

A CAPABILITY APPROACH TO INDIGENOUS EDUCATION MOBILITY: A CONCEPTUAL FRAMEWORK AND FUTURE DIRECTIONS

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Abstract. Mobility is vital in fulfilling fundamental human needs, enabling access to opportunities and services, including education. Mobility, including transportation, distance, and costs, have profound impacts on students' well-being and academic achievement. Nonetheless, Indigenous students continue to encounter barriers to education, underscoring deep-rooted inequalities in school access. Through theoretical synthesis, this paper finds that Indigenous children's access to education is profoundly shaped by intersecting social and spatial inequalities. These compounded disparities highlight the need to engage with social and spatial justice perspectives in understanding the structural barriers constraining educational mobility. A critical issue in educational mobility concerns the extent to which students are both capable of and afforded equal opportunities to access schooling. This capability is shaped not only by social identities: gender, and household income, but also by spatial constraints. Therefore, this study extends the Capability Approach (CA) framework, by integrating the concepts of socio-spatial justice and inequality in analysing the persistent barriers that Indigenous students face in accessing education. This study further indicates that Horizontal and Vertical Equities could serve as effective strategies to mitigate mobility challenges, thus contributing valuable insights for future rural education policymaking.

Keywords: indigenous education, mobility, social justice, spatial justice

Introduction

Indigenous communities predominantly lived in rural areas, characterized by distinct geographical features, such as rugged terrain, forested, mountainous, and hilly topographies (Zhu et al., 2023). Consequently, they are often isolated and restricted from accessing fundamental services, including education, healthcare, and market activities (Hidayati et al., 2021; Horn et al., 2021; Nugin, 2020). Mobility, which is the physical movement of people via modes of transportation (Litman, 2016; Hannam et al., 2006), facilitates access to these services, serving as a cornerstone of social inclusion and well-being (Breen et al., 2021). Indigenous students face numerous challenges and barriers in accessing education, as evidenced by the significant dropout rates (Yew et al., 2021; Mohamad Shah et al., 2020). In 2021, 42.29% of the students dropped out before completing Form Five (Bernama, 2022). Mobility-related factors such as transport modes, travel distance, and associated costs play an important role in shaping educational attainment (Ordóñez-Pacheco et al., 2024). Seamless mobility, however, depends on equitable access to resources that support physical accessibility, as limited accessibility may constrain school travel (Hidayati et al., 2021).

According to Müller et al. (2020), accessibility is influenced by spatial factors, particularly the proximity of schools to students' homes and the availability of the surrounding transport system. However, accessibility is also socially shaped, as unequal resource distribution generates different levels of access among social groups (Amorim

et al., 2025). This aligns with Ravensbergen (2022) and Shaker (2021), who conceptualise mobility as an embodied and negotiated experience shaped by physical, environmental, and spatial constraints across varying class, race, gender, and income. Despite the socio-spatial barriers faced by Indigenous students, few studies have analysed these barriers through the lens of Capability Approach (CA) and mobility. This study contributes theoretically by conceptualising mobility as a functioning and socio-spatial inequalities as conversion factors within the CA, interpreted through the perspectives of social and spatial justice. In doing so, the study reframes mobility beyond logistical challenge, but also a matter of equitable capabilities and structural justice. This study seeks to contribute to inclusive education debates and to offer a justice-oriented lens for addressing persistent inequalities in rural mobility. This paper is structured as follows Literature Review, Methodology, Results, Discussion and Conclusion.

Literature review

Spatial justice

Spatial justice concerns the fair and equitable distribution of resources across space and how living environments enhance or limit individuals' movement and opportunities (Weck et al., 2022; Sheller, 2020). Spatial (in)justice can be understood as both a consequence and a process, whereby geographical and distributional patterns generate justice or injustice (Soja, 2009). Spatial arrangements influence social behaviour, as the built environment serves as both a medium for human activity and a facilitator of access to resources (Setianto and Gamal, 2021). However, resources and opportunities are often unevenly distributed across space, causing certain communities to experience greater inequalities and marginalisation due to their geographical location (Madanipour et al., 2022; Soja, 2010). By that, spatial justice recognizes that individuals' surroundings and location should not constrain their capabilities and opportunities (Dong et al., 2022; Sen, 2009).

Social justice

The very structure of space can generate injustices, contributing to social inequalities (Dikeç, 2001). Social inequalities are justifiable only if they benefit the least advantaged members of society (Rawls, 1971). In this context, policies that prioritise rural transportation may be justified, provided they enable disadvantaged groups, such as children, to have better mobility to school. Social justice, thus, entails efforts to alleviate underlying inequalities through affirmative action (Litman, 2022). Similarly, Angit and Jarvis (2024) define social justice as recognising group-based inequalities and actively seeking measures to address them. While Social Justice in rural education studies is traditionally oriented towards the Rawlsian Distributive Approach (Roberts and Green, 2013), this study emphasises socio-spatial justice, highlighting how inequalities are embedded in mobility.

