

Promoting diversity in a community engagement module for undergraduate engineering students

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Abstract— The Community-based Project module is a compulsory undergraduate module of the Faculty of Engineering, Built Environment and Information Technology at the University of Pretoria in South Africa. It is an eight-credit (80-hour) module and entails students working at least 40 hours in the community, and then reflecting on their experiences. Since 2005, about 20 000 students have worked with an average of 350 campus-community partners on more than 5 800 different projects each year. These projects were completed in eight different countries and involved various sectors of the community.

Students work in groups, which include students studying for different degrees, as well as students from different cultures, religions and gender. The module coordinator and students engage with diverse campus-community partners. Subsequently, the aim is to increase students' awareness of their responsibility towards the community, for the students to develop cognisance of their citizenship and for them to learn to utilise their acquired skills in a specific society. The module integrates both service and learning objectives to enable the students to apply their newly acquired knowledge to the betterment of the communities they serve. This paper describes how diversity is embedded in the module through its activities, impact and social engineering to enhance peace engineering on the African continent.

Keywords: *community engagement, diversity, University of Pretoria, South Africa*

I. INTRODUCTION

The challenge of South African society is the legacy of systematic racial ordering and discrimination under apartheid and, which causes it to remain deeply racialised. As the categories of race have become the basis for post-apartheid redress, South Africans continue to live as a rainbow nation defined by race [1]. Diversity in South African society creates the opportunity for engineers to find alternatives that allow them to use their skills in a positive, proactive way to promote peace.

The central civic mission in higher education in South Africa arises from the needs of a society where the racial, religious and economic differences are dominant and unavoidable. Students' intercultural sensitivity can be enhanced in higher education. They can develop various soft skills, such

as intercultural sensitivity when there is a representation of students from diverse ethnicities and gender in a group. Diversity also broadens the students' collection of thoughts, ideas and opinions, and has a positive effect on their cognitive complexity [2]. When interethnic interaction forms part of community engagement, students develop a positive self-concept, problem-solving skills, growth in leadership and cultural awareness or understanding, as well as a high level of public interest [3]. However, to bring a diverse group of students together is not enough. Students need to be provided with stimulating courses where they have the opportunity to interact with their distinct differences [2].

Students who are educated in a diverse setting are better prepared for an even more complicated and diverse society. Diversity in the curriculum should therefore address collaboration, problem-solving and deliberation relevant to the field of study. The challenges of South African society demand that greater and more equal opportunities be provided to higher education for students to engage in interethnic and gender interaction and to understand the importance of diversity in society [4].

In international scholarly papers, diversity is defined by race, class, socio-economic status, gender and sexuality [5]. It includes a stereotype confrontation, recognition of universality, knowledge of the population served, understanding the value of diversity and interaction across differences [6]. This study follows a holistic approach to diversity. Diversity is not only defined by race, but also by gender, course for which students are enrolled and community partners, as well as the skills acquired through the different projects. This paper presents an interpretive summary of how diversity is embedded in the compulsory undergraduate Community-based Project module.

II. COMMUNITY ENGAGEMENT AS PART OF PEACE ENGINEERING

The importance and potential of community engagement as an opportunity for the youth to constructively engage in social upliftment are emphasised in the National White Paper for Post-school Education and Training in South Africa [7]. Aligned with the White Paper, a strategic goal of the University of Pretoria emphasises the strong social responsiveness of the University to make an impact on society by embedding community engagement and civic commitment

in its academic mission to develop graduates who appreciate the importance of community engagement [8].

Adhering to the strategic goal of the University of Pretoria, the Faculty of Engineering, Built Environment and Information Technology established a compulsory, but free-standing undergraduate course, the Community-based Project module. The eight-credit module (80 hours) is offered on an open-ended and project-orientated basis and integrates community service and service-learning projects in the curriculum of all the undergraduate modules in the Faculty. The programme requires students to work in the community for at least 40 hours, during which time they address a specific need in the community. Even though the course may also be a service-learning course, this paper will use the term “community engagement” and show how it can be utilised to promote peace engineering.

