



Rural knowledge practices and engineering study: A case study from South Africa

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ABSTRACT

CONTEXT

Rurality is a complex phenomenon that can be understood as both a demographic and social category that intersects with other categories, such as race, gender, and social class. Success on the part of students from rural backgrounds requires that HEIs recognize and value the knowledge practices that these students bring to their experiences of higher education. The term 'knowledge practices' refers to the knowledge gained from social, cultural, ecological and epistemological activities.

PURPOSE OR GOAL

This paper seeks to understand the knowledge practices – pertaining specifically to mathematics, science, and language – that a sample of engineering students from rural backgrounds brought with them from their rural contexts. The paper reflects on how these knowledge practices are deployed within engineering teaching and learning.

APPROACH OR METHODOLOGY/METHODS

Data was collected within an interpretive, qualitative, case study design. The case under investigation is a faculty of engineering at an HEI in South Africa. Eight second-year engineering students from rural areas were purposively sampled. These students participated in a three-part data collection process, including the development of 'digital documentaries', individual interviews, and a focus group discussion. The qualitative data was coded using Atlas.ti and analysed thematically.

OUTCOMES

The knowledge practices that rural students develop through their upbringing include, for example, practices such as estimation, knowledge pertaining to the natural environment, and communication. However, these knowledge practices are not adequately recognized or employed within their engineering studies, even by the students themselves.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

Alternative forms of knowledge remain unrecognized within higher education, such that even many of those who possess such knowledge fail to recognize its value. Identifying ways of recognizing traditional knowledge systems may serve to enrich engineering curricula and enhance rural students' learning.

KEYWORDS

Engineering education; rurality; knowledge practices.

Introduction

Higher education has succeeded in attracting greater diversity of students in recent decades, with increasing enrolment on the part of students of colour, women, students with disabilities and students from working-class and rural backgrounds. However, physical access to higher education institutions has not necessarily translated into what Morrow (2009) calls epistemic access. Such access requires that students are enabled to become epistemic contributors (Fricker, 2015), which requires that opportunities are created for students to deploy the skills, knowledges, and experiences they have acquired prior to entry into higher education. Nonetheless, evidence from several studies on rurality in South Africa and elsewhere indicates that the voices, perspectives and practices of university students from rural backgrounds remain ignored (Walker and Mathebula, 2020; Naidoo, Traher, Lucas, Muhuro and Wisker, 2020).

Given this, the present study seeks to investigate the knowledge practices that rural students bring with them to their experience of engineering education, specifically, by answering the following research question: what knowledge practices related to their chosen discipline do engineering students from rural contexts bring with them to higher education? The remainder of this paper is structured such that it begins with more detailed discussion of the issue of rurality in higher education, before positioning knowledge as a social practice. The research design employed is then presented, before the results obtained – pertaining to the mathematical, scientific and literacy-based knowledge practices of a group of engineering students – are discussed.

Rurality and Higher Education

Rurality is a contested and complicated concept (Sauvageot and da Graça, 2007), that has been variously defined in relation to factors such as population density, settlement size, economic factors, and landscape. More importantly for the purposes of this study, rurality is often constructed as 'backward' or lacking modernity (White and Corbett, 2014). But, locating rurality on the negative end of an assumed binary, far removed from notions of sophistication, technological advancement, and cosmopolitanism (Cuervo and Wyn, 2012), denies rural populations recognition of their own strengths and values. This has implications for the way rurality is treated within higher education.

Walker and Mathebula (2020) show that rural students come from backgrounds with specific values and socio-cultural systems and, as such, their experience of higher education may differ from that of urban students. Their study suggests that there is a gap between the sociocultural practices of rural students and those of higher education institutions. This gap manifests in spatial inequalities of access to higher education (Mgqwashu, 2019), which in turn manifest in several barriers to university enrolment and persistence for students from rural areas. These barriers may (but do not always) include socio-economic status, family and community attributes, personal contexts, educational aspiration and attainment, lack of financial support and academic preparedness.

