

TAU PROJECT FINAL REPORT

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Developing a community of scholarly engineering educators at the North-West University

Context

Engineering Education Research (EER) is a new area of interest at the NWU, and limited formal scholarship of teaching and learning has taken place in the past. There are, however, a number of factors that are changing this context. The Faculty now has two academic staff members who have completed a PhD in Education. A further staff member is currently enrolled for a PhD in Engineering Education through UCT. This is an important milestone as it shows other engineering academic staff members that there is an opportunity to pursue engineering education research as a primary research area. Furthermore, the NWU Centre for Teaching and Learning (CTL) is active and provides extensive academic development opportunities for staff. These opportunities open up conversations in the teaching and learning space and introduce academic staff to important and relevant education theory and research. The CTL also provides annual opportunities for academic staff to apply for Scholarship of teaching and learning (SoTL) funding. These contextual factors provide an environment that encourages and supports an interest in engineering education and engineering education research.

Engineering education and engineering education research, although well established in other geographies, is relatively new in South Africa. Other than UCT, there are few formally developed engineering education research programmes and centres. There is, however, a growing interest, in part ignited by several activities in the last few years that have been run in conjunction with UCT, SASEE (The South African Institute for Engineering Education) and the newer National Integrated Engineering Curricula project funded by the Royal Academy of Engineers.

Rationale

At present the engineering education and research activities in the Faculty of Engineering at the NWU have taken place in isolation and sometimes in an ad-hoc manner. Many staff members have expressed an interest in participating or initiating activities but do not always know where to start. As an engineer who is making the transition from discipline-specific (industrial engineering) research to Engineering Education research, I understand the challenges related to identity, community and a sense of belonging faced by academics who have a passion for engaging in the Scholarship of Teaching and Learning. I also understand the many barriers experienced by these academics as they navigate the literature and methodological considerations of an entirely new discipline.

Communities of practice can provide a supportive and facilitating environment that could be well suited to addressing these needs. Due to the growing interest in engineering education and research nationally, there is also an opportunity to explore how institutions can form and develop sustainable scholarly and research work in this space.

Purpose

The purpose of this fellowship opportunity is therefore to open up conversations and opportunities for strengthening scholarly teaching and learning, SoTL and engineering education research in the

Faculty of Engineering at the North-West University (NWU). The aim is to do this through the formation of an engineering education and research community of practice (CoP). This CoP will support the personal career development of staff in the Faculty and encourage scholarly approaches to teaching and learning that question and seek to improve and share best practices and experiences.

By supporting the development of academic staff and facilitating more scholarly approaches to teaching and learning, this project links well to the NWU's teaching and learning strategy. It supports the strategic goal of "Quality, sustainability and responsiveness of the teaching and learning offering" that should impact the strategic driver of teaching and learning innovation.

It is envisaged that the creation of this CoP will positively influence students' teaching and learning experience and student success and retention rates. It is also hoped that this community will provide an enabling space to discuss issues related to social justice, exploring how teaching, learning and the curriculum can adapt to address the current inequalities that exist in higher education in South Africa. If the project is successful, it is hoped that this research group and community will grow, drawing in more lecturers and having a greater impact on students and their broader societal context.

Ultimately, it is anticipated that the CoP will support and develop academic staff members in the Faculty that wish to tackle SoTL projects and publish the work that they are doing. It is further hoped that the CoP could lead to strategic engineering education initiatives and research projects in the Faculty using trans-disciplinary teams that has a meaningful and tangible impact on the University's strategic goals.

Theoretical framing

Beddoes (2014) has identified the new disciplinary perspective that needs to be navigated as researchers enter the engineering education research community. Researchers need to develop a new identity as they make this transition, and developing and refining this identity is neither a straightforward nor a linear process (Gardner and Willey, 2018). Engineering Education Research (EER) is also frequently misunderstood specifically by these transitioning researchers as they moved from engineering education, through scholarly teaching and learning to the scholarship of teaching and learning (SoTL) to engineering education research (EER). Understanding this evolution is an important aspect of the journey of most engineering education researchers.

One of the ways to address some of these challenges is by making use of a community of practice. A community of practice exists when a group of people forms around a shared interest or activity, and through their interaction in this community, learning takes place (Cuddapah and Clayton, 2011). The proposed research group in Engineering Education can therefore be seen as a community of practice.

To conceptualise the CoP in the Faculty, I used Wenger's communities of practice social learning model (Wenger, 1998). This model describes the transition and relationship between the community and the forming of individual identities. Wenger's communities of practice social learning model identifies four interdependent components: community, practice, meaning-making and identity. Community refers to the group formed by mutual engagement, and practice relates to the activities that take place within this community to sustain engagement. Meaning-making refers to the process of becoming as participants of the community engage, finally forming new identities through this process.

Approach

An introductory session on the possibilities for engineering education and research was included in the Faculty planning session at the beginning of the year. This provided a platform to initiate discussions. This was followed with a survey to all first semester lecturers that tested interest in being involved in a community of practice. Conversations then took place with interested staff members in the Faculty around interest, motivation, current activities and expectations.