The course is a macro community engagement course due to the substantial number of enrolled students and projects. A large number of students are registered ($\pm 1\ 600$ students per year) and they work on more than 500 projects with more than 370 campus-community partners annually (of which 280 are sustainable campus-community partners) [9].

Students apply their newly acquired and existing knowledge in real-life challenges. In the process, students become more aware of their social responsibility. Students learn to utilise various life skills such as communication, interpersonal, technological and leadership skills in a multidisciplinary and multilingual environment. The aim is for students to become aware of and cultivate personal, social and cultural values [10], and become responsible critics of contemporary societies and active agents for positive social transformations. In the South African context, it is of the utmost importance that future engineers understand the dynamics in the community and are able to integrate their acquired knowledge to promote peacebuilding efforts in the community.

Students work in urban and rural communities from eight different sub-Saharan countries. The community partners include pre-schools, primary and secondary schools, hospitals and non-profit organisations like animal shelters and sanctuaries. Various organisations such as city councils and government departments also assist with networking or sponsorships.

The module is taught in a hybrid learning format. Students attend an orientation lecture at the beginning of the year. After that, the students are assisted in identifying appropriate projects, and students are linked with the designated community partners.

During and after completing the fieldwork, students complete various assignments where they reflect on their experiences. A supervisor on site assesses the students after they have completed the project, and verifies the hours the students have worked [11]. After that, students write a report on the outcomes of their project, deliver a presentation to the lecturer and create a YouTube video about their project. The YouTube video is only made public with the consent of the community and the students [12].

The module coordinator consolidates the campus-community partnerships to ensure the sustainability of the service in the community, to facilitate the learning and assessment of students, and to manage the budget allocated to the module. Furthermore, the module coordinator networks with existing societies on campus that are linked to engineering, such as Enactus, Engineers Without Borders, the Aeronautical Society of South Africa, faculty houses and school houses to develop a collective agreement within the Faculty on community engagement.

III. DIVERSITY WITHIN THE MODULE

Opportunities to ensure diversity in the module are within the compositional diversity of race, gender and the different courses that are part of the module. Students have the opportunity to work in diverse communities, with diverse project options where they can use the skills they have already acquired for the betterment of society.

The University’s compositional diversity provides students in the module with the opportunity to work in diverse groups. Figure 1 illustrates the percentage of compositional diversity of the module.

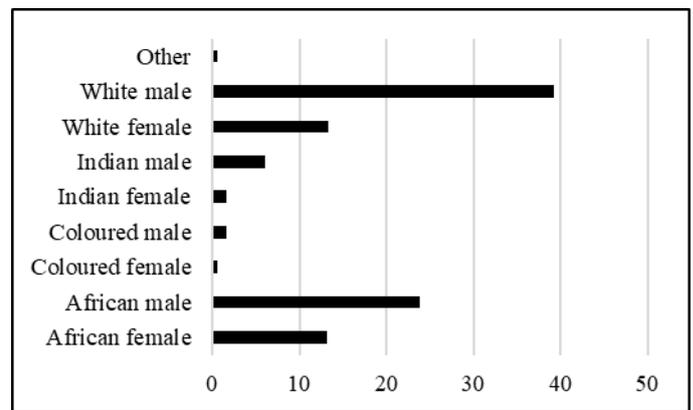


Fig. 1. Compositional percentage according to gender and racial diversity within the module

White male students (39.2%) are still the dominating compositional gender in the module. However, the composition of African male (23.8%), white female (13.3%) and African female students (13.2%) has improved from previous years to enable groups to be more racially diverse.

Students enrolled in the Community-based Project module come from three different schools: School of Engineering (10 different degrees)¹, School of Information Technology (nine different degrees) and the School for the Built Environment (six different degrees). Figure 2 indicates the compositional diversity of the different degrees in the module. The highest percentage of students in the module are enrolled in engineering degrees (68%).

¹ Degrees are similar to “majors” in the USA.