However, students from rural backgrounds are brought up in a rich cultural world, and they learn skills and knowledge that go unacknowledged within university contexts (Mgqwashu, Timmis, de Wet and Madondo, 2020). According to Cross and Atinde (2015), students from rural backgrounds come to university with well-developed mechanisms and strategies that enable them to cope with challenges. These strategies emerge from their lives in rural communities. As such, exploring the learning of engineering students from rural backgrounds requires exploration of their prior learning and already-developed knowledge practices. This necessitates consideration of knowledge as a social practice.

Knowing as a Social Practice

This research is based on a practice-theory perspective. One of the leading proponents of practice as a theoretical construct is Schatzki (2001:11), who views practices as “embodied, materially mediated arrays of human activity, centrally organised around shared practical understanding”, which implies that they are purposeful, rule-governed and value-laden. Using this theory enables us to consider the possibilities of knowledge equity, mutual engagement and an ecology of knowledges. In the practice sense, all knowledge is situated as it is contingent upon on the contexts and practices that surround it. Practices are ‘social’ insofar as they are recontextualised – and regulated – in specific contexts (Van Leeuwen, 2008). This means that some social practices, such as those of the family unit, might not be proceduralised or tightly sequenced, when compared to other social practices, such as those of the schooling system, which offer less opportunity for resistance and reconfiguration (Van Leeuwen, 2008).

Moreover, the view that knowledge is a social practice underpins this study and refers to the contention that knowing is inherent in action (Ryle, 1949; Polanyi, 1967). This means that knowledge is implicit in social action and embedded in social practices. This point has been made by several authors, albeit in different terms. In line with a practice-theory perspective, Lave (1988) argues that knowing in practice is continuously enacted through individuals’ everyday activities, and Hutchins (1991) suggests that cognition is culturally situated within social activity. To argue, then, that knowledge is a social practice is to contend that knowledge is socially configured in particular contexts. Indeed, as Foucault (1977) argues, socially-constructed knowledge emerges in specific social contexts in ways deemed appropriate to those contexts, where some contexts (such as higher education) have strongly institutionalised procedures for knowledge generation.

It is important to note, however, that this does not mean that knowledge is fixed. Individuals reconstitute knowledge over time and across contexts and, in this way, knowledge shifts as practices shift (Lave, 1988). As individuals develop new practices – and new ways of engaging with the world – knowledge is recontextualised (Chouliaraki and Fairclough, 1999). Such recontextualization requires that existing knowledge is either excluded, included or given greater or lesser prominence (Fairclough, 2003). The notion of recontextualization also allows for recognition that ‘everyday’ concepts and ‘theoretical’ concepts exist alongside one another in what Guile (2010) calls a sphere of reason. Given this, the focus of the present study is on the extent to which the knowledge that students from rural areas bring with them – as emergent from the myriad social activities in which they have engaged during their upbringing – is able to be recontextualised within higher education through processes of inclusion, rather than exclusion.

In line with the view of knowledge as a social practice, different knowledge practices shape the histories and trajectories of students from rural backgrounds as they enter into higher education. In South Africa, as elsewhere in the world, historical inequalities have led to inequalities in access to the processes of knowledge production. This has led to calls to ‘decolonise’ higher education curricula, given that western knowledge has marginalised alternative forms of knowledge (Leibowitz, 2017). This process – which De Sousa Santos (2014) refers to as epistemic injustice – has prompted calls for cognitive justice and the equal recognition of all forms of knowledge (Leibowitz, 2017).

As such, the concern of this paper is with how knowledge is embedded in students from rural backgrounds’ everyday activities, and the social and physical contexts in which these activities take place. Doing so is a first step towards understanding how universities can open up – or not – opportunities for this knowledge to be recontextualised. Rural communities engage in unique practices that reflect particular values and sociocultural systems (Cross and Atinde, 2015). The challenge facing rural students is that there is a gap between the practices, values and systems that underpin rural life and those that underpin

higher education. There is thus a need to consider how different knowledge practices can be incorporated into higher education classrooms.

