Aligning Green Campus Initiative (GCI) to Envision 2030 and graduate attributes at the Durban University of Technology (DUT)

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ABSTRACT:

The United Nations wants to see institutions of higher learning taking a leading role in making its sustainability agenda come to life and build resilience on their campuses and in their local communities. This is so because the sustainability agenda influences behaviour and alters mindsets about resource utilisation and consumption patterns, and institutions of higher learning as centres of learning and research are aptly positioned to facilitate this agenda. This paper looked into the place of Green Campus Initiative (GCI) in the sustainability agenda, its adoption by the leadership of universities, challenges experienced by practitioners and possible solutions to these challenges. Virtual interviews were conducted with practitioners attached to residences and questionnaire were used to collect data from 50 student members using Microsoft Teams as data were collected during Covid-19 alert level 3 when social distancing had to be practised. The study found that while the uptake of GCI was enthusiastic at the beginning after the launch by the Minister of Higher Education, practitioners faced many challenges stemming from the lack of appropriate policies, which resulted in GCI being implemented on an *ad hoc* basis, with no dedicated department, staff or funding. What the study found encouraging was that matters of sustainability are enshrined in the university's new strategic plan, Envision 2030, implied in its graduate attributes and that GCI activities would help the university achieve all its graduate attributes. A study of this nature will bring GCI challenges to the attention of the executive leadership and hopefully enhance full-scale implementation.

Introduction

Environmental problems are proliferating across the globe resulting in increased climatic disturbances, deforestation, extinction of plant and animal species, melting ice caps and rising sea levels, water, land and air pollution (Fonseca, Moura, Jorge & de Almeida, 2018; Nunez, 2019). Unprecedented population growth coupled with overconsumption result in high energy price, uncertainty about future energy supply and food insecurity (Ting, Bin & Weng Wai Choong (2012), all rooted in human socio-economic activities (Nunez, 2019; Mohammadalizadehkorde & Weaver, 2018; Thondhlana & Hlatshwayo, 2018). Bulunga & Thondhlana (2018); Nunez (2019; Richardson & Lynes (2007) point out that there are many temperature-dependent global problems caused by uncontrolled anthropogenic activities that exceed regenerative bio-capacity. Jafary, Wright, Shephard, Gomez, Nair (2016) point out that Colleges and universities in the U.S.

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spend an average of $1.10 per square foot (ft ^{2}) on electricity and 18c/ft ^{2} on natural gas annually. In agreement HESA (2014) observes that in the United Kingdom universities utilized 7.9 billion kWh of energy and produced 2.3 million tons of carbon emissions in 2014 and that (Aleixo, Leal & Azeiteiro (2018) several universities have been experiencing energy efficiency issues. Aasa, Jesuleye & Ajayi (2020:82); Alshuwaikhat & Abubakar (2008: 1777); Teah Yang, Onuki & Teah (2019); Thondhlana & Hlatshwayo (2018: 2) argue that if university campuses, regarded as 'small cities', 'small worlds', 'smaller versions of the cities' can reduce their carbon footprints, they would help promote environmentally friendly practices, improve disaster resilience of their local communities, boost their bottom lines and cut costs for consumers (Mohammadalizadehkorde & Weaver, 2018). In consensus, Benjamin, Lawrence & Miranda (2018); Yanthi, Yunansah, Wahyuningsih & Milama (2018) opine that universities can be impactful to conservation efforts using the GCI philosophy to develop new paradigms of thinking about the environment and inculcate green values within and outside of their campuses. Yanthi et al. (2018) further advice that the concept of green should be reflected in structural designs, thermal insulation, cooling system, lighting, safety and landscaping and curricula.

This paper connects to especially SDG 13 of United Nations' Sustainable Development Goals (SDGs) – *Take urgent action to combat climate change and its impacts*, adopted as the 'blueprint to achieve a better and more sustainable future for all' (UN website, 2019; Weber, 2017). Anderson, Ryana, Sonntaga, Kavvadab & Friedlc (2017) posit that for countries to move towards achieving the SDGs, they have to strive for sustainable patterns of development and consumption, environmental, social and economic prosperity through integrative solutions. This paper is significant in the era of burgeoning global problems and

the importance of control mechanisms, environmental planning, legislation, policy instruments and measures to enhance planetary resilience for current and future generations (Khan & Chang, 2018).

