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Reflecting on a community of practice for engineering education research capacity in Africa: who are we and where are we going?

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ABSTRACT

The Engineering Education Research Network in Africa (EERN-Africa) was created to enable connections between practitioners and researchers with a shared interest in African engineering education contexts. Recognising the importance of developing an African voice in the engineering education research space, the EERN-Africa community has interacted in a dynamic and dialogic way with our own teaching and research practices across diverse African contexts, with an ethical commitment to democratic and inclusive community-building. The objective of this paper is to reflect on the current status of the Community of Practice (CoP), and the challenges and opportunities in sustaining and growing the CoP. A collaborative analysis of perspectives on this emerging identity is presented, using an Appreciative Inquiry (AI) methodology and drawing on collective written reflections and discussions. Six broad themes on the value that the CoP has for both individuals and the group were identified: networking, capacity development, emotional support, impact on professional identity, social and environmental impact, and breaking borders. This paper contributes an approach for collaborative capacity-building in EER through a virtual CoP, underpinned by the spirit of *ubuntu*.

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1. Introduction

> I knew [engineering education research] was a noble cause to pursue for a positive impact in engineering education but [I] lacked an active network for intentional collaboration. (Irene)

African engineering educators who are curious about understanding and improving teaching and learning practices often feel isolated in technically-focussed departments. Although internationally there is increased recognition that effective education requires sustained attention and research (Winberg et al., 2018), until recently, few institutions in Africa have recognised this as a valid research focus in engineering. The result of this lack of capacity for engineering education research (EER) is that many African educational innovations are not represented in the research literature (Wolff et al., 2022, Inglis and Matemba, 2021). African engineering education teachers and researchers are thus informed by studies from elsewhere in the world, and find themselves seeking support from colleagues from different educational contexts to develop their educational expertise. These experiences are not unique to Africa. Writing from Australia, Dart, Trad, and Blackmore (2021, 1083) also note that new researchers are inhibited by institutions which may be 'ambivalent or even hostile' to EER. Rodrigues, Paul and Cicek (2021) identified the importance of a supportive community as part of the transition to EER. Despite these similarities, it is important to note that EER as a research discipline has developed different contours in distinct global regions, pointing to the importance of national and regional communities (Borrego and Bernhard 2011, Cao et al. 2021, Klassen and Case, 2022).

The Engineering Education Research Network in Africa (EERN-Africa) was conceived in 2020 to:

(1) Enable connections and conversation between practitioners and researchers with a shared interest in engineering education in African contexts;
(2) Build capacity for research in engineering teaching and learning;

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(3) Provide research-based solutions to engineering education problems that are applicable to African contexts, including matters of curriculum, teaching and learning, assessment and accreditation; and
(4) Increase representation of African perspectives of engineering education practice in the international literature.

The first members of EERN-Africa established a WhatsApp group, which continues to serve as the main mechanism for introducing new members and communication. Through word-of-mouth referrals at engineering education events, new members joined, including both emerging and established researchers in engineering education, and engineering education practitioners. The members engage with each other in monthly online meetings and share information in an online repository. The interactions aim to strengthen education practices and research through a range of conversations, projects and partnerships. EERN-Africa currently includes more than 100 members from 21 African countries, as well as members from the African diaspora and international allies. Through its members, EERN-Africa is linked to other African and international institutions such as the African Engineering Education Association (AEEA), the Research in Engineering Education Network (REEN), the South African Society of Engineering Education (SASEE), and the World Engineering Education Forum (WEEF). Interactions between members with diverse expertise and differing levels of institutional support, and between local, national and global networks are similar to the 'bottom-up' development of EER in the Nordic countries (Edström et al. 2018, 219).