Research Design

Because knowledge, as a social practice, is contingent upon the social contexts in which it is generated and deployed, the focus of this study is on the discipline of engineering, specifically. The goal of the research was to uncover the particular knowledge practices that engineering students from rural areas bring with them to their experience of engineering education – and the extent to which these knowledge practices might be deployed in service of learning engineering. The study is interpretive in nature as it attempts to understand engineering students' situated, personal experiences with rural and university-based knowledge practices. In line with an interpretive paradigm, the study adopts a qualitative research design, as it aims for in-depth understanding rather than generalizable findings.

Given the use of qualitative research, the sample selected for this study is small in scale and participants were purposively selected. In total, eight engineering students from rural backgrounds participated in this research project. These participants all reported that they were the first in their families to attend university and that, prior to entry into university, they lived and attended school in rural areas in South Africa. The participants took part in three data collection activities.

First, the participants prepared digital documentaries. Digital documentaries, or digital stories, consist of video and photos with voice-over narration, and are used within research to stimulate self-reflection on the part of participants (Mikhailovich, Pamphilon and Chambers, 2015), and allowed researcher-access to the participants' rural communities in a way that was not invasive and gave the participants the power to decide what – and what not – to share with the researchers. The participants' digital stories were used to capture their 'material culture' and included records of their rural spaces, families, schools, churches. Some also depicted narratives of rural life and livelihoods.

The digital stories were analysed in themselves, but were also used to elicit discussion during the subsequent semi-structured interviews held with the participants. Each participant was interviewed once, for a period of 40 to 60 minutes. The focus of the interviews was on what had been presented in the digital stories, but also on the participants' experiences and trajectories at university. In particular, attention was given to uncovering the participants' knowledge practices brought from their rural backgrounds.

Finally, a focus group was held with five participants (five attended, though all participants were invited). A focus group was held, in addition to individual interviews, given Morgan's (2001) assertion that group interaction can draw out similarities and differences, providing rich information about a range of perspectives and experiences, thus strengthening the triangulation of the research. For the focus groups, participants were asked to bring learning artefacts from their studies and were asked to speak to the artefacts in terms of their personal relevance and practical value. Thereafter, participants were asked to draw a picture, depicting activities and practices that they considered indicative of their rural communities. Participants were then invited to explain and discuss their individual pictures.

The interviews and focus group discussions were audio-taped and transcribed verbatim. Thematic analysis was then undertaken on the data using Atlas.ti. The digital documentaries were collected as part of a larger research project and permission was obtained to use these. In addition, all the participants gave informed consent for their participation in this research. During the research, trustworthiness (Lincoln and Guba, 1985) was enhanced by using multiple data collection methods, as well as member-checking, in that all participants were sent transcripts of their individual interviews as well as of the focus group discussion, and were asked to raise any concerns they had with these transcripts. As is the norm in qualitative research, trustworthiness is also enhanced by providing verbatim extracts from and 'thick description' (Ryle, 1949) of the data collected in the reporting of findings. The use

of computer-assisted qualitative data analysis software further contributes to the trustworthiness of this research.

Knowledge Practices Related to Mathematics

Mathematics is “a kind of cultural knowledge, which all cultures generate but which need not necessarily look the same from one cultural group to another” (Bishop, 1988: 180). McMurchy-Pilkington (1995) has previously explored the mathematical thinking and reasoning skills that Māori adult learners draw on in their everyday cultural practices and argues that mathematics activities are culturally and socially organized. This is demonstrated in the present study, in which the participants demonstrate awareness of and engagement in a variety of mathematics practices within their rural communities.

Some of them had personal engagements in these practices. For example, the participants indicated that they were taught counting systems and estimation but that the act of counting involved more than simply arriving at a ‘total’, in that it was tied to intricate knowledge of the livestock being counted. Jabali explains:

When you open the gate ... you know five cows, five goats out five goats must come back you understand and you sort of like you know your goats because the goats are not like the same white one, black and white.

