

Article

Not peer-reviewed version

Disability Inclusion in the Engineering Profession: The Role of ECSA in Advancing an Inclusive Engineering Environment for Professionals with Disabilities

Ada Dienga and [Josias Mamabolo](#) *

Posted Date: 2 February 2026

doi: 10.20944/preprints202601.2403.v1

Keywords: disability inclusion; ECSA; engineering profession; inclusive workplaces; transformation; universal design; accessibility; South Africa; professional regulation



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a [Creative Commons CC BY 4.0 license](#), which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Article

Disability Inclusion in the Engineering Profession: The Role of ECSA in Advancing an Inclusive Engineering Environment for Professionals with Disabilities

Ada Dienga and Josias Mamabolo *

Engineering Council of South Africa

* Correspondence: josias@ecsa.co.za

Abstract

Disability inclusion in the engineering profession remains an underexplored but essential dimension of workforce transformation, professional equity, and sustainable development. Globally, engineering regulators and professional bodies are increasingly expected to address systemic barriers that limit the participation and progression of engineers with disabilities. In South Africa, the Engineering Council of South Africa (ECSA) holds a statutory mandate to protect the public, promote professional competence, and advance transformation within the engineering sector. This article examines the role of ECSA in supporting disability inclusion and evaluates the extent to which its policies, accreditation criteria, stakeholder engagements, and regulatory instruments contribute to creating an inclusive engineering environment. Using a qualitative document analysis of regulatory frameworks, disability legislation, and engineering education and workplace literature, the study identifies persistent structural barriers related to accessibility, professional registration, workplace accommodation, data availability, and institutional culture. While ECSA has made progress through its Transformation Framework, education accreditation standards, and stakeholder engagement mechanisms, disability inclusion remains insufficiently institutionalised. The article proposes a disability inclusion model tailored for ECSA, centred on accessibility, universal design, disability-responsive regulation, data-driven transformation strategies, and strengthened partnerships with disability rights organisations. The study contributes to debates on inclusive professional regulation and offers practical pathways for advancing disability-inclusive engineering in South Africa.

Keywords: disability inclusion; ECSA; engineering profession; inclusive workplaces; transformation; universal design; accessibility; South Africa; professional regulation

1. Introduction

Disability inclusion is a fundamental component of social justice, workplace equity, and sustainable development. The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) affirms the right of persons with disabilities to equal participation in education, employment, and professional life (United Nations, 2006). Despite these international commitments, persons with disabilities remain underrepresented across science, technology, engineering, and mathematics (STEM) professions, including engineering (World Health Organization & World Bank, 2011; Lindsay et al., 2019).

In South Africa, disability inclusion is constitutionally protected and legislatively reinforced through instruments such as the Employment Equity Act (Republic of South Africa, 1998), the White Paper on the Rights of Persons with Disabilities (Republic of South Africa, 2015), and sector-specific transformation strategies. However, evidence suggests that engineers with disabilities continue to

face systemic barriers in education, professional registration, workplace participation, and career advancement (Department of Higher Education and Training [DHET], 2020).

As the statutory regulator of the engineering profession, the Engineering Council of South Africa (ECSA) plays a critical role in shaping professional norms, competencies, and access pathways. ECSA's mandate extends beyond technical competence to include ethical practice, public protection, and transformation of the profession (ECSA, 2022). While transformation initiatives have historically prioritised race, gender, and youth development, disability inclusion has received comparatively limited regulatory attention.

This article critically examines ECSA's role in advancing disability inclusion within the engineering profession. It evaluates existing regulatory instruments, accreditation standards, and professional processes to identify structural gaps and opportunities for reform. By doing so, the study seeks to contribute to a more inclusive understanding of professional regulation in engineering and to propose a practical model for disability-responsive regulatory governance.

2. Literature Review

2.1. Conceptualising Disability Inclusion

Disability inclusion refers to the deliberate removal of physical, institutional, attitudinal, and systemic barriers that prevent persons with disabilities from participating fully and equally in society (Shakespeare, 2014). Contemporary disability theory adopts a social and human-rights-based model, which recognises disability as the interaction between impairment and environmental barriers rather than an individual deficit (Oliver, 1996; United Nations, 2006).