EERN-Africa is a network representing multiple perspectives and dialogues, which has developed into a purposeful Community of Practice (CoP). At its most basic level, a CoP refers to a group formed with the purpose of sharing knowledge or experience (Hoosen, 2009). Wenger, Trayner and de Laat (2015) see communities and networks as two complementary aspects of the social fabric of learning rather than separate structures. To provide a distinction, Wenger (1998) notes that a CoP is 'about' something, rather than just a set of relationships. It has an identity as a community and shapes the identities of its members (Ibid.). Lave and Wenger (1991) characterise a CoP in terms of three fundamental elements: a *domain* (a common interest), a *community* (people with commitment to the domain) and a *shared practice* (collective learning through joint activities, discussions, information sharing and helping each other). A CoP is not a closed community and allows members to participate in different ways and capacities. Its permeable periphery creates opportunities for members to learn from each other, with newcomers engaging in practice in concrete terms and core members gaining new insights from contact with less-engaged participants (Wenger, 1998).

Gray (2004) argues for the benefit of an online community for geographically dispersed educators, leveraging social interaction and story-telling to drive informal learning, develop individual identity, and construct a collective identity. Chalmers and Keown (2006) point out that the technological convenience of online engagement does not remove the need to intentionally build community for effective professional development. Van Laren and Mudaly (2012) use shared reflection to explore the contribution of a CoP in shifting academic educator identity and assisting in crossing disciplinary boundaries, while Jita and Mokhele (2013) note the importance of a CoP in allowing teachers to develop a researcher identity. EER Communities of Practice have been intentionally created to offer support, debate, collaboration and action that allows for capacity building, identity formation, and improved teaching (Streveler, Smith and Miller, 2005). Structured communities of practice designed to develop capacity for newcomers into EER as well as proposed conceptual frameworks to facilitate their development are commonly reported (e.g. Mann and Chang, 2012, Adams et al. 2014, Dart, Trad, and Blackmore 2021). However, literature on EER capacity is still lacking when it comes to representing broader contexts where EER activities are not recognised or supported.

This paper reflects on the emergence of EERN-Africa as a CoP. EERN-Africa has developed organically, with an ethical commitment to develop a distinctive, democratic and inclusive African community. This resonates with Hlatshwayo and Shawa's (2020) drawing on *ubuntu currere* to encourage dialogue between multiple epistemologies and stakeholders. Using collaborative reflection as a methodological approach (Czerniewicz et al. 2020) in the mode of Appreciative Inquiry (AI) (Reed, 2006), the objective of this paper is to reflect on the current status of the Community of Practice, and the challenges and opportunities which will impact on sustainability going forward. These shared negotiations of individual and collective identity contribute to an 'understanding of the diversity of traditions ... and regional variations that influence EER" (Borrego and Bernhard 2011, 38), and to an acknowledgement of the 'collective work of knowledge producers' in our diverse knowledge spaces (Turnbull, 1997, 553).

The main contribution of this paper is to present an approach for collaborative EER capacity-

building through a CoP which is inclusive, encourages broad stakeholder engagement, and does not require a formal structure or institutional resources. In a region where EER is often not recognised as a valid engineering research discipline, and where people are isolated both within their institutions and by large geographic distances, EERN-Africa has built a sustainable and engaged community using virtual tools, in which we learn together and build capacity through collaboration and experience-sharing.

2. Conceptual and methodological framework

The Community of Practice framework (Wenger, McDermott and Snyder, 2002) is used to analyse EERN-Africa as a distinct social structure of interaction and learning. Positioning EERN-Africa as the structure locates the *domain* as engineering education; the *shared practice* as discussion around teaching and learning practices and related research; and the *community* to include engineering education researchers and practitioners. Wenger's (1998) early analysis identified five different stages of development of a CoP, growing from *potential* through *coalescing* to *active*, and then declining to *dispersed* and *memorable*. We adapted Wenger's (1998, 3) visual conceptualisation of the stages of development, using the first three stages (*potential*, *coalescing* and *active*, to understand how member participants experience EERN-Africa as a whole.

The challenge of establishing a community is that it requires sustained identification and engagement over time (Wenger, Trayner and de Laat, 2015), as well as the negotiation and renegotiation of reasons to learn together, help each other, follow up on ideas, develop shared resources, and sustain a social space for learning. This is a process that takes time and commitment (Ibid.). We used Wenger-Trayner and Wenger-Trayner, (n.d) model of levels of participation (core, active, occasional, peripheral and transactional) to investigate members' sense of ownership in EERN-Africa.