The field of GCI is still regarded as new and significantly undersized, but significant in the sustainability and conservation agenda, because higher education has experiencing a rapid development and growth in terms of student numbers and infrastructure, with a sharp increase in energy use, low level of campus operation efficiencies (Thondhlana & Hlatshwayo, 2018; Tiyarattanachai & Hollmann, 2016; Yanthi et al., 2018) and waste generation. Akbar, Amber, Kousar, Aslam, Bashir & Khan (2020) concur when stating that academic buildings in a typical university campus occupy about 42% of the total space and are responsible for nearly 50% of the total energy use and carbon emissions of the campus. Marinho, Gonçalves & Kiperstok (2013) posit that universities are required to undertake a leadership role towards sustainable development and energy efficiency, which according to Bulunga & Thondhlana (2018) run into millions of US dollars annually. In a study conducted in China, Tiyarattanachai & Hollmann, (2016) state that GCI as a movement provides a platform for universities, their leaders, lecturers, researchers and undergraduate students to engage their resources in responding to the challenges of balancing human economic and technological development with environmental preservation. Alam, (2018) shared that there was still reluctance on the part of many universities to make environmental issues a priority in curricula, research, service and operations, resulting in GCI is not being fully implemented to reach its full potential and required transformation. In South Africa GCI was only adopted in 2011 during the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 17) held in Durban. The National Minister of Higher

Education, Dr Blade Nzimande, formally constituted GCI in 2012 as a framework for students to play their part taking urgent action to combat climate change and its impacts (Anderson et al., 2017), making GCI a relatively new paradigm. Further aims included building the legacy of the COP 17 climate change summit (Brand South Africa, 2012) and seizing entrepreneurial opportunities that could arise from possible solutions (Brand South Africa, 2012).

Brief review of literature

Holzbaur, Jordaan & Wenzel (2013) also argue that achieving sustainability is a complex challenge due to (Tiyarattanachai & Hollmann, 2016) population explosion and facilitated development which intensify environmental overexploitation. Aleixo et al. (2018) associate sustainability with the preservation and conservation of resources for future generations, while Tiyarattanachai & Hollmann (2016) view sustainability as the balance of economic, social and environmental conditions in development efforts. Guterres (2021) Weenen (2000) argue that the limit of non-renewable resources should be considered by people equipped with the understanding of the relationship between energy use, climate and resultant negative impacts of reckless consumption and overexploitation and other unsustainable practices. Fayiga, Ipinmoroti & Chirenje (2017) concur when stating that the United Nation's proposal of sustainability is not fully adopted by nationalities. It is critical to point out that the sustainability agenda does not belong to the UN, but to all governments and nations (Hopkins, 2016). It means that everyone and every sector has a role to play to minimise waste and reduce harm to the natural environment (Eskom Report Water and Energy, 2014). Climate change with its crisis multiplier effect is the foremost challenge facing the earth in modern times and has profound implications for international stability, threatening food production, fresh water supplies, oceanic food chain and many more (Guterres, 2021). Tung

Ha, Tran, Nguyen & Hoang (2019) hinted that CFC gases are typical of after-effects of the increasing world's population, economic growth and increase in consumption production, pollution and continuous resource depletion and environmental deterioration. The United Nations (2017) state that the effect on human is revealed through poverty and environmental degradation, which are closely interrelated. Fayiga et al. (2017); Jafari (2013) postulate that developing countries including all African countries are particularly vulnerable to effect of climate change, while least able to afford the cost of adapting.

Sustainability addresses use that responds to basic needs to better the quality of life while minimizing consumption, emission of toxic materials, waste and pollutants so as not to jeopardize the needs of current and future generations (Tung Ha et al., 2019). This is enlightened kind of development, which deliberately strives for sustainability through informed and planned behaviour incorporated into everyday practices. Amaral, Martins & Gouveia (2015); Krstic´, Filipe & Chavaglia (2020) aver by proclaiming that resources unavailability can be countered through shifting consumption patterns, transitioning to renewable energy sources, adoption of new ways of living and innovation to use what is regarded as waste as input for developing other products.