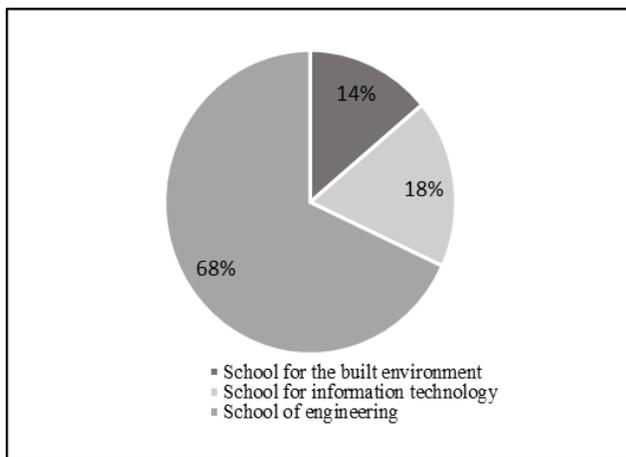


Fig. 2. The compositional course diversity within the module

Students are encouraged to create groups that are diverse in terms of race, gender and course. Figure 3 indicates the percentage of the groups' diversity for 2018.

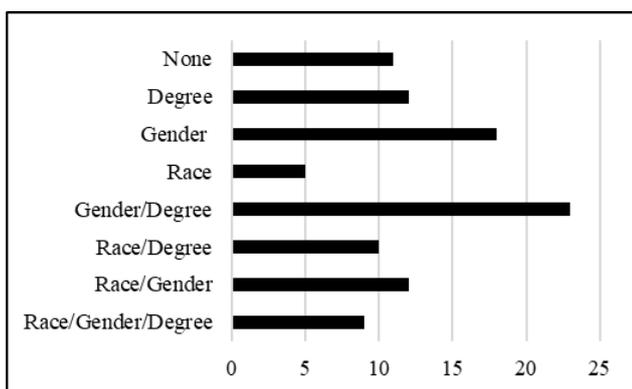


Fig. 3. The percentage of the compositional diversity of the 2018 groups

The most common group diversity in the 2018 group was gender and degree diversity (23%). Students found it logistically and academically challenging to create groups that were diverse in terms of race, gender and degree (9%).

Students' experience in these diverse groups provide qualitative feedback about the impact of the experience. Students reflected on their diverse groups as follows:

Being part of a diverse group was essential for me to appreciate and respect everyone's opinions or decisions about a certain thing, as everyone has different opinions, and this is amplified when the group is gender and racially diverse.

Having diversity in the group assured that there was a diversity of thought and that helped us solve every problem efficiently.

It was exciting to have a diverse group because every day during the project we had the opportunity to communicate

and to learn about our differences. Our group was more prolific as we were a good combination and always had a mix of various ideas, are gave feedback on the various aspects of the project and experiences we had. We always helped each other.

Students can also work with a variety of community partners where they have to use different skills to complete the identified projects. Students work in urban and rural areas with community partners from eight different sub-Saharan countries. The community partners include pre-schools, primary and secondary schools, hospitals and non-profit organisations like animal shelters and sanctuaries. Various organisations like local city councils and government departments assist with networking or sponsorships. The partner must preferably be situated in a community with which the students are not familiar, or with community partners that work in disadvantaged or challenged communities. Figure 4 illustrates the compositional diversity of the community partners involved in the module.

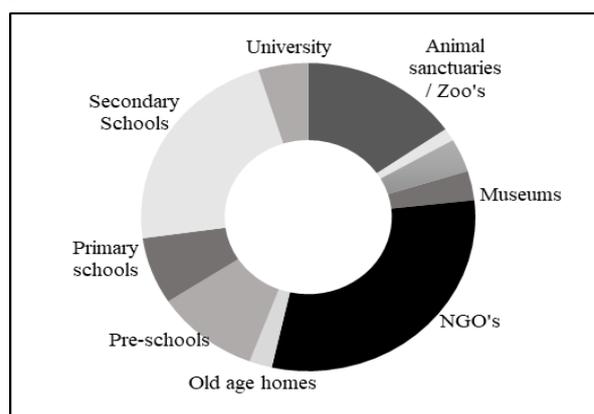


Fig. 4. Compositional diversity of community partners in the module

IV. ENSURING PEACE ENGINEERING THROUGH THE PROJECTS

Annually, the students identify and execute more than 500 projects. Groups may vary between two and five students depending on the project's logistics. Some projects take place in neighbouring countries, which makes it difficult for a group to be too large. Projects must adhere to the criteria set in the module. The requirements include that religion or political party may not be promoted and that students may not receive any compensation while they are working on the projects as the projects must be executed at non-profit organisations. Students must identify a specific task with the community partner that they must complete for the project. It is essential that students work closely with a supervisor on site. The supervisor assesses the student at the end of the project.

