

# **Sustainable Horizons: Navigating the Educational Landscape for Environmental Stewardship.**

Ladies and gentlemen, fellow scholars and guardians of the green, let me share a little academic humour to kick off my presentation.



## **Acknowledgements:**

- I express my gratitude to Prof AV Mudau for being a mentor and guide during my academic journey over the past 8 years.
- Additionally, I want to extend my appreciation to Prof MM Dichaba for creating a supportive and conducive environment that contributed to my success in this academic endeavour.

## **How did I get here?**

My academic journey started with the attainment of a BSc Degree in Agricultural Sciences from the University of Swaziland (UNESWA) between 2001 and 2006. Subsequently, I pursued a Master of Education degree at the University of South Africa (UNISA) from February 2011 to October 2014, specialising in Environmental Education. Building on this, I completed my Doctor of Philosophy in Education with a focus on Curriculum Studies, majoring in Environmental Education, at UNISA from 2015 to 2020.

In addition to my doctoral and master's qualifications, my educational foundation includes an Honours Degree in Education (Major: Environmental Education) and a Post Graduate Certificate in Education (Senior and FET Phase: Majoring in Mathematical Science) from UNISA. These credentials collectively underscore my enduring commitment to advancing education, particularly in the vital fields of education for sustainable development, sciences, and agricultural sciences.

My expertise spans a wide range of skills, from environmental, and science education to effective curriculum evaluation. As a self-starter with a profound understanding of teaching techniques and e-learning methods, I have contributed to the education field through numerous journal articles, conference proceedings, and book chapters. My research interests encompass critical areas such as education for sustainable development and science education, showcasing my commitment to advancing knowledge in these domains.

Beyond the academic realm, I have actively participated in impactful projects, including the SA Science Education Community Engagement Project, Climate Change Education, and initiatives like "Sustainability Starts with Teachers". These endeavours highlight my dedication to the practical application of education for sustainable development and community engagement. My commitment to education is further demonstrated through my involvement in mentoring and guiding students, as seen in their participation in national and international conferences where they present insightful research findings. Overall, my body of work portrays me as a scholar who is deeply invested in shaping the discourse on science education, sustainability, and curriculum development.

## **7 Key contributions I made in research:**

My niche area in research is education for sustainable development (ESD) also known as Environmental Education (EE) and my focus in the past eight years has been to promote the development of the knowledge, skills, understanding, values and actions required to create a sustainable South Africa and the world, that ensures environmental protection and conservation, promoting social equity and encourages economic sustainability. I have contributed to the development and growth of the field specifically in the education sector. My assessment of the growth in the past eight years is evident in my Masters and PhD studies focusing on coverage of ESD in the curriculum, green schools, teachers' professional development, ESD teaching strategies and other important research on education in general.

### 1. My Master's study

My Master's study looked at the effects of improper waste disposal in communities. The results of this research project indicated that concerns related to ESD, such as inadequate management of solid waste, are not given sufficient attention by teachers,

learners, school administrators, and parents. The study suggested implementing practical approaches, such as the adoption of the 3Rs (reduce, reuse, recycle), to empower participants in addressing the issue of improper solid waste disposal in school environments.

## 2. My PhD study

In my PhD study, I investigated the impact of curriculum shifts on EE in South Africa's Further Education and Training Phase. Examining coverage, teaching, and examination of environmental impact topics, my research highlighted the crucial role of examiners and underscored the need for teacher collaboration and training programmes. The study revealed varying degrees of coverage in both curriculum and examinations, emphasising the influence it has on teacher practices. Despite challenges, the curriculum shifts positively contributed to increased coverage and examination of environmental impact topics, fostering structural and cultural changes in content delivery. The findings provided essential insights for teachers and policymakers aiming to enhance education for sustainable development practices in the South African education system.