Materials and Methods

This study adopts theoretical synthesis through systematic review of relevant literature using three primary databases: Scopus, Web of Science (WoS) and Google Scholar. This paper adopted manual searching and the snowballing method to maximise

literature searches, as recommended by Mohamed Shaffril et al. (2021). This theoretical synthesis was guided by research questions, using the PICO method: P- Population, I- Interest, and Co- Context (Lisnawaty, 2024; Mohamed Shaffril et al., 2021). The questions of “How does the Capability Approach explain the mobility barriers of Indigenous children to education?” and “How do socio-spatial justice and inequalities enhance the Capability Approach in understanding mobility to education?” drive the search strings as in *Table 1*. The search strings were complemented by Boolean operators (AND/OR/NOT) and field code functions, including truncation (*) and phrase searching (“”). These yielded 189 articles from Scopus and 124 from WoS. Additionally, manual searching and snowballing yielded 24 articles, bringing the total to 346 retrieved at this stage.

Table 1. *The search strings.*

Databases	Search String
Scopus	((“Capabilit* Approach” OR CA OR capabilit*) AND (mobility OR access OR movement OR transport*) AND (education OR school OR “school enrolment” OR dropout OR absent*) AND (rural OR remote OR “Indigenous student*” OR “Indigenous children” OR “rural areas”) AND (inequalit* OR socio OR social OR spatial OR “socio-spatial” OR “social justice” OR “spatial justice”))
Web of Science	((((TS=(“capabilit* approach” OR capabilit* OR CA)) AND TS=(“social justice” OR “spatial justice” OR social OR spatial OR “social inequalit*” OR “spatial inequalit*”)) AND TS=(education OR school OR dropout OR “school enrolment”)) AND TS=(mobility OR movement OR access OR transport OR “school mobility”)) AND TS=(“Indigenous children” OR “Indigenous student*” OR Indigenous OR rural OR remote)

Screening and eligibility

Inclusion and exclusion criteria (*Table 2*) were established to ensure only relevant articles were selected, while studies with unsuitable population characteristics were disregarded (Patino and Ferreira, 2018). Ultimately, 34 articles were included in the theoretical synthesis, while 288 were excluded as irrelevant to the study’s objectives, particularly those from clinical, medical, engineering, social mobility, and ecotourism fields.

Table 2. *Inclusion and exclusion criteria for document retrieval.*

Criteria	Inclusion	Exclusion
Document Type	Theoretical Review, Empirical paper	Conference Review, Conference Proceeding, Letter
Publication Timeframe	Theoretical Review-No fixed timeframe; it is subject upon the year in which theory was developed. Empirical paper-8 years (2017-2025)	Empirical Paper - <2017
Field of Subject	Capability Approach, Social Justice, Spatial Justice, Rural Education, Mobility	Other than the stated field of subject

Results and Discussion

The Capability Approach (CA) (*Figure 1*) is a framework developed by Amartya Sen and expanded by Martha Nussbaum to examine the factors affecting the well-being of individuals and communities, including inequalities in their distribution (Nussbaum, 2007; Randal et al., 2020; Sen, 2009). Aside from assessing wellbeing, CA serves as a tool for shaping and evaluating policies in both developed and developing nations (Robeyns, 2005), including examining whether students possess the opportunities and autonomy to achieve educational outcomes through internal and external factors (Hart, 2019). Capabilities refer to the real opportunities individuals have to achieve certain beings and doings, while functionings are the actual realizations of those opportunities.

In CA, resources alone are insufficient as individuals need to be able to convert them into achieved outcomes. This ability depends on personal, social, and environmental factors, known as conversion factors. Agency complements this process by representing the freedom and autonomy to decide which capabilities to transform into functionings (Robeyns et al., 2025; Unterhalter, 2020; Walker and Unterhalter, 2007; Robeyns, 2005).

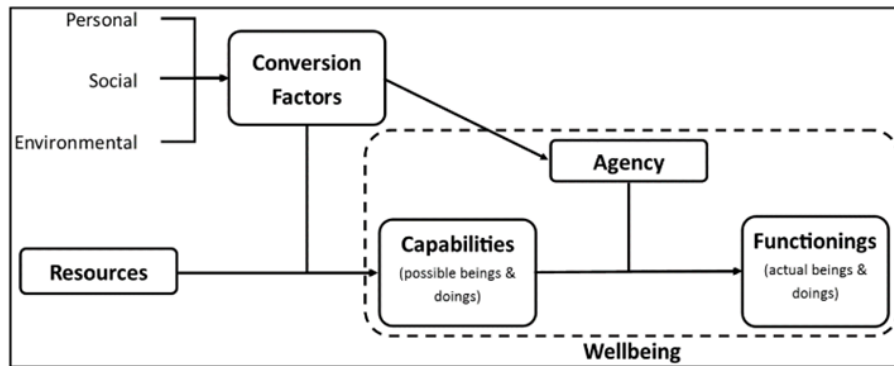


Figure 1. The capability approach framework.
 Source: Randal et al. (2020); Robeyns (2005).