According to Matemba and Lilemba (2015), traditional counting systems, including counting of livestock, apply a holistic approach that situates objects within a greater whole. As such, in the rural communities in which the student-participants grew up, counting was not inculcated as a context-free, value-neutral enterprise; instead, it involved broader social values, knowledges and practices. As such, the use of counting reflects the situated nature of (mathematical) practice.

This enables rural communities to use mathematical practices to solve everyday challenges they encounter, especially through the use of estimation. There exists a tension in this regard: at university, particularly in engineering, priority is given to obtaining exact answers to problems whereas in real-world contexts, particularly those characterized by rural livelihoods, estimation is the norm. Jabali, again, explains:

The thing is at university, its more or less like a program, somebody already program that these are the steps that you need to take to get to this point. Whereas in the rural areas, it's a program but you are allowed to participate by editing the program. I don't know if that makes sense. There is no fixed structure. Your input can make a lot of change. And you are not limited to whatever that is already been there, you can change. Say maybe, they used to feed the cows that side, you can use the other side. To put fertilizer in the garden we don't measure exact we just estimate. See it's not fixed. You can do what they are doing but with more options to choose from.

Jabali here recognizes that the ways of solving problems and engaging in social practice are functionally different in his rural home and academic disciplinary contexts.

But Jabali's comments also demonstrate that out-of-school mathematics practices are not legitimated within the university. In his comments, there is a sense of alienation and powerlessness, in that ‘somebody’ has already ‘programmed’ what needs to be done, and that people from rural areas can do what ‘they’ are doing. “In the rural areas”, according to Jabali, “you are allowed to participate” – as opposed to higher education where, by implication, participation is limited.

A finding of this research is that the student-participants found it quite difficult to relate what they are learning at university to their rural backgrounds, resulting in a sense of alienation. This lack of connection between knowledge from rural backgrounds and new knowledge in the university needs to be problematized. The comment from Jabali above reflects a deeper social representation that denies status to the mathematical practices of socially and economically marginalized groups. This may have implications for personal self-esteem,

cultural identity, and construction of mathematical meaning. As Gerger (2014) argues, valuing traditional numeracy practices will make students aware that they already possess significant numeracy skills, strengthening their self-esteem, and increasing motivation for learning.

Knowledge Practices Related to Science

The student-participants had similar difficulty in identifying scientific practices in their rural communities. This was surprising given that rural communities systematically engage in forms of science as they engage in subsistence activities. These activities require sophisticated knowledge of natural processes, plants, animals, and materials. Knowledge practices related to traditional healing and medicine were commonly mentioned by the student-participants. For example, Jane states that:

My great grandparents were traditional healers, so they passed the knowledge to my granny. So her knowledge about the traditional medication of how to prepare them, it motivated me a lot in life sciences...because she was the one who nurtured me. I spent a lot of time with her and that's how I got motivated in life sciences because I wanted to know more based on what I have learnt from home.

Such statements demonstrate how ethnobotanical knowledge is embedded in rural communities' cultural and religious life (Berkes, 2012). According to Lave (1991), people come to understand themselves in relation to their natural environment by organizing their knowledge of flora and fauna to enhance their lives. Although rural students are knowledgeable about these traditional cultural practices, there was little evidence that these were seen as resources within the higher education environment.

A notable exception to this is the role of rural knowledge practices in preparing students for the notion of engineering design. For example, Ken argues that a certain aspect of his rural upbringing prepared him for engineering design:

Yes, when I grew up, we used to make cars, small cars using bricks we used to just yah make some small houses there then used the bricks to play there yah that kind of the things so yah we learn how to actually try to if I can say in engineering there is something that we called, we design yah so that kind of a thing you know.

Similarly, Sef contends that:

I used to play with my friends...we used to have everything organized... Yeah so many times we will build this kind of a house for ourselves like for parents, we would have another one for babies. We used card box to build, that kind of inspired me to be a designer (laughs) like I always wanted to plan.

By and large, however, the students constructed their rural upbringing as a disadvantage. For example, Terry states that:

Sometimes they teach about some events you have never heard of, they teach you about casinos... but you have to imagine them. Sometimes they give you examples you do not relate... in rural areas, we are not exposed to a lot of stuff...and they expect us to have experienced such things. So when it come to the examples they give, that's where they kill us.

