table 1: Example of Conversion Protocol

Original Concept	Scenario Description	Converted "Work Task" (Competency)
Sponsorship vs. Mentorship	HR data shows high retention of junior women engineers but zero promotion to partner/principal level in 20 years.	**Task:** Design a sponsorship framework that assigns political capital to high-potential candidates. *Action:* Shift from "offering advice" (mentorship) to "advocating for high-visibility project assignment" (sponsorship).
Groupthink & Safety	A design team for a hydraulic system has reached consensus rapidly. No one has offered a dissenting view or identified potential failure modes.	**Task:** Institute a "Devil's Advocate" or "Red Team" protocol. *Action:* Formalize dissent in the safety meeting agenda to mitigate confirmation bias and the illusion of invulnerability.

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Structural Accountability	A proposal is made to increase company accountability on equity, but leadership is hesitant to share data.	**Task:** Audit the supply chain and internal pay scales. *Action:* Establish vendor parity metrics and publish an annual CSR report with disaggregated pay gap data by race, gender, and caste.

IV. PROPOSED FRAMEWORK: THE FOUR DOMAINS OF INCLUSIVE ENGINEERING LEADERSHIP

Based on the analysis of the 50 scenarios, this paper proposes a taxonomy of four domains necessary for inclusive leadership in technical fields. These domains move from the structural/systemic to the interpersonal/behavioral.

A. Domain I: Structural Engineering of Equity

This domain treats inequity not as a problem of "bad apples" but as a "structural failure" in the organization's design. Just as an engineer analyzes a bridge for load-bearing weaknesses, an inclusive leader must analyze organizational processes for bias.

➢ *Key Work Tasks*

- Pay Equity Audits: Conducting rigorous statistical regression analyses of compensation to identify and rectify gaps unexplained by tenure or performance.[33]
- De-biasing Recruitment: Standardizing interview rubrics to eliminate "halo effects" and "affinity bias." For instance, in the context of Indian engineering, this involves anonymizing resumes to remove markers (surnames, hometowns) that might trigger caste-based implicit bias.[12]
- Transparency Protocols: Creating Standard Operating Procedures (SOPs) for promotion that are transparent and accessible, dismantling the "hidden curriculum" of advancement that favors those with existing social capital.

➢ *Theoretical Underpinning*

This domain draws on the concept of Structural Equity [34], which requires institutionalizing accountability. It moves the locus of intervention from "fixing people" (training) to "fixing processes" (engineering).

B. Domain II: Interpersonal Allyship and Micro-Interventions

While structural changes are essential, the daily culture of a team is defined by interpersonal interactions. This domain assesses a leader's ability to manage the "micro-climate" of their team, ensuring psychological safety.

➢ *Key Work Tasks:*

- The "Call In" vs. "Call Out": Utilizing situational judgment to decide when to publicly correct a microaggression (to set a norm) versus when to address it privately (to facilitate learning without defensiveness).[10]
- Equitable Task Allocation: Monitoring who gets assigned "Non-Promotable Tasks" (NPTs) or "office housework" (e.g., taking notes, planning parties). Research shows women in STEM are disproportionately burdened with these, reducing their time for technical work.[36] The competent response is to implement a rotational system for NPTs.
- Sponsorship: Moving beyond mentorship (giving advice) to sponsorship (using power to create opportunity). The SJT assesses whether a leader is willing to spend their own political capital to advocate for a marginalized team member.

➢ *Theoretical Underpinning*

This domain aligns with the literature on Allyship [37], distinguishing between passive support and active, risk-taking advocacy.

C. Domain III: Inclusive Design and Accessibility

This domain is specific to the engineering function: ensuring that the products designed and the environments worked in do not exclude or disable people.

➢ *Key Work Tasks*

- Physical & Digital Accessibility: Proactively ensuring workspaces (labs, shop floors) and digital tools accommodate mobility devices and assistive technologies, rather than waiting for an accommodation request.[32]
- Neurodiversity Inclusion: Designing workflows that accommodate different cognitive processing styles (e.g., ADHD, Autism). This might involve offering noise-canceling headphones in open-plan offices or providing written agendas well in advance of meetings to support those who need processing time.[39]
- Product Safety & Anthropometry: Ensuring that safety equipment (PPE), crash test dummies, and ergonomic designs account for female bodies and diverse anthropometric data, preventing the "reference man" bias that endangers women in engineering environments.

➢ *Theoretical Underpinning*

This domain draws on Universal Design principles and the Social Model of Disability, viewing disability as a mismatch between the individual and a poorly designed environment.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1416

D. Domain IV: Strategic Authenticity and Anti-Performativity

This domain assesses the leader's ability to align organizational values with actions, specifically resisting the temptation of "performative allyship."