Mobility as functioning

Functionings primarily encompass educational achievement (Okkolin et al., 2018), literacy in reading, writing, and communication, and education system effectiveness (Broderick, 2018), while mobility is primarily conceptualised as a capability (Sherriff et al., 2020; Ryan et al., 2019). Nevertheless, Vecchio and Martens (2021) critique this tendency, arguing that it emphasises the opportunity to be mobile while overlooking whether mobility provisions enable equitable participation in valued activities. Beyond logistics, mobility has significant implications for quality of life and social inclusion (Milbourne and Kitchen, 2014; Kolodinsky et al., 2013). Mobility encompasses both the ability to travel and the infrastructure and conditions that facilitate movement, which are shaped by physical, socioeconomic, and temporal factors that affect social groups unevenly (Zhao and Zhang, 2019; Shirmohammadli et al., 2016). As such, mobility is crucial in shaping students' well-being and academic performance (Ordóñez-Pacheco et al., 2024; Litman, 2016), however, the capabilities to achieve positive outcomes may differ for Indigenous students compared to other student groups. Recognising the significance of mobility in enabling inclusive school participation, this study conceptualises mobility as a functioning.

Resources

Sen (1985) advocated a paradigm shift from focusing solely on resources to considering actual opportunities to achieve a good quality of life. Resources alone may not guarantee functioning, but they serve as means to achieve it. In this regard, Hart (2019) highlighted that although school facilities exist, they must also accommodate students' needs to ensure maximum participation. Similarly, despite the provision of school transport for Indigenous students, absenteeism persists due to inaccessible pickup points and poor road conditions that constrain school access (Liao et al., 2025; Zamzuri et al., 2023; Nugin, 2020; Porter and Turner, 2019). This includes impassable

roads after rainfall, risking landslides (Dong et al., 2022). These highlight how resources are often compounded by conversion factors, hampering the capability to achieve functioning.

Accessibility as capabilities

Capabilities are essential for securing individuals' fundamental rights and freedoms. A central concern in the CA is determining which capabilities matter (Nussbaum, 2003; Robeyns, 2005). Accessibility becomes a crucial consideration when involving geographical and social injustices (Farrington and Farrington, 2005). This aligns with (Pereira et al., 2017), who describe accessibility as a "combined capability" that simultaneously reflects individual and environmental characteristics. Moreover, accessibility as capability is typically adopted in discussions of transport policy, particularly in relation to its individual components (Jehle et al., 2022; Pereira et al., 2017). As such, accessibility is essential for achieving satisfactory mobility to school among Indigenous students. However, achieving uniform accessibility across Indigenous settlements remains challenging due to varying geographical conditions and accessibility levels. Consequently, individual perceptions of accessibility become important in defining equity, as both concepts emphasise individual differences and varying abilities to achieve desired outcomes (Luz and Portugal, 2022). Accessibility also serves as a crucial indicator of spatial inequalities, reflecting how transport and infrastructural systems may privilege certain areas or groups while leaving others with limited access (Rodrigue, 2024).

Conversion factors

Social factors

Conversion factors shape the conversion of resources into capabilities to achieve beings and doings (Robeyns, 2005). In this study, social inequalities surrounding Indigenous students are conceptualised as social conversion factors. Berreman (2015) noted that social identities can perpetuate inequalities through the uneven distribution of advantages, resources, and opportunities among marginalised groups. As a minority and marginalised group, Indigenous students face compounded barriers to school access, particularly due to gender and economic pressures. Financial hardship may compel students to discontinue schooling to support household income, as many Indigenous families rely on agriculture and informal employment, often prioritising immediate economic needs over long-term educational goals (Ab Rahman et al., 2024; Singar and Zainuddin, 2017). Although school transport is provided free of charge, students still require financial resources for school-related expenses such as books, uniforms, and meals (Abu Hassan et al., 2023). Additionally, girls are found to face greater mobility restrictions and safety risks than boys. Long commutes, particularly along isolated routes, raise parental concerns, leading to hesitancy in allowing them to go to school (Porter and Turner, 2019). Boys are perceived as more capable of walking to school, reflecting varying social perceptions of commuting safety. This reflects how social norms operate as conversion factors, shaping who can realistically convert mobility resources into actual educational access (Molina-García et al., 2025).