The Stockholm Declaration of 1972 addressed sustainability in higher education focussing on finding ways in which universities, their leaders, lecturers, researchers and students can engage their resources in responding to the challenges of balancing between the human quest for economic and technological development with environmental preservation (Tiyarattanachai & Hollmann, 2016). Genta, Favaro, Sonetti, Barioglio & Lombardi (2019) concur when suggesting education as one of the possible solutions to overexploitation of resources through conservation strategies and innovation. Cohen, Lawrence, Armstrong,

Wilcha, Gatti (2018); Findler, Schönherr, Lozano, Reider & Martinuzzi (2018); Mafongosi, Awuzie & Talukhaba (2018); Tezel, Ugural & Giritli (2018) vouch that institutions of higher learning are leading role players in the development of sustainability practices through education, research, innovation and demonstration, practices that permeate curricular, co-curricular, administrative, facilities and community engagement activities. Regarded as the first step towards sustainability, GCI aims at building and sustaining a culture of conservation among the universities (Sonetti, Lombardi & Chelleri, 2016; Genta et al., (2019) and should therefore become integral part of a modern day university system (Rwelamila & Purushottam, 2016). Aasa et al. (2020) view GCI as a process of reducing 'multitude of on and off-site environmental impacts resulting from campus decisions and activities, as well as raising environmental awareness with human communities of college or university' to lead and demonstrate 'stewardship of the natural world.' Bulunga & Thondhlana (2018) in their study of action for increasing energy-saving behaviour in students' residences, stated that human behaviour around resource consumption is at the midpoint of nearly all global environmental challenges. Baker-Shelley, Van Zeijl-Rozema & Martens (2017) argue that through GCI universities can play a leading role in driving society's quest for sustainable development. To this end, Genta et al. (2019); Zhao & Zou (2015) state that there are several international declarations that are signed by Higher Education Institutions which shows the breadth of the commitment universities have towards resources sustainability. A sustainable development mindset could be achieved through offering good environmental education, demonstrating sustainable practices, research and championing sustainable practices in their local communities as centres of knowledge and behavioural change (Alam, 2018; Bulunga & Thondhlana, 2018).

Tan et al. (2014); Weber (2017) assert that in order to make the energy and resource efficient campus development smoothly, a strong university-level leadership and strategy aligned to environmental sustainability needs to be established and prioritised, with good design geared for the construction and operation of energy and resource efficient campus. University infrastructures usually embodied on a university campus, are significantly large systems containing lecture theatres, restaurants, sports halls, student residences, laundries, laboratories and more (Choi, Oh, Kang & Lutzenhiser, 2017). Pro-environmental university behaviour seeks to minimise the negative impacts of its actions on the natural and built environment through the application of sustainability and conservation notions in its premises through the generation of positive change (Bull et al., 2018; Mtutu & Thondhlana, 2016). The interim Chancellor of the University of Carlifornia Davis ranked the greenest university in the world in 2016, stated that the ranking not only reaffirmed their standing as a global leader in sustainability, but also demonstrated their continuing commitment, which implies that sustainability is not a destination, but an attitude and a life style.

University leaders and researchers should appreciate the fact that if the degradation of the environment continues, it will destabilize their economic success and that of their local environment (Alam, 2018). With the signing of the Talloires Declaration in 1990, a significant improvement was made in the level of awareness of colleges and universities to have a positive contribution on the way toward environmental improvements (Clugston & Calder, 1999). It is believed that individuals with better levels of education and knowledge are better capable of holding pro-environmental attitudes (Chase, Dautremont-Smith, Huggins & Pope, 2018); Tung Ha et al., 2019), which they can bring to the attention of local communities (Hani, Osama, Mohamad, Raed & Muna, 2019; LaMorte, 2019) with the aim of

influencing their behaviour. Strydom & King (2013) claims that one of the factors determining the quality of life of residents in a given territory is the state of the environment and environmental infrastructure constituting their health ecosystems of clean water, fresh air, fertile soils, flora and fauna. The United States Environmental Protection Agency postulates that environmental education should be steered through the interaction of all components facilitated by policies and enactment thereof.

Known as Campus Climate Initiatives in Canada and Green League in European universities GCIs is an umbrella concept, covering the administration of campus sustainability operations (Aleixo et al., 2018). GCIs include the design of campuses for energy efficiency, management of green statistics (24%), energy and climate change (28%), waste (15%) water (15%), transportation (18%), purchasing, food, and sustainable landscaping (Rwelamila & Purushottam, 2016; UI Green Metric, 2015). It aims to harmonise and balance universities and their campuses, core and peripheral operations, people and nature to ensure that the frameworks of sustainability are implemented. GCI is a platform for universities to empower its communities on sustainability matters through integration of the sustainability agenda in governance, traits of ethical investment, administration, the curriculum, operations and materialistic consumption patterns and lifestyles (Filho, Will, Salvia, Adomßent, Grahl & Spira, 2019; Kristina & Matea, 2016). Such commitment would aid campuses in decreasing their carbon footprint and that of local communities (Teah et al., 2019) as was the case with Tokyo universities. Acuho-I (2019) expect GCI to take charge in reducing consumption rate of water and electricity and protect environment within university and surrounding communities as universities take their rightful place as knowledge producers, disseminators and stewards of their local environments and resources (Bull, Romanowicz, Jennings,