Key dimensions of disability inclusion in professional environments include:

- physical and built-environment accessibility;
- digital and information accessibility;
- reasonable accommodation;
- inclusive organisational culture;
- equitable access to professional development and advancement (WHO & World Bank, 2011).

In professional and regulatory contexts, disability inclusion requires systemic interventions rather than ad hoc accommodations.

2.2. Disability in Engineering and STEM Professions

Global research consistently demonstrates that persons with disabilities are significantly underrepresented in engineering and other STEM fields (Moon et al., 2012; Lindsay et al., 2019). Barriers include inaccessible laboratories, rigid assessment methods, exclusionary technical standards, and entrenched stereotypes regarding productivity and safety (Vornholt et al., 2018).

Engineering education environments often rely on physical infrastructure and pedagogical practices that disadvantage students with mobility, sensory, cognitive, or psychosocial disabilities (Raja, 2016). These barriers persist into professional practice, where workplace safety regulations, field-based requirements, and performance norms may unintentionally exclude engineers with disabilities (Duff et al., 2020).

The exclusion of engineers with disabilities not only undermines equity but also limits innovation and diversity of problem-solving approaches within the profession (Moon et al., 2012).

2.3. Professional Regulation and Inclusion

Professional regulatory bodies shape inclusion through:

- accreditation of education programmes;
- competency and assessment standards;
- registration and licensure processes;
- ethical and professional conduct requirements;

- transformation and diversity strategies (Adams, 2011).

Internationally, engineering regulators are increasingly embedding inclusion, accessibility, and universal design principles into accreditation and professional standards (Royal Academy of Engineering, 2019). However, research suggests that disability inclusion often remains implicit rather than explicitly regulated (Duff et al., 2020).

2.4. ECSA's Mandate and Transformation Agenda

ECSA is established under the Engineering Profession Act 46 of 2000 and is mandated to regulate the engineering profession in the public interest (Republic of South Africa, 2000). Its responsibilities include accrediting engineering programmes, registering professionals, setting competency standards, and promoting transformation (ECSA, 2022).

ECSA's Transformation Framework acknowledges disability as a dimension of transformation but offers limited operational guidance on implementation (ECSA, 2021). The absence of disability-specific indicators, accessibility standards, and monitoring mechanisms limits the effectiveness of inclusion efforts.

3. Research Methodology

This study adopts a qualitative, exploratory research design. Data were collected through document analysis of:

- ECSA policies, accreditation criteria, competency standards, and transformation frameworks;
- national disability legislation and policy instruments;
- international literature on disability inclusion in engineering and STEM;
- reports from disability advocacy organisations and higher education bodies.

Thematic analysis was used to identify recurring patterns, gaps, and opportunities related to disability inclusion across education, registration, and professional practice (Braun & Clarke, 2006). This approach is appropriate for analysing regulatory and institutional frameworks where empirical disability data remain limited.

4. Findings: Barriers to Disability Inclusion in Engineering

4.1. Accessibility Barriers in Engineering Education

Engineering education remains a critical exclusion point for persons with disabilities. Many accredited programmes continue to operate in environments characterised by inaccessible laboratories, workshops, and field-training facilities (DHET, 2020). Limited availability of assistive technologies and inflexible teaching methods further disadvantage students with disabilities.

Although ECSA accreditation criteria emphasise educational quality, accessibility requirements are not consistently or explicitly enforced, resulting in uneven inclusion across institutions.

4.2. Professional Registration and Assessment Barriers

Professional registration processes often rely on standardised assessments and workplace competency evaluations that may not adequately accommodate diverse abilities. Limited guidance on reasonable accommodation, combined with insufficient disability awareness among assessors, can result in exclusionary outcomes (Duff et al., 2020).

The absence of clearly articulated disability-responsive assessment frameworks within ECSA's registration processes presents a structural barrier to professional recognition.

4.3. Workplace Inclusion and Career Progression

Engineers with disabilities frequently encounter workplace barriers such as reluctance to provide accommodations, misconceptions about safety and productivity, and limited access to adaptive technologies (Vornholt et al., 2018). These challenges restrict career advancement and reinforce underrepresentation at senior professional levels.

Regulatory guidance on inclusive workplaces remains limited, reducing accountability among employers.

4.4. Data and Representation Gaps

A significant finding is the lack of disability-disaggregated data within ECSA's registration and monitoring systems. Without reliable data on engineers with disabilities, targeted policy interventions and progress tracking remain constrained (WHO & World Bank, 2011).