In this case, not only are the unique knowledge practices of rural students ignored, but dominant, urban practices are privileged to the detriment of some students in the class. It is perhaps for this reason that, in the focus group session held with the students, Paul, with much agreement from his fellow student-participants, describes his experience as follows:

It's like when you go to war, you go with your tools. But when they are useless its automatically that you will struggle. Almost everyone brought everything but in most part it failed because of this environment that we are not familiar with.

This is indeed tragic as, if given the necessary support and recognition, students from rural backgrounds can and should be able to recontextualize their knowledge practices at university, the possibility of which is highlighted in the above comments by Ken and Sef,

pertaining to engineering design. However, this is not possible if these knowledge practices – derived from personal experiences, elders, parents, neighbours, and peers, and constituting the ‘lived texts’ of students’ upbringing – are de-valued in the higher education context.

Knowledge Practices Related to Language and Literacy

The development of mathematical and scientific knowledge is underpinned by language and literacy skills. This is well-argued by Kate, one of the participants in this research:

For me science is mostly its derived from Latin...everything seems foreign. Some of the words you can't even translate them into your own language. So that thing of linking what I know from home and what I am learning here it's not that easy. We constantly have to go and research.

Here, Kate identifies the fact that language presents a significant challenge to rural students, particularly in a multilingual environment such as South Africa. Most rural students are expected to adopt English as a medium of instruction upon entry into higher education. As Jabali describes, their struggle is not because they do not *know* but because they struggle to understand the language:

There is little or no interaction between the lecturers in university because of the language of communication, sometimes you don't get the terminology but when things are expressed in your language that's when you understand better, I personally struggle with understanding academic papers we have to study. This causes poor performance.

A particularly lucid example of how language barriers serve to conceal traditional forms of knowledge – in this case related to science – is provided by Kate:

It's the vocabulary or the objects that sometimes they make examples with that I never heard of before. Like in first year when I was doing my introduction to engineering there was this thing that you were to design it's called bio-mass; I was not familiar with those words. So it was kind of too much work for me I had to do research about it only to find that it is something that I know. So sometimes we don't get the concept because we are not familiar with those words.

However, the data collected for this research shows the wealth of linguistic resources that rural communities draw from; these emerge in a variety of contexts, including homes, church services, children’s play, conversations on the street, community gatherings, agricultural work, festivities, and rituals. Literacy learning is intricately tied to social contexts (Barton and Hamilton, 2000), and literacy development in the rural communities of the student-participants corresponded to specific social roles. As Jane shares:

And then you just gather as a community you dance those rituals dancing and then you sing if you're a singer and then there were some troops... they play these drums. Yah... and then there will also be other chiefs who also come and then they will also share their stories and then they also give motivations for the youth.

This richness highlights a need for hybrid literacy practices (Hornberger, 2005) within higher education that provide students with opportunity to deploy their rich linguistic resources and, in so doing, connecting their sociocultural backgrounds to learning at university. Archer’s work on symbolic objects and academic literacy in an engineering context (2008, 2009, 2010) is a useful example of how this might be achieved. This work demonstrates that lecturers need to create opportunities for students “to use their cultural knowledge, speech practices, communicative genres, and diverse ways of engaging text” (de la Piedra, 2006: 402) in order to create enabling spaces that enhance learning, especially for students from rural backgrounds.

Conclusion

The generation of knowledge is profoundly situated and relational, involving power and social relations. It is therefore important to understand how universities open up or limit possibilities

for students from rural contexts in ways that either augment or alleviate inequalities in educational access and achievement. In this paper, a practice-theory perspective allows us to reject the implicit view of engineering knowledge as objective, neutral and value-free. In many cases, as shown in the findings of this research, the values and practices that emerge out of the realities of students from rural backgrounds, often go unrecognized and unutilized in their formal learning. This is problematic, as opportunities should be created to enable these students to recontextualize their knowledge practices at university.