Laskari, Stuart & Everitt, 2018; Sunbolt, 2019; Tangwanichagapong, Nitivattananon, Mohanty & Visvanthan, 2017). As such the United Nations expects to see universities at forefront in implementing sustainability initiatives (Yuan, Zuo & Huisingh, 2013) using such indicators as management audit, water audit, landscape audit, biodiversity audit, waste audit and buildings audit utilising their fully operational green offices that engage all stakeholders (Adomßent, Grahl & Spira, 2019). The ranking of green universities by UI Green Metric (2015) is reaffirmation global universities of their commitment to matters of sustainability. The aim of the metric is encouraging universities self-asses and align their policies and direction to combat global climate change and be more sustainable. Teah et al. (2019) argue that the University of Tokyo through its sustainable campus project plans to cut the campus CO2 emissions by 50 percent at year 2030 following (Fonseca et al., 2018) the Cornell's Ithaca decreasing campus emission by 30 percent through cultural and behavioural change. Studies by Alberts, Gurguc, Koutroumpis, Martin & Napp (2016); Sintov, Dux, Tran and Orosz (2016) on universities and student residences show that GCIs have yielded high monetary savings estimated to 30%.

Envision 2030 and graduate attributes at DUT

As it can be seen from its strategic map (Figure 1), DUT has included sustainability as one of its four perspectives aimed at delivering experience within an environmentally responsible and financially sustainable framework. The university hopes to achieve this by creating a future-oriented living and learning environment, engendering a sustainable and efficient business model and improving the efficiency of resource utilisation and decreasing environmental risk. The sustainability perspective twines with the other three perspectives of stewardship, systems and processes and society. Envision 2030 as the strategy is called, aims at developing the ability

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to think critically and creatively; work independently and collaboratively; become effective communicators; become culturally, environmentally and socially aware within the local and global context; and become active and

reflective learners as graduate attributes. Environmental awareness also features in the graduate attributes. Clearly, GCI as a platform sustainability within universities in South Africa is catered for at the strategic level.
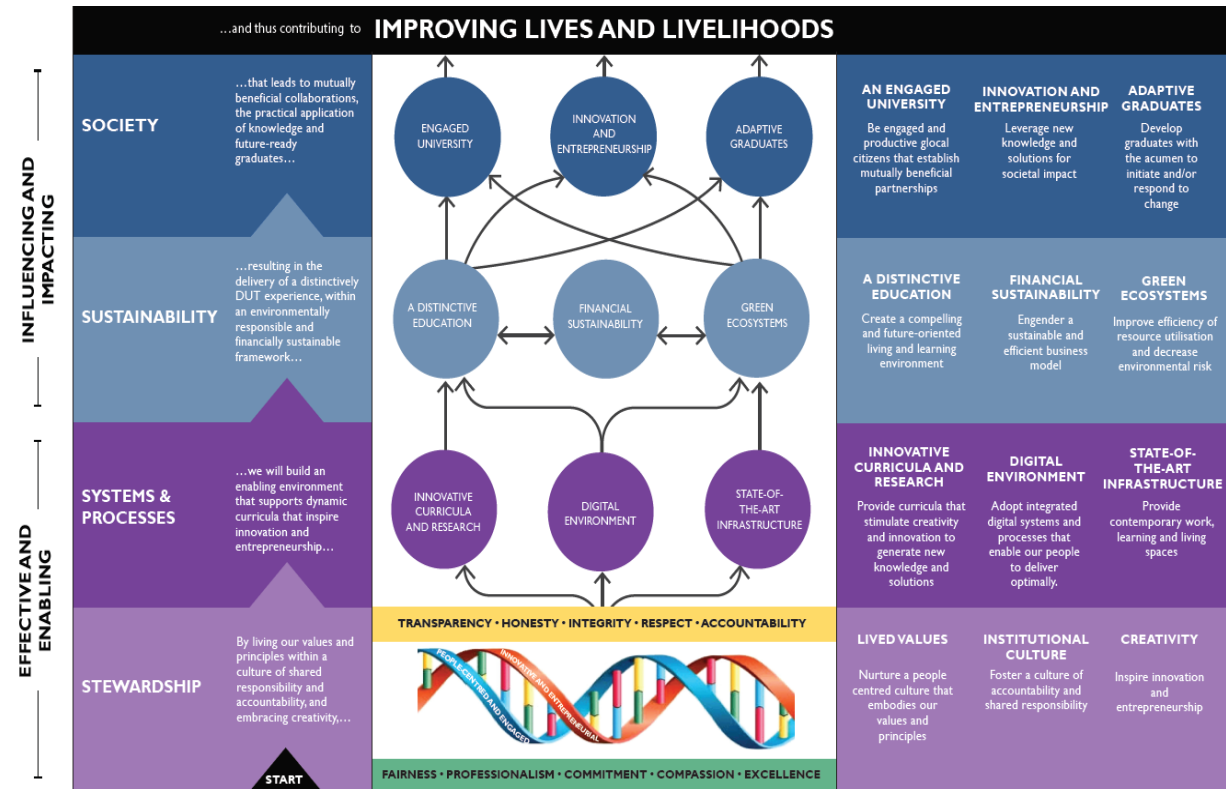