Appreciative Inquiry (AI) is used to discover existing strengths through a reflective process (Reed, 2006), with a focus on identifying, valuing, and sharing what works. AI allows relationships to develop in ways which cross 'boundaries of power and authority' (Whitney and Trosten-Bloom, 2010, 272). The EERN-Africa CoP aims to reframe the consistent deficit discourse around Africa by affirming multiple knowledge systems, and encouraging dialogue between multiple stakeholders (Hlatshwayo, Shawa and Nxumalo, 2020) regardless of their experience or perceived position within the network. This is consistent with the philosophy of *ubuntu*, which foregrounds the value of collective existence within the community (Nxumalo and Mncube, 2019).

Collective reflection was adopted to explore members' experiences and perspectives on EERN-Africa, emphasising 'the social nature of meaning construction' (Czerniewicz et al. 2020, 949). A core group of four co-authors planned the collaborative process, shaping the reflective questions that were asked. All members of the network were invited to participate in the study, and 16 active members agreed to collaborate as co-authors and research participants. Members of this co-author group have studied and worked in eight African countries and three of the co-authors currently work outside of Africa. The largest representation in the co-author group is from South Africa, where Engineering Education is relatively well-established. This representation is also reflected in the composition of the network, although this is expanding across the African region. Most of the co-authors are from urban research universities, two are from urban technical universities and one is from a rural university. The majority of the co-authors represent institutions that have been established for 30 years or more, and the experience of participants in engineering education ranges from 5 to 27 years.

The data on which this paper is based were collected through a series of reflective engagements, comprising synchronous and asynchronous reflection, discussion, and collaborative writing online. The first engagement (R1) asked participants to submit written responses to the question, 'What does the African Engineering Education Research Network mean to you?' The second written reflection (R2) used the visual prompts from Wenger (1998, 3) and Wenger-Trayner and Wenger-Trayner, (n.d) to allow participants to reflect on and gauge their involvement in EERN-Africa as a CoP, and further asked them to discuss future involvement and challenges to participation. Finally, an oral group reflection (R3) lasting approximately 90 minutes, prompted by the findings of the preliminary exploratory analysis, provided participants the opportunity to expand on and discuss their thoughts on the purpose of the network.

All qualitative, reflective data were coded using a hybrid of deductive and inductive coding to develop a narrative discussion based around identified themes (Creswell 2012). The data were initially categorised under relevant topics (deductive), and the written details within these topics were coded so that themes could be identified (inductive) by a sub-group of co-authors. Triangulation was performed by sharing the themes with all co-authors, who discussed and refined the themes, ensuring trustworthiness of our analysis.

The strength of collective reflection or collective autoethnography as a research approach lies in the tension and interaction between the diverse

perspectives of the participants (Guyotte and Sochacka 2016). However, it must be acknowledged that the co-authors' perspectives are necessarily those of insiders and cannot represent the whole community (Roy and Uekusa, 2020). We have attempted to make ethical and respectful decisions in writing this paper, communicating frequently and collaboratively interpreting the data to minimise, but not eliminate, our subjectivity and bias (Ibid.).

The following sections present the findings and analysis of the collective reflective responses. The discussion is woven into these sections to increase readability. Reflective responses are identified using the contributor's name and the following abbreviations: R1 (Written reflection 1), R2 (Written reflection 2), and R3 (Oral group reflection). We have organised this data to answer three key questions. 'Where are we?' discusses members' opinions on the stage of development of EERN-Africa as a Community of Practice. 'What do we value?' investigates the similarities and differences in our perception of what the CoP means to each of us. 'Where are we going?' explores the constraints and opportunities which will influence the ongoing development of EERN-Africa. There is ongoing debate amongst the members about all of these questions. As stated by Karin (R3): '[Through *ubuntu currere*], we are framing the space in which we work together as a holistic ecosystem. The big question will be what do we want to do in this space?'