5. The Role of ECSA in Advancing Disability Inclusion

5.1. Strengthening Accreditation Standards

ECSA can influence inclusion by integrating explicit accessibility and universal design requirements into accreditation criteria. This would compel higher education institutions to address disability inclusion systematically rather than reactively (Royal Academy of Engineering, 2019).

5.2. Inclusive Professional Registration Processes

Clear guidelines on reasonable accommodation, alternative assessment formats, and disability awareness training for assessors would enhance fairness and transparency in registration processes.

5.3. Transformation Structures and Stakeholder Engagement

Establishing disability-focused advisory structures and engaging disability organisations would strengthen representation and accountability within ECSA's transformation agenda.

5.4. Continuing Professional Development (CPD)

Mandatory CPD modules on disability inclusion, inclusive design, and workplace accommodation would enhance professional competence and ethical awareness across the profession.

6. Discussion

The findings demonstrate that disability inclusion within the engineering profession remains largely peripheral to regulatory practice. While ECSA's existing frameworks provide a foundation for transformation, disability inclusion requires deliberate institutionalisation across accreditation, registration, and professional practice.

Embedding disability inclusion aligns with broader sustainability and social justice objectives and strengthens the profession's capacity to respond to complex societal challenges.

7. Proposed Disability Inclusion Model for ECSA

The proposed model comprises five interrelated pillars:

- Inclusive Regulation: Disability-responsive accreditation and registration standards.
- Accessibility and Universal Design: Mandatory accessibility requirements in education and practice.
- Disability Data Systems: Systematic collection and reporting of disability indicators.
- Partnerships: Collaboration with disability advocacy organisations and employers.

- Capacity Building: CPD, assessor training, and leadership sensitisation.

8. Conclusions

Disability inclusion remains one of the least developed dimensions of transformation within the South African engineering profession. As the statutory regulator, ECSA holds significant potential to drive systemic change by embedding accessibility, inclusion, and equity into professional regulation. Strengthened regulatory instruments, improved data systems, and collaborative partnerships can advance a more inclusive engineering environment that benefits both professionals with disabilities and the broader society.

References

- Adams, R. (2011). *Engineering education and professional practice: Reforming regulation*. Springer.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Department of Higher Education and Training (DHET). (2020). *Statistics on post-school education and training in South Africa*. Pretoria: DHET.
- Duff, A., Ferguson, J., & Gilmore, K. (2020). Disability inclusion in professional accreditation systems. *Studies in Higher Education*, 45(7), 1461–1475.
- Engineering Council of South Africa (ECSA). (2021). *Transformation Framework*. Pretoria: ECSA.
- Engineering Council of South Africa (ECSA). (2022). *Annual report*. Pretoria: ECSA.
- Lindsay, S., Cagliostro, E., Albarico, M., Mortaji, N., & Karon, L. (2019). A systematic review of the benefits of hiring people with disabilities. *Journal of Occupational Rehabilitation*, 29(4), 639–651.
- Moon, N. W., Todd, R. L., Morton, D. L., & Ivey, E. (2012). Accommodating students with disabilities in STEM. *Journal of Postsecondary Education and Disability*, 25(4), 307–322.
- Oliver, M. (1996). *Understanding disability: From theory to practice*. Macmillan.
- Raja, D. S. (2016). *Bridging the disability divide through digital technologies*. World Bank.
- Republic of South Africa. (1998). *Employment Equity Act 55 of 1998*. Pretoria: Government Printer.
- Republic of South Africa. (2000). *Engineering Profession Act 46 of 2000*. Pretoria: Government Printer.
- Republic of South Africa. (2015). *White Paper on the Rights of Persons with Disabilities*. Pretoria: Government Printer.
- Royal Academy of Engineering. (2019). *Engineering inclusive futures*. London.
- Shakespeare, T. (2014). *Disability rights and wrongs revisited*. Routledge.
- United Nations. (2006). *Convention on the Rights of Persons with Disabilities*. New York: UN.
- Vornholt, K., et al. (2018). Disability and employment. *Journal of Occupational Rehabilitation*, 28(4), 650–664.
- World Health Organization & World Bank. (2011). *World report on disability*. Geneva: WHO.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.