The notion of situatedness of knowledge highlights the importance of shared historical and social resources in sustaining mutual engagement across diverse participants with diverse experiences in diverse contexts. A dialogic approach to pedagogy in engineering education may better acknowledge and legitimize diverse forms of knowledge. Subject content can be presented in a way that reflects the familiar lived experiences of a range of diverse students (including those from rural backgrounds). Indeed, language and literacy are crucial to such endeavors: as Mamdani (2019: 26) argues, “if you want to access a different intellectual tradition, you have to learn the language in which the tradition has been historically forged”. We argue that the corollary of this is also true: that if we want to recognize and give value to rural knowledge practices, we need to recognize and give value to the linguistic traditions and literacy practices through which these too have been forged.

This may involve a shift away from the view of engineering as a hierarchical and singular discipline and towards expansion of disciplinary boundaries and greater epistemological diversity. Creating spaces for a plurality of knowledges may enhance educational access and achievement (De Sousa Santos, 2014). This paper has attempted to understand rural students’ knowledge practices and the extent to which these practices aid students in their learning within engineering education. Unfortunately, it would appear, as was perhaps to be expected, that curricula, teaching and learning and assessment in higher education do not adequately recognize and give value to traditional ways of knowing. The student-participants in this study struggled to identify specific knowledge practices that they drew on in their engineering studies, despite numerous prompts to allow them to do so. This illustrates the extent to which alternative forms of knowledge remain unrecognized in higher education in that even those who possess such knowledge struggle to recognize its value. Nonetheless, there is some evidence that these knowledge practices may assist in engineering education, in particular in the form of estimation and engineering design. How these knowledge practices might be incorporated into the engineering curriculum is beyond the scope of the present paper – but offers rich potential for future research and pedagogical efforts.

References

- Archer, A. (2008). Cultural studies meets academic literacies: Exploring students’ resources through symbolic objects. *Teaching in Higher Education*, 13(4): 383-394.
- Archer, A. (2009). Invisible landscapes: Students’ constructions of the social and the natural in an engineering course in South Africa. *Social Dynamics*, 35(2): 258-275.
- Archer, A. 2010. Shamanism and science: Curriculum as reciprocal and transformative. *Education as Change*, 14(1): 61-75.
- Barton, D., & Hamilton, M. (2000). Literacy practices. In D. Barton, M. Hamilton, & R. Ivanič (Eds.). *Situated literacies: Theorising reading and writing in context* (pp. 7-15). London: Routledge.
- Berkes F. (2012). *Sacred ecology*. New York: Routledge.
- Bishop, A. (1988). *Mathematical enculturation: A cultural perspective on mathematics education*. Dordrecht: Kluwer.
- Chouliaraki, L., & Fairclough, N. (1999). *Discourse in late modernity: Rethinking critical discourse analysis*. Edinburgh: Edinburgh University Press.