3. Where are we? Development of the EERN-Africa CoP

When asked whether the EERN-Africa CoP is at the *potential*, *coalescing* or *active* stage of development (Wenger, 1998), five responses selected *potential* stage, four selected *active* stage, and 10 selected *coalescing* stage. Overall, there were 19 responses because members were allowed to choose more than one level if they felt that the CoP spanned multiple stages. This indicates a level of consensus that the group is at a *coalescing* stage of development, which Wenger (1998, 3) defines as 'exploring connectedness, defining a joint enterprise and negotiating community'. Abel (R2) describes how 'relationships between group members have developed to an extent where individual members are actively considering or pursuing joint collaborations'. Further, Lauren (R2) states:

> It seems as if the group has progressed beyond the initial phases of seeing potential and commonalities in their work, and is now in the realm of exploring their links, identifying common interests and alignment in their work, and identifying a shared understanding of what the group means to them.

Participants' explanations of why they chose a particular stage of development highlight the differences between members in defining the end goal or purpose of the EERN-Africa CoP. Figure 1 represents the three broad categories of goals that the respondents commented on: *community*, *cooperation* and *transformation*. These goals echo the motivations for entering EER identified by Rodrigues et al. (2021, 7). The members' identification of the end goals are related to their perception of the stage of development of the CoP. If developing *community* is perceived as the goal, members identify the CoP as *active* because '[w]e already built a good relationship and engaged each other in our activities' (Tagwa, R2). Similarly, if the goal of *cooperation* is recognised, the CoP is *active* because '[s]ome members have formed collaborations and are working towards accomplishing certain project tasks' (Irene, R2). However, some members aim for the complex goal of *transformation*, which includes addressing the global North/South divide, decolonisation, equity and social justice. These members think that the group is still at the *potential* stage because it is too early to evaluate our impact. This indicates the need to clearly define the purpose of the EERN-CoP or to explicitly acknowledge and accommodate the range of end goals.

Participants were asked to assess and select their level of participation in the EERN-Africa CoP. The findings show respondents identifying with a range of different roles, with responses spread between *core* (4), *active* (8), *occasional* (4) and *peripheral* (2) – again, members were allowed to choose more than one level. These findings identify EERN-Africa as a 'balanced community', which is defined by Wenger, McDermott and Snyder (2002, 45) as 'a varied mix of people who care about each element to different degrees'.

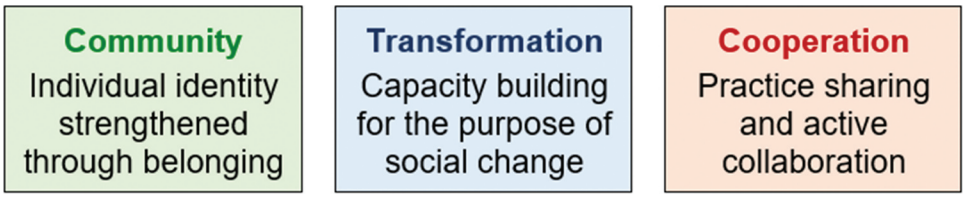

Figure 1. Goals of the EERN-Africa, identified from respondents' answers.

The reflections on these selections reveal a common pattern where members equate their level of participation to their frequency of attending meetings and their engagement in these meetings, suggesting that members perceive monthly meetings as central to the CoP. For instance, members considered themselves as *occasional* members when they felt that they 'have not been able to make all the meetings' (Anita, R2). Another measure was collaboration, where those who had formed collaborations within the group seemed confident that they were *active* or even *core* participants. For instance, a member who selected Core Group and Active, explained, 'I selected both here because in some I see myself as part of the Core Group (and was invited to write this paper) [. . .] I have not attended as many meetings as I would have liked so I also see myself as an active member' (Bruce, R2). However, for some, being *active* meant doing more than making the meetings: 'I need to step up and be more active. . .not just attend conferences, but propose ideas, carry-on with some of these ideas, and build more connections' (Cedrick, R2). These diverse identifications have parallels with Mann and Chang's model of CoP participants' varying trajectories (2012, 94) of engagement with the group. It is quite likely that members have different perceptions of what the different levels of participation mean for them in relation to the CoP. This resonates with the coalescing phase of the CoP where a shared understanding of the purpose, roles and activities of the CoP are yet to be consolidated.