Spatial factors

Indigenous students face a heightened risk of dropout, further intensified by the geographical and environmental conditions of their settlements (Ibourk and Raoui, 2025). A key concern raised by Indigenous teachers and parents relates to physical accessibility to school, particularly inaccessible and inconsistent transport services. Due to long travel distances, some students wake up as early as 5.30 a.m. to wait for school transport, which is often delayed or fails to arrive, discouraging school attendance. These challenges extend beyond mobility but affecting the quality of education, as students arrive at school tired and sleepy (Daud and Othman, 2025; Wan and Idrus, 2021). The topography between villages and schools also significantly influences educational access. Zhu et al. (2023), emphasize that increasing elevation and rugged road conditions may reduce school accessibility. Such geographical conditions affect the spatial configuration of roads by influencing where and how roads are constructed, potentially increasing the actual travel distance between students' homes and schools. These compounded spatial barriers highlight how the physical characteristics of the built environment shape access to capability-enhancing resources, demonstrating that geographical proximity alone does not necessarily ensure accessibility (Cooke et al., 2022), as topography and transport conditions also shapes access.

Conclusion

The Capability Approach provides a comprehensive framework for examining how resources and capabilities are influenced by conversion factors, ultimately affecting the attainment of functionings. This paper explores socio-spatial inequalities as conversion factors that affect accessibility and mobility functionings in Indigenous education. Mobility is typically measured through travel frequency, speed, and distance (Litman, 2016). However socio-spatial constraints produce differing levels of actual mobility (Zhao and Zhang, 2019; Shirmohammadli et al., 2016), making experiences of movement an important dimension in understanding mobility (Luz and Portugal, 2022; Hidayati et al., 2021). As noted by Marcuse, spatial injustices are rooted in broader social injustices, which inevitably possess a spatial dimension (Marcuse, 2009). Consequently, spatial justice is closely associated with equity and accessibility (Amorim et al., 2025; Zhao and Zhang, 2019). In this regard, equity analysis should consider opportunities that influence well-being (Lucas et.al, 2019), including access to safe and adequate mobility to school. As emphasized by (Nyamai and Schramm, 2023; Sheller, 2018; Pereira et al., 2017), justice should prioritise the mobility needs of vulnerable groups, making horizontal and vertical equity suitable approaches for intervention. Horizontal equity (HE) involves the equal distribution of resources, treatment, and opportunities among individuals with similar needs and abilities, while Vertical Equity (VE) concerns the distribution of resources, and opportunities according to different needs and abilities, particularly among socially disadvantaged groups (Litman, 2025).

In this regard, HE can ensure that Indigenous students with similar mobility needs receive comparable infrastructural and transport provisions (Litman, 2025). Specifically, a standardised transportation system integrating technologies such as GPS may provide real-time information on transport schedules, vehicle arrivals, waiting times, and service disruptions, thereby improving service reliability and reducing unnecessary waiting times (Henriquez-Jara et al., 2025). It may also keep parents informed about their children's journeys to school, reducing concerns on unsafe travel,

particularly over long distances. Nevertheless, inadequate transport services must still be addressed through regular monitoring and evaluation of service accessibility, regularity, and adequacy (Zamzuri et al., 2023; Kamarudin and Mohd Said, 2022).

Meanwhile, VE can complement these efforts by ensuring that students constrained by social barriers receive additional support to access education. This may be achieved through community involvement and participatory approaches in policymaking and mobility planning. Incorporating Indigenous students' perspectives on their mobility experiences and needs enable more tailored strategies while fostering inclusion and well-being (Chatterjee, 2018). Meanwhile, community involvement can also be strengthened through initiatives that encourage school attendance. This includes providing financial assistance for low-income families to support educational needs such as school uniforms and books, in addition to the government's Rancangan Makanan Tambahan (RMT) initiative, which provides supplementary meals for students from low-income households. Furthermore, in areas with restricted accessibility, the government could introduce financial incentives for parents who transport their children to pickup points or directly to school.

Implication and limitation

By conceptualizing mobility as a functioning within the CA, this study reframes Indigenous school attendance as not just an issue of accessibility, but also as a matter of students' mobility to school. The study further integrates socio-spatial inequalities as factors influencing students' access to equitable educational mobility, thereby providing a conceptual basis for discussions on the CA and educational mobility. This framework may also inform policymakers and relevant stakeholders, including the Ministry of Education Malaysia (MOE), Department of Orang Asli Development (JAKOA), and transport providers, in developing more context-sensitive policies and mitigation strategies. As this paper adopts a theoretical approach to examining the socio-spatial inequalities affecting Indigenous children's mobility to education, it does not incorporate empirical data. Consequently, the practical application of the proposed framework may be limited in fully capturing the lived mobility experiences of Indigenous children. Future research may extend this theoretical synthesis by integrating CA into empirical studies on mobility to education, particularly within rural settings.

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Conflict of interest

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