Figure 1: DUT Strategic Map – Envision 2030

Source: DUT Website (2020)

Methods

The aim of the paper was to uncover the extent of GCI implementation, reported behavioural changes, challenges, possible solutions and develop mechanisms to align GCI to the strategy and graduate attributes. The sample was made of 53 participants composed of GCI coordinators, residence life officers and 50 student GCI members. Virtual interviews were conducted with GCI coordinators and residence life officers using MS Teams and qualitative questionnaires were used to collect data from student GCI members. Questionnaires were shared with students via MS Teams as the country was at Covid-19 alert level 3 at the time of data collection, which was November to December 2020. These were then downloaded, captured on a spreadsheet developed by the qualitative statistician and the spreadsheet was sent for analysis.

Results

Participants shared that all the campuses of the university were involved in GCI with Steve Biko as the main campus leading the way and that students involved were second to third year with no participation from first year students. In their view all staff, academic departments and students were expected to participate in greening campuses, even though the students were the drivers of the movement. Even though GCI was a worldwide movement, to their knowledge there was no policy at DUT to enforce it and the residences were the custodians of the movement. They shared that even though there was no

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policy in place, the executive management supported the movement, which is why 'greening the university' was also one of the strategic drivers in its 2015 – 2019 strategy. In the absence of a policy, academic departments did not fully participate nor drive all students to. Katiliūtė, Stankevičiūtė & Daunorienė (2017) opine that for GCI to be successful, all stakeholders, internal and external have to participate. Figure 2 illustrates some plant initiatives taken.
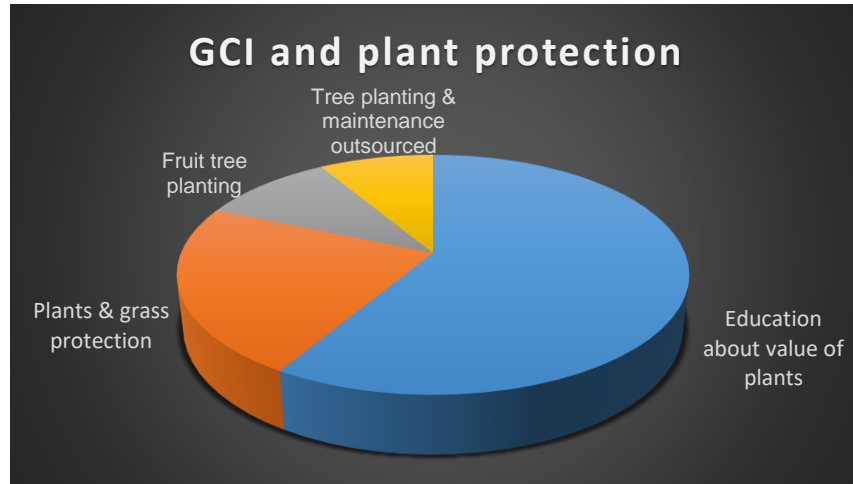

Figure 2: GCI and plant protection at DUT

This in line with the view held by Aleixo et al. (2018); Tiyarattanachai and Hollmann (2016) that preservation and conservation of resources for future generations to balance economic, social and environmental conditions should start at campus level. However, outsourcing such activities will deprive students of opportunities to be hands-on and achieve graduate attributes.