4. What do we value? Shared perspectives on the meaning of the CoP to members

The variety of responses to the question regarding what EERN-Africa means to members were coded into six themes. These evolved organically from the data, beginning with identifying word repetitions, and noting the similarities and differences between the texts. Emerging ideas were grouped together after collaborative discussion to develop overarching themes. Member checking ensured that interpretations were challenged, and alternative views were considered in the process of identifying the final themes, which reveal the value of the CoP for individuals and the group. The six themes are: capacity development, networking, emotional support, impact on professional identity, social and environmental impact, and breaking borders. The articulations of the value of participating in EERN-Africa are generally well-aligned with the original aspirations of the community, and in some cases extend beyond the original goals.

4.1. Capacity development

Capacity development for EERN-Africa members encompasses individual development – personal and professional – and the collective capacity building of group members to conduct engineering education research. Participants reported on the value that the CoP provides in terms of research development, capacity building, learning from others and reciprocal learning. The diversity of experience represented in the CoP was evident, which influences the level at which capacity development is taking place. The participant reflections revealed the value of shared contexts and experiences, with challenges and opportunities to be confronted: Helen (R1) states:

> The African EERN is an opportunity for me to be in a regular community with other people who care about engineering education, and who are at different stages of their research journeys. It exposes me to the wide range of questions that people are asking, and to the different constraints and opportunities that exist in different contexts across our continent.

4.2. Networking

Networking relates to the process of interacting with others to exchange information and develop professional or social contacts (Gibson, Hardy, and Buckley 2014). The data analysis revealed several activities that support the process of networking. These include: connecting with others, sharing information, not feeling alone and identifying opportunities for collaboration. The importance of this networking in the African context is outlined by Esther (R1): 'Engineering Education Research Network for me is a place that connects me to other people who are looking for ways to improve African engineering education'. Lauren (R1) extends on this idea by stating that '[i]t is an opportunity to network with people who have similar career and research interests, so that we can look at ways (big and small) to cater to the educational needs of Engineering students in Africa'. Other participants also highlight the importance of having a network of people who can relate to their context. The findings by Dart, Trad, and Blackmore (2021) and Rodrigues et al. (2021) show that networking or involvement in EER community as being an important component in capacity development of individuals in the field.

4.3. Emotional support

In addition to the capacity development and networking opportunities that the CoP provides, it is also evident that participants seek emotional and moral support from the community. A space that facilitates support, care and collegiality is necessary as members

develop their individual identities and the group forms its own identity. This affective support has emerged as highly necessary post-Covid-19 because of past feelings of isolation. This is highlighted by Lelanie (R3) who mentions that '[. . .] it felt like home, in a way. For me it felt like I had people walking this journey with me, even though they're doing different research and I hardly understand the words that they're using'.

Members attributed the sharing of personal journeys in the monthly sessions as beneficial to them knowing more about people across the continent – often more than they know the people in their own institutions, echoing the findings of Dart, Trad, and Blackmore (2021). The importance of connecting at a personal and social level, as well as a professional level was expressed: 'We so seldom make the time to get to know our colleagues at a personal level, and yet this "affective" dimension makes all the difference to any form of learning and development' (Anita, R1).

4.4. Impact on professional identity

The value that participants extract from the CoP extends beyond personal value and impacts professional identity, which resonates with many CoPs referenced in the review of literature. A theme emerged relating to the impact that the CoP has on the professional role that participants play and through this, the value of the formation of engineering student identity in the academic context. This value includes student success, transformation in engineering education, impacts on teaching and learning and the professional development of students. Once again, the importance and value of the context emerged with some querying 'How can I be a better lecturer? How can I have a better product that goes to the marketplace at the end of the day?' (Irene, R3). Participants also indicated that they were inspired by the group to approach their practice in a more scholarly manner:

> I'm working on so many initiatives among our engineering students in my university and in all Sudan but I never looked at this from the research point of view. The group helped me to start looking at evaluation and assessment on all my works among students and faculties. (Tagwa, R1)