For the majority of the students (2018: 66.14%), this project has been their first structured community outreach experience. Favourite student projects include doing renovation or small building projects, teaching Mathematics and Physical Sciences at secondary schools, assisting with career guidance at schools, repairing old computers, upgrading computer centres for schools and non-profit organisations, teaching necessary computer skills to learners and community members, and

developing a website for schools and non-profit organisations. Students also assist with renovation projects at local museums and help with the classification of the different museum collections [13]. Figure 5 illustrates the percentage of projects that are the most popular in the Community-based Project module.

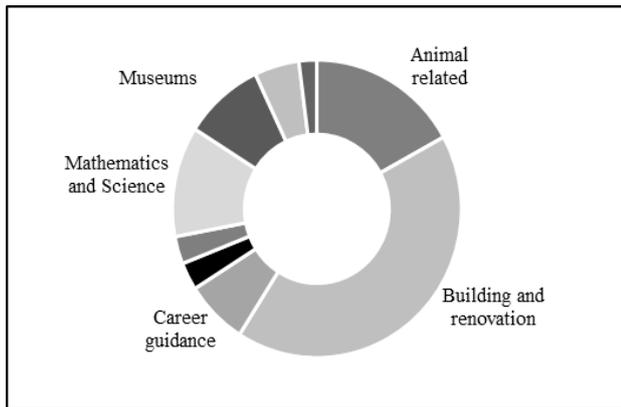


Fig. 5. The diversity of the projects in the module

The most popular projects are related to building and renovation (42%) or projects in which animals are involved, such as animal shelters or sanctuaries (17%), and teaching Mathematics and Science (12%).

V. IMPACT OF THE MODULE

The module has been running for 14 years, and more than 20 000 students have successfully completed almost 6 000 projects. So far, students have been involved in the community for a total of 800 000 hours. The large number of projects, students and community partners requires a unique teaching and assessment model. The module's success can be ascribed to the dynamic logistic and financial processes, effective communication, and passionate administrative, management and academic staff members.

The module has received institutional, national and international recognition. The module was a finalist for the MacJannet Prize for Global Citizenship of the Talloires Network and the Global Engineering Deans Council Airbus Diversity Award. It has also received the University Education for Transformative Leadership in Africa Mini Grant of the Talloires Network and was the first recipient of the University of Pretoria's Community Engagement Award. The module also received the Marketing Advancement and Communication in Education (MACE) Excellence Award in the Category: Integrated campaigns or projects and Subcategory: Social responsibility citizenship development. The module received acknowledgement in various publications, including a chapter in a textbook focusing on exemplary case studies of community engagement modules in South Africa [14].

VI. CONCLUSION

The outcomes of the Community-based Project module have contributed to its success, as is visible through the impact it has had on communities, students and other stakeholders. A

significant percentage (76.54%) of the module's alumni indicated that their experience during the fieldwork for their undergraduate module gave them an opportunity to understand their social responsibility. The alumni confirmed this in an open-ended question about the module's value in terms of their careers, for example: "One of my next employment responsibilities will be community upliftment." and "I can share my experiences of the module to encourage everyone to get involved in community outreaches" [15].

The module gives students the opportunity to experience real-life issues while being of service to the broader community. Within the module, students can work in diverse groups in a community of their choice. Students must feel that they can make an impact on the skills they have already acquired. Shared feedback from students in their reflections assignments as well as in their final presentations, indicates personal growth and stronger cognisance of the diverse South African society as a common theme. Students' reflections on their reports and verbal feedback show that, while they experienced the module as positive and enriching, it was also a personal growth experience that impacted on their social awareness.

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