Figure 3: Water and electricity saving through GCI

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On the issue of water and electricity saving, they shared that water tanks had been installed, competitions were held and prizes won for being the most green university or campus, metre boxes had also been installed to control place, light sensors were used, press taps were being installed, solar panels, supported by Bulunga and Thondhlana (2018); Sunbolt (2019) were also being installed on new buildings. GCI was reportedly facing a number of challenges at DUT. Participants believed that these stemmed from a lack of institutional sustainability policy, which was supported by Arroyo (2017); Filho, Shiel, do Paço, & Brandli (2017); Genta et al. (2018); Mafongosi et al. (2018); Mohammadalizadehkorde & Weaver (2018) when singling lack of policy as the foremost cause of challenges. Policy would inform planning, setting of goals and reallocation of resources as suggested by Wisecup, Grady, Roth & Stephens (2016).

the use of water and electricity. Information posters were billed on campuses (not as sustainable as digital information screens) and smaller scales education was taking

They also highlighted the lack of a proper GCI structure leading to poor coordination, inadequate resources preventing GCI from reaching its maximum impact and inability to learn from leading global green universities and inability to maintain the momentum, making GCI look like a momentary whim. Figure 4 is a cause-and-effect diagram used to illustrate the effects of these challenges. Mohammadalizadehkorde & Weaver (2018: 7) further highlights a structure that is reflected on the organisational chart, training, measurable indicators, routine reporting and documentation, reviews, and others as elements for universities to develop sustainable behaviour.
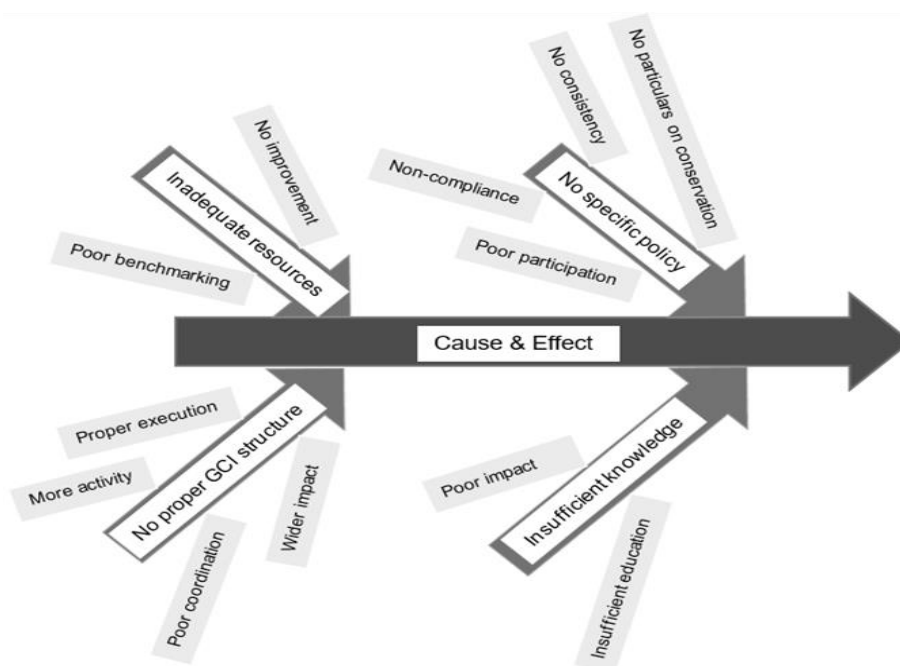

Figure 4: Challenges faced by GCI at DUT

Due to the lack of proper GCI structure, there was no proper execution of sustainability programs, not enough communication with academic departments and outside stakeholders, poor participation and no improvement and poor coordination between

campuses. Such challenges were also observed by Coleman (2019); Rwelamila & Purushottam (2016). Sonetti et al. (2016) also observed that there were still gaps with regards to practices due to barriers in the organisational framework resulting in integration challenges and lack of