4.5. Social and environmental impact

An extension of the original goals of the network is the value that is placed on social and environmental impact. Participants specifically indicated that the societal and environmental impact of activities was important to them and that the CoP enabled them to make a connection to these. This theme incorporates comments that relate to societal and environmental challenges, including diversity, and explores African solutions that tackle these. The need for this focus is expressed by participants stating that this is '[a] great place to network with like-minded people and add to the body of knowledge for societal impact' (Irene, R1) and '[i]t represents a community focused on ensuring [that] the practice of engineering in Africa is responsive to social and environmental challenges and that people are equipped to play leadership roles in the sector' (Alison, R1). Participants commented on the CoP's potential value of influencing transformation in engineering education, as demonstrated below:

> I see it as a very timely and wonderful forum that has the potential to inspire substantial transformation to engineering education across the continent. We are noticing that many of our problems are common and having people coming together to discuss them and propose potential solutions informed by research is absolutely necessary. (Shamim, R1)

4.6. Breaking borders

Breaking borders is an additional value of the EERN-Africa CoP. Its recurring presence in the participant responses indicated the potentially disruptive effect of the CoP. This theme relates to the role that the CoP plays in facilitating the 'breaking' of boundaries so that participants are able to engage outside of their institutions, regions, countries and contexts. Edström et al. (2018) also reflected on the importance of networks in developing EER beyond borders in three Nordic countries, however this theme indicates that EERN-Africa is different and valued because it crosses a wider range of borders, geographies, contexts and languages. It allows for benchmarking, sharing of perspectives from different places, and thinking around diversity and complexity. As expressed by Tagwa (R1), 'the group discussion is helping me to know the current situation of engineering education in Africa and compare it with our situation in Sudan'. In the African context, border breaking needs to be foregrounded as a significant contribution to capacity building on the African continent. Establishing the network means 'that you can talk to someone across and beyond Africa, focusing on engineering education in Africa. I think it's a legitimate exercise as well' (Abel, R3). EERN-Africa achieves border-crossing, breaking of silos, cultures and language barriers, and resistance to hierarchies.

5. Where are we going? - Constraints and opportunities for EERN-Africa

The challenges expressed by members are similar to those Wenger, McDermott and Snyder (2002) refer to as challenges of a globally distributed community and include the following: time, size, geographical distance

and language and/or communication challenges, each of which are discussed below. In addition to these challenges, the general issue of funding in EER in Africa remains a significant practical constraint for most members. The unprecedented growth of EERN-Africa CoP requires sustainable financial investment over the long-term so as to consolidate both administrative and organisational functions, as well as to spearhead and coordinate research opportunities across the continent.

5.1. Time challenges

The main challenge that was expressed by most members was time. Workload is a problem for many lecturers as they are faced with '[c]onflicting priorities of work and teaching' (Alison, R2). The challenge is that the '[t]iming of meetings may sometimes overlap with other work engagements' (Shamim, R2). Of particular significance for this group is that many members are lecturers from universities which do not support or reward participation in EER and in this network. The challenge of time and support to do EER work is also noted by Dart, Trad, and Blackmore (2021). This raises the challenge of finding time outside of activities such as teaching, completing PhDs or other research projects (usually funded), making time for one's personal life, and then engaging in voluntary network activities such as monthly meetings.

5.2. Size challenges

There are challenges in managing the group as it grows rapidly in size. The group continues to attract a range of participants who are interested in African engineering education, from observers to active and core participants. The group includes those with origins in Africa, African staff in the diaspora, engineering education researchers (including PhD students), professional engineers and undergraduate engineering students. The network has also attracted international collaborators from non-African heritage backgrounds. These individuals are attracted to the network because of their interest in African engineering education or their connections to projects. This rapid growth and diversity makes it increasingly difficult for people to get to know each other at a personal level, and it can lead to a lack of focus as to what the CoP aims to achieve. Members expressed that they like networking 'but at some stage it gets overwhelming to be connected to so many people and to be involved in so many things' (Helen, R2). Further, co-ordinating the administration of new and established members is a challenge and members have suggested that 'it is time to form subgroups and to develop strategies to support each group' (Cedrick, R2).