- Cross, M., & Atinde, V. (2015). The pedagogy of the marginalised: Understanding how historically disadvantaged students negotiate their epistemic access in a diverse university environment. *Review of Education, Pedagogy, and Cultural Studies*, 37(4), 308-325.
- Cross, M., & Ndofirepi, A. (2017). *Knowledge and change in African universities, Volume 2: Re-imagining the terrain*. Rotterdam: Sense Publishers.
- Cuervo, H., & Wyn, J. (2012). *Young people making it work: Continuity and change in rural places*. Carlton, Victoria: Melbourne University Publishing.
- de la Piedra, M. T. (2006). Literacies and Quechua oral language: Connecting sociocultural worlds and linguistic resources for biliteracy development. *Journal of Early Childhood Literacy*, 6(3), 383-406.
- de Sousa Santos, B. (2014). *Epistemologies of the south: Justice against epistemicide*. London: Routledge.
- Fairclough, N. (2003). *Analysing discourse and text: Textual analysis for social research*. London: Routledge.
- Foucault, M. (1977). *Language, counter-memory, practice*. Oxford: Basil Blackwell.
- Fricker, M. (2015). Epistemic contribution as a central human capability. In G. Hull (Ed.), *The equal society* (pp. 73-90). Cape Town: UCT Press.
- Gerger, E. (2014). Implications of social practice theory for the development of a numeracy programme. *ALM International Journal*, 9(2), 85-96.
- Guile, D. (2010). *The learning challenge of the knowledge economy*. Rotterdam: Sense.
- Hornberger, N. (2005). Biliteracy. In R. Beach, J. Green, M. Kamil, & T. Shanahan (Eds.), *Multidisciplinary perspectives on literacy research* (pp. 319-347), Cresskill, NJ: Hampton Press.
- Hutchins, E. (1991). Organizing work by adaptation. *Organization Science*, 2(1), 14-39.
- Lave, J. (1988). *Cognition in practice*. Cambridge: Cambridge University Press.
- Lave, J. (1991). Situating learning in communities of practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 63-82). Washington, D.C.: American Psychological Association.
- Leibowitz, B. (2017). Power, knowledge and learning: Dehegemonising colonial knowledge. *Alternation*, 24(2), 99-119.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Mamdani, M. (2019). Decolonising universities. In J. D. Jansen (Ed.), *Decolonisation in universities: The politics of knowledge* (pp. 15-28). Johannesburg: Wits University Press.
- Matemba, Y. H., & Lilemba, J. M. (2015). Challenging the status quo: Reclaiming indigenous knowledge through Namibia's postcolonial education system. *Diaspora, Indigenous, and Minority Education*, 9(3), 159-174.
- McMurphy-Pilkington, C. (1995). Mathematical activities of Māori women in a Marae kitchen: Ina Te Mahi He Rangatira. Paper presented at the History and Pedagogy of Mathematics conference, Cairns, Australia.
- Mgqwashu, E. M. (2019). Education for public good in the age of coloniality: Implications for pedagogy. *Journal of Decolonising Disciplines*, 1(1), 64-68.
- Mgqwashu, E. M., Timmis, S., de Wet, T., & Madondo, N. E. (2020). Transitions from rural contexts to and through higher education in South Africa: Negotiating misrecognition. *Compare: A Journal of Comparative and International Education*, 50(7), 943-960.
- Mikhailovich, K., Pamphilon, B., & Chambers, B. (2015). Participatory visual research with subsistence farmers in Papua New Guinea. *Development in Practice*, 25(7), 997-1010.
- Morgan, D. L. (2001). Focus group interviewing. In J. F. Gubrium, & J. A. Holstein (Eds.), *Handbook of interview research: Context and method* (pp. 141-159). London: Sage.

- Morrow, W. (2009). *Bounds of democracy: Epistemological access in higher education*. Cape Town: HSRC Press.
- Naidoo, K., Trahar, S., Lucas, L., Muhuro, P., & Wisker, G. (2020). 'You have to change, the curriculum stays the same': Decoloniality and curricular justice in South African higher education. *Compare: A Journal of Comparative and International Education*, 50(7), 961-977.
- Polanyi, M. (1967). *The tacit dimension*. New York: Doubleday.
- Ryle, G. (1949). *The concept of mind*. Chicago: University of Chicago Press.
- Sauvageot, C., & da Graça, P. D. (2007). *Using indicators in planning education for rural people: A practical guide*. Paris: International Institute for Educational Planning (IIEP), UNESCO.
- Schatzki, T. (2001). Introduction. In T. R. Schatzki, K. Knorr Cetina, & E. von Savigny (Eds.). *The practice turn in contemporary theory* (pp.1-14). London: Routledge.
- Van Leeuwen, T. (2008). *Discourse and practice: New tools for critical discourse analysis*. Oxford: Oxford University Press.
- Walker, M., & Mathebula, M. (2020). Low-income rural youth migrating to urban universities in South Africa: Opportunities and inequalities. *Compare: A Journal of Comparative and International Education*, 50(8), 1193-1209.
- White, S., & Corbett, M. (2014). *Doing educational research in rural settings: Methodological issues, international perspectives and practical solutions*. New York: Routledge.

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