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participation by all stakeholders, lack of monitoring and ineffective reporting. Participants felt that the foremost solution to the challenges would be the development of the sustainability policy, which will enforce compliance and make room for regulation and monitoring of the sustainability practices. The policy would also allow for the creation of a fully-fledged GCI office and budget allocation to enable staff to benchmark, acquire cutting-edge knowledge, coordinate activities across campuses and grow the impact of GCI. The office would be able to reach all stakeholders via social media, promote the movement and teach skills to local communities, which might lead to innovation and new sustainability ventures as spinoffs. Participants thought that as long as resource over-utilization remained a problem, human beings need to adapt and innovate as advocated by Amaral et al. (2015), which means that GCI has a future with enlightened and commitment management. The fact that sustainability is highlighted as one of the four perspectives of Envision 2030 and among the graduate attributes of the university, means that the executive management takes it seriously, what is required for these challenges to be brought to their attention.

Discussion

Findler et al. (2018) conducted a study on the themes covered in literature and impacts areas outside the higher education institution system and found that besides qualified and globalised workforce and research, indirect impacts included economic growth, change in business practices, social cohesion and sustainable lifestyles among others. Some of the mechanisms to promote the sustainability perspective (Fig. 1), would be for staff and students to get educated and involved in sustainability matters, create campus gardens and make own compost to fertilize gardens and use rainwater to water these gardens and flush toilets. To bring this perspective, which twines with the other three, the university will have to communicate its sustainability values to all its

community publish environmental calendar, encourage participation and communicate GCIs activities no matter how small. It will have to activities go highly digital by install solar powered tables and encourage use of digital materials and e-books, promote recycling of old hard copies. Running of busses throughout the day has to be controlled. Environmental champions will have to be appointed to create awareness, which might be rewarded in ways determined by a well-resourced GCIs office. GCIs will provide a platform for students to achieve such graduate attributes as thinking critically and creatively; working collaboratively; becoming effective communicators; becoming culturally, environmentally and socially aware within the local and global context and becoming active and reflective learners. If the sustainability agenda is prioritized just like research and entrepreneurship are at the university, with its own directorate or fully-fledged office, the impact would be phenomenal especially in inner cities engulfed by decay. Critical departments such as Civil Engineering and Geomatics, Horticulture, Environmental Health and Ecotourism could champion the implementation of the sustainability perspective. This would help the university live up to its mission and not merely (Mohammadalizadehkorde & Weaver, 2018: 2) 'greenwash' Envision 2030 but produce no significant pro-environmental behaviour to model for immediate communities. The current Vice Chancellor awards on the promotion of Envision 2030 will remain uncoordinated without an institutional structure to promote GCI.

Limitations and Future Studies

The study was conducted during Covid-19 alert level 3 when social distancing was encouraged. This meant that the researcher could not observed verbal cues as interviews were virtual and questionnaires were also distributed and collected technologically. This was a case study

of DUT, which means that the findings are not generalizable to other universities. Future studies could focus on how the university moves forward to infuse GCI into all its practices to enhance attainment of its graduate attributes and make perspective three (from the bottom) of Envision 2030 alive. As Katiliūtė et al. (2017) argued, GCI requires involvement of the whole university community (executive management, academic departments, support departments and housing (Marinho et al., 2013) spilling over into local communities and schools through community engagement projects. Tezel et al. (2018: 864) pointed out that over and above knowledge generation and innovation through research, universities have a responsibility of 'guidance of society' through participation in community engagement and outreach programmes. A study conducted by Choi et al. (2017) on plans and living practices for the green campus of Portland State University found that the understanding of the concept of GCI among majority of the students was low, implying that it might even be worse in South Africa where the concept and movement is only about 8 years old. Such a study would also have to be conducted to feed into GCI at DUT.

Conclusion

GCI can be promoted in a coalescence of ways including all stakeholders. Chase et al. (2018) advocate for interdisciplinary, action-oriented approach using events, guest and resident speakers, workshops, projects, competitions, etc. which will change mindsets and develop a pro-environmental culture. This paper argues that without a policy that will enable the development of required structures and release budgets, GCI will remain enshrined on strategic maps with a will that is not backed-up by commitment and effort. Arguments were brought forth on the leading role that universities can play in building campus and local environmental resilience, promote innovation and entrepreneurial opportunities through GCI, accrue savings, enhance relevance and responsiveness to local and global needs and production of an educated workforce that will exhibit envisaged graduate attributes. This paper contributes to baseline analysis at DUT, but also highlights critical factors that have to be in place for GCI implementation across the country.

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