5.3. Geographical distance challenges

Members of our community are distributed across different institutions, countries and even continents, which means that the group cannot meet face-to-face, potentially affecting the development of the community. However, because the group was formed during the disruption of Covid-19, where working and engaging online was normalised, this has been easily assimilated by the network, and in fact represents one of the unique strengths of the CoP. Social media and online platforms have been used for engagement from the start. WhatsApp is used to bring members together and facilitate convenient communication, Zoom is used to host and record meetings and a shared Google Drive is used for storing and sharing information.

One of the challenges of having members spread across the globe involves coordinating across the different time zones, and finding suitable times to schedule meetings and combined activities. Cedrick (R2), who is based in Cincinnati, noted: 'I missed most meetings because of time zone differences'. Considerations proposed by members include having an EERN-Africa calendar on Google or Outlook and developing regional hubs. Additionally, access challenges in different countries, particularly relating to power supply and internet stability, hinder participation in meetings. A striking example of this was the *coup d'etat* in Sudan, but most participants have experienced disruptions to the electric supply and internet connection.

5.4. Language and communication

The language barrier (the CoP communicates in English) was noted as a challenge for some members. Given that the CoP spans different countries in the African region, language, with its history of division, power and colonisation is subsumed beneath the everyday challenges of communication and efficiency of access. There are four main languages used in education systems in Africa: English, French, Portuguese and Arabic. Swahili and other indigenous African languages are regularly used informally in the classroom, but not as mediums of instruction or accreditation. Tagwa (R2) cautioned that 'not every person in the group speaks English very well and is able to understand every single word especially from the people that talk too fast'. In a different context and time:

> Language differences also introduce a very basic barrier to communication. They can intensify language boundaries, even when all parties agree to speak a common language. Non-native speakers may not understand the nuances and connotations behind certain terms or may hesitate to speak if they are uncertain of their ability to express themselves effectively. (Wenger, McDermott and Snyder, 2002, 119)

History demonstrates that language is often used as a medium of control and with this in mind, the EERN-Africa needs to be open to and conscious of the way communication is managed. Currently there are informal initiatives to deal creatively with language differences through the translation of meeting invitations and seminar recordings. Despite this challenge members have continued to participate in the CoP, which has contributed to the growth of the network by building collaborations, finding and giving support, and discussing contextual issues.

5.5. Contestation over EER

A debate emerged in the oral reflective meeting (R3) around what the network can achieve when it comes to developing capacity in EER, acknowledging that learning to 'do' engineering education research is quite a 'process' and is 'time consuming' (Bruce, R3), and that 'Education Research is not really something easy that one can pick up a book and read about' (Atanda, R3). Despite this reality, there was the shared belief that the network provides a space where people can talk about EER (especially considering that in most African countries EER is not recognised). This means that 'we can open the door that allows people to realise there's even a door there in the wall. And then [. . .] that long journey of developing into an engineering education researcher' can take place (Helen, R3). Therefore, the network 'can perhaps spark collaborations towards actually doing engineering education research and learning about engineering education research' (Bruce, R3).

How research is approached and designed is intimately connected to the purpose of the research, and the researcher's frame of reference, with their experiences and gazes giving the research its characteristic perspective. This paper has drawn on multiple frames of reference within the CoP and has revealed that we have not yet negotiated a 'shared' understanding of the EER domain. There is a strong sense that the primary focus of EERN-Africa is research and reflection on teaching and learning, but this is situated in an ongoing conversation about what qualifies as 'rigorous' EER (Riley, 2017, Brennan 2018). The important future work of this network is to create spaces for African engineering education researchers to create and interpret research from our contexts and for our contexts.

6. Conclusions and implications for EERN-Africa

This research, in both its subject matter and methodology, has drawn attention to the way in which the CoP impacts the individuals who are part of it. The Appreciative Inquiry approach has enabled EERN-Africa to reflect on its processes and to consolidate an understanding of its purpose and practice in a dialogic manner that opens up new avenues for exploration. The formation and reflection on the current value of the EERN community lays the foundation for broader engagement between stakeholders on the continent.