➢ *Key Work Tasks*

- Navigating Pushback: When faced with "diversity fatigue" or claims of "reverse discrimination" from majority groups, the leader must be able to articulate the "business case" and the "moral case" for equity without retreating.
- Resource Allocation: Distinguishing between symbolic acts (e.g., changing a logo for Pride month) and material acts (e.g., donating to LGBTQ+ STEM scholarships, ensuring transgender-inclusive healthcare benefits).
- Vulnerability: Modeling "Cultural Humility" (Tervalon & Murray-Garcia, 1998) by admitting one's own gaps in knowledge and biases, creating a "brave space" for growth.[40]

➢ *Theoretical Underpinning*

This domain critiques Performative Allyship [26], emphasizing that true inclusion requires the relinquishing of power and privilege, not just the signaling of virtue.

V. DISCUSSION

A. The "Say-Do" Gap in Technical Leadership

The analysis of the SJT scenarios highlights a critical distinction between "Equality" (treating everyone exactly the same) and "Equity" (providing resources based on need). A manager may pass a written quiz knowing the definition of equity, yet fail to apply it when a team member requests a flexible schedule for caregiving or religious observance. The proposed SJT framework forces the leader to demonstrate *how* they would accommodate the request in a high-pressure project timeline, rather than simply identifying that they *should*. This moves assessment from the declarative (knowing *that*) to the procedural (knowing *how*).

B. Mitigating Bias in High-Stakes Decisions: The Engineering of Merit

Engineering relies on data, yet personnel decisions are often rife with heuristics. The "Halo Effect" leads managers to favor candidates from their own alma mater (often elite institutions), mistaking pedigree for competence. In the Indian context, this is inextricably linked to caste. Networks often control access to these institutions, and "merit" becomes a code word for social capital.19

The SJT framework disrupts this by presenting scenarios where "merit" is contested. For example, a scenario might present two candidates: one with a polished degree from a top-tier institute, and another from a provincial college with a portfolio of innovative, scrappy projects. The "competent" response requires the leader to look beyond the pedigree (the structural advantage) to assess the actual engineering capability (the skill), thereby operationalizing a more genuine form of meritocracy.

C. The Safety Imperative: Groupthink as an Engineering Failure Mode

The paper integrates the "Safety Case" alongside the moral and business cases for DEI. Historical engineering disasters illustrate that when psychological safety is absent, critical technical information does not flow up the chain of command.

➢ *Scenario Application*

Consider a generalized high-stakes scenario: A junior engineer notices that a critical component (e.g., a seal, a sensor, or a software patch) has not been tested under extreme environmental conditions. The launch or release deadline is imminent. A senior manager pressures the team to "sign off" to avoid delays. The SJT tests the leader's response: Do they silence the junior engineer to maintain group harmony (Groupthink), or do they halt the process to investigate the risk? The "inclusive" response is not merely to listen, but to *amplify* the concern and validate the dissenter's role in the safety culture.

➢ *Implication*

This reframes inclusion not as "being nice" but as "being safe." It argues that diverse teams are less prone to the "illusion of invulnerability" that characterizes groupthink.[23]

D. Contextual Nuance: The Global South Perspective

The framework acknowledges that DEI is not a monolith. While US-centric models focus heavily on race, an engineering leader in India must navigate caste dynamics. The SJT model includes scenarios specifically designed to test "caste competency"—e.g., recognizing when a "vegetarian-only" team lunch might subtly exclude specific colleagues, or addressing the use of casteist slurs disguised as "jokes" in the hostel or workplace.[25] By incorporating these localized scenarios, the framework achieves a higher degree of ecological validity for global engineering firms.

VI. CONCLUSION

To achieve genuine diversity in engineering, the profession must stop testing leaders on their vocabulary and start testing them on their judgment. The current paradigm of awareness-based training has reached a point of diminishing returns; it creates a workforce that knows the *language* of equity but lacks the *fluency* to practice it under pressure.

This paper provides a blueprint for converting static DEI concepts into rigorous, scenario-based work tasks. The Situational Judgment Framework proposes that inclusive leadership is a technical competency, comprised of Structural Equity, Interpersonal Allyship, Inclusive Design, and Strategic Authenticity. By evaluating leaders on their ability to "engineer

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1416

equity"—through structural reforms, active sponsorship, and the mitigation of groupthink—organizations can move beyond performative compliance toward measurable cultural change.

For the engineering education sector, this implies a radical curricular shift. Ethics and management courses must move beyond case studies of "what went wrong" to simulations of "what would you do right now?" Only by practicing these decisions in the safety of a simulation can future engineers be prepared to make the courageous choices required in the field. The ultimate goal is an engineering culture where safety and equity are viewed not as competing interests, but as mutually reinforcing pillars of professional excellence.

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