Conversations were also held with several academics at other Universities in South Africa and in other countries. These conversations explored approaches that have been used by other universities on similar journeys. They recommended a range of ideas but getting together as a group regularly was one of the strongest recommendations. Ideas included symposia, reading groups and bringing experienced researchers and practitioners in the discipline to give presentations followed by a discussion.

Although I had a formal plan to develop and grow the CoP of time, I have found that it developed organically from the conversations that took place informally and has built on existing interest and initiatives. The CoP has therefore been formed in a more flexible and collaborative manner.

Key achievements

A community of practice has been formed and the impact has been far reaching. A formal Engineering Education Research group has been formed within the Centre for Engineering Education. This group has a mandate to foster and be the custodians of engineering education SoTL projects and other research and scholarly teaching and learning activities in the Faculty. The formation of a formal Engineering Education Research is important as this means that the group reports into the Faculty as a formal research group. This means that the group can form a Scientific Committee that can support the development of research proposals in this discipline. Funding is also available to support engineering education and research activities. A core team of interested members have emerged and this continues to grow.

Two institutional events have taken place. The first of these was the formal launch of the research group that included an overview of the purpose of the group, great discussions around the profile of engineering education research as a research discipline and presentations from NWU colleagues in the Faculty of Health Sciences who presented on the opportunities for SoTL projects. The launch event was well attended by interested staff and was supported by the Dean of the Faculty and three Faculty Directors who pledged their support to the research group.

The second event formed part of a national, hybrid SASEE workshop that included an in-person session that was hosted and run by a team at the NWU. The session was presented by myself, a colleague from the Vaal University of Technology (VUT) and a leading researcher in engineering education from Stellenbosch University. This session was also broadcast to other hubs around the country while two other sessions, held in Cape Town and Pretoria were streamed into the NWU hub. The NWU hub was attended in-person by members of the NWU engineering education research group and colleagues from VUT.

As the custodian of research work in this area, the group is currently supporting one staff member with a SoTL application, a further staff member with the development of a proposal for research work that can be submitted to the Scientific Committee and apply for ethics clearance and is involved in

two publications at international conferences. Further staff members have expressed an interest in developing research or SoTL projects around work that they are doing or questions that they are curious about.

By creating an interest and awareness of engineering education and research, staff members have also become involved in other initiatives outside the NWU including the National Integrated Engineering Curricula project.

This TAU project was also presented at the HELTASA conference in 2021.

Measuring project success

The identified change for this project was to establish an effective research group in engineering education in the Faculty of Engineering at the NWU that has a broader impact on teaching and learning in its societal context. An important part of this change will be to establish what would define the group as *effective* and what actions can be taken to ensure that this is achieved and sustained. Measuring the success of a project like this is challenging and potentially problematic. Measures have the ability to create focus and align and maintain a project's energy towards the intended purpose. However, measures also have the potential to drive dysfunctional behaviour, sometimes leading to the chasing of targets rather than providing a flexible and adaptive environment that really serves the deeper purpose of the project. Acknowledging these challenges, it is nevertheless a good idea to consider how a project's success will be measured at the start to guide the project and provoke thinking around what the project ultimately aims to change.

For this project, the following measures will be developed and used as the project unfolds:

Short-term measures

- Tracking the number of sessions that are held over the year
- Tracking interest in and attendance at the sessions
- Evaluating at strategic points, how well the expectations of group members are being met.

Long-term measures

- Tracking the emergence of SoTL projects and publications in SoTL and EER
- Tracking the shift in expectations of members over time, specifically in relation to the CoP conceptual model and issues around social justice.
- The impact of the research work on teaching and learning, student access and success and social justice in the Faculty.

Institutional support required

Going forward, it will be important to gain institutional support for this emerging research area. It is important that academics who wish to pursue engineering education research and SoTL projects are acknowledged equally to discipline specific researchers. The perception that education researchers are “good teachers” needs to be changed. Engineering education researchers are “good researchers” in addition to potentially being “good teachers”. Furthermore, perceptions around research trajectories for NRF rating applications and promotions needs to be intentionally changed so that there are equal opportunities for these academics and that their applications and career trajectories are supported and encouraged.

Conclusions and the way forward

It is believed that this TAU project has been a success. It has established a CoP, the Engineering Education Research group at the NWU. This group has the potential to develop staff and facilitate engagement and change that can have a positive impact on engineering education and higher education at the NWU and in South Africa.

It will be important to sustain and retain energy and within the group, especially over the next two years as it becomes a more established CoP. At present, the group is led by myself but overtime, other members will be drawn in to play key roles so that the group has the ability to exist beyond a few key members. It will also be important to document and track the processes followed and the progress made so that institutional knowledge can be shared and retained.

The learnings from the establishment of this group are also being spread outside of this specific CoP. A presentation to the entire university will take place in October on this TAU project and an abstract will be submitted to the annual NWU Teaching and Learning conference. The aim of these engagements will be to share learnings and to promote the wonderful work that is done as part of the TAU fellowships.

REFERENCES

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