The examined data show the values of *ubuntu*, networking and support that underpin capacity building. In the EERN-Africa CoP, participants note that Africans face similar challenges in the teaching and learning environment, although we come from different academic cultures. These similarities and differences contribute a rich depth of diversity that is valuable and should be visible both within and beyond our own context. EERN-Africa sees itself as engaging with a range of potential participants, from policy makers to engineering educators and administrators, as well as researchers embedded in engineering faculties who have not yet identified themselves as engineering education researchers.

The values of inclusivity, democratic engagement and multiple epistemologies, along with a broadened understanding of who are considered to be stakeholders (Hlatshwayo and Shawa, 2020), have been intentionally and consistently modelled in the process of designing, undertaking and writing up this research. These values need to be explicitly incorporated into the practice and purpose of EERN-Africa as it embarks on the next stage of its journey and shifts away from the *potential* and *coalescing* stages to an *active* stage of development. As the CoP evolves, an iterative revisiting and reconceptualising of the domain, community and practice will solidify its value to its members, as well as to those beyond its current borders.

Reflecting on our own practice as a community provides a model of engagement that is generative and potentially transformative. It opens up the space to engage appreciatively and reflectively with knowledge and practice within engineering education in a range of contexts across the African continent. The process of undertaking this research has modelled good practice as a form of capacity-building. It has engaged conceptually with knowledge and with issues of power relating to whose knowledge counts and which knowledge has value, thus reclaiming power and knowledge by an African CoP.

For an African EER CoP to flourish, attention needs to be placed on creating opportunities for its voice to be articulated and heard, and for participants to become co-creators of a new reality that holds multiple epistemologies in dialogue. The African voice in the international context has been evident over the years, but these occurrences have been individual or isolated, intersecting with the global conversation at strategic points. What has been absent is the voice of African engineering education researchers and practitioners speaking into one another's contexts, using their own practice and experience as the context for their scholarship as a coherent body. African engineering education researchers and practitioners need to know and understand one another and to articulate the specific characteristics of their experiences and contexts to develop a shared scholarship.

7. Recommendations

Communities of Practice have great potential to build contextual capacity for EER, in service of our collective mandate to transform engineering education. After reflecting on the trajectory, values and challenges of the EERN-Africa CoP, based on this study we make recommendations for other emerging and evolving global and regional networks in the EER space.

The study has demonstrated that a CoP can be constituted outside of formal structures and without funding or institutional support, using free online tools to connect geographically dispersed individuals. We recommend this approach to the wider engineering education research community especially where structured or legitimised systems of engineering education are low to nonexistent. This approach is already being used to develop EER CoPs in other international contexts such as Latin America (REEN, n.d). The low startup costs and the strong desire for connection between isolated individuals mean that such networks can grow rapidly and can have substantial early impact.

EERN-Africa has benefited from a wide range of participation, valuing practicing engineers, representatives of professional bodies and academic staff. We recommend accommodating members who are at different levels in their maturity or engagement with EER. By remaining flexible and welcoming of a variety of needs and contributions from different members, the network has grown capacity through exposing members to the value of engineering education research, and through providing mentoring and encouragement to those who are developing as EER scholars.

As a voluntary and self-organised network, it is critical to be aware of and open to the complexities of engagement and participation. It is important to acknowledge that members may have different goals or motivations for engaging in a CoP and will have different levels of capacity in terms of time and experience to contribute to the community. To effectively include all members of the CoP, sensitivity to levels of participation is needed so that all members feel valued. This may include ensuring that meetings are planned ahead and recorded, and all information shared to the group is available to all members at all times.

Finally, we recommend collective reflection as an integral part of sustaining and growing inclusive and engaged Communities of Practice. CoPs have a responsibility to create and nurture spaces for the members to identify and incorporate changes over time. This reinforces a shared ownership by all members, and fosters community through belonging.

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No potential conflict of interest was reported by the author(s).

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