## 3. Research on the Coverage of ESD in the curriculum

Because of the scourge of environmental degradation that is facing the world on issues such as climate change, pollution, deforestation, desertification, and ozone layer depletion, my interest was and has been to help in finding sustainable solutions. This cannot be achieved without the provision of quality education to all. The lack of practical solutions for these environmental issues has led me to conduct a baseline investigation on the extent to which ESD content has been integrated into the basic education curriculum. Few studies have been conducted on the ESD coverage in the study materials used by teachers and learners in schools. My contribution to the body of knowledge on ESD coverage was that my published research found that there is a misalignment between policy and actual practice of ESD content in the FET curriculum. In the initial sampling of documents analysed, I chose 11 core subjects that are taught in the FET phase in the South African education system because DBE policy stipulates that ESD should be integrated into all subjects. I was surprised that some subject's policies did not include ESD content in the curricula. The only exception was in Life Sciences where the CAPS policy stipulates the actual coverage

of ESD content in terms of marks to be allocated in the Grade 12 examinations. This implies that policy makers should stipulate the extent to which each topic must be covered in the summative assessments. This raises a call for ESD to be taught as a separate subject instead of being embedded in all subjects as stipulated in subject policies. Furthermore, my research outputs on the coverage of ESD highlighted the need for policy developers to ensure that environmental impact topics are integrated into the policy documents of all subjects instead of writing a generalised statement that teachers find challenging to put into practice. This calls for subjects such as Accounting, Mathematics, Mathematical Literacy, and English to integrate the teaching of environmental impact topics using the Life Sciences model where the policy stipulates the breadth of coverage in the policy as well as in the summative assessment. Because of the range of environmental disasters that we experience every day, my research outputs have concluded that it is time that the next review of the curriculum policy introduces ESD as a separate subject in the basic education sector. It is important to mention that most of my research outputs have focused on the coverage of ESD in the curriculum specifically for basic education. More recently, my focus has shifted to the extent of coverage of ESD content in the higher education sector.

#### 4. Research on Green schools

Other research output on greening schools for sustainable development with my PhD student, Dr Bopape, and my mentor, Prof Mudau, contributed to the body of knowledge that education is the best vessel or vehicle to bring about the paradigm shift from unsustainable behaviour to green, efficient, sustainable schools. Education needs to be at the forefront of leading and fulfilling the responsibility of protecting the environment as endorsed by the South African Constitution. However, the education system cannot achieve positive results if its implementation is done in isolation. All citizens need to be taken on board irrespective of their age, educational and economic backgrounds. The key finding in this research is that the current schooling system in South Africa is not yet paperless, and it seems it will take several decades for schools to be fully green. This was evident in the trail of e-waste generated from old technology that still needs to be addressed, where less than 20% of e-waste is recycled, resulting in global health, environmental risks and loss of scarce and valuable natural material (World Economic Forum Annual Meeting, 2020). In this research, we used a thematic

framework that was different from other studies because it targeted the key role players at schools, namely, SMTs and SGBs. It can be noted that this research, on the other hand, came up with an environmental audit tool called the Two-Way Approach that could be used by schools to assess their greenness. Strategies used for sustaining school resources were also revealed by this research. Furthermore, this study adds another responsibility to the DBE as an organ of the state, to ensure that ESD should not only be for funding for imparting knowledge, assessment, examinations, promotions, and certification. There is a need for capacity building of role players on how to assess the green status of their schools and counteracting the threats posed by degraded ecosystems; constraints on state funds; and climate change catastrophes and calamities to the country that has been hit hard economically by COVID-19. In the field of ESD, the findings of this research output should add to the debates on sustainability as revealed in SDGs and NDP to be achieved in 2030 and schools should not be left behind. The DBE should raise awareness by assisting role players with directives that can be taken to achieve green status. One of the major contributions of this research was that we were able to diagnose areas of strengths, weaknesses, opportunities, and threats faced by schools' resource management on waste, energy, water, landscaping, institutional management, and governance.

##### 5. Research on teachers' professional development in (ESD)

Teachers are important agents of change who can deliver the educational response to ESD. Since teachers are influential change agents, it emerged in one of my research outputs that there is a need for them to be supported with the required skills, knowledge, strategies, values, required motivation and commitment to respond to sustainable development. Consequently, teachers can be supported to develop resources and access resources on ESD. ESD has much to offer in the building of a relevant, quality education system not only in South Africa but also across the globe towards attaining the SDGs. It is apparent from the findings reported in my research, that the desired goal of ESD to develop environmental literacy in schools has not reached an acceptable level of promoting behavioural change across the board. Importantly, my published research indicates that obstacles in fostering environmental literacy stem not only from teachers and schools but also from deficient and inconsistent systems and policies designed to direct the execution of ESD. Additionally, there is a shortage of teacher development and support. The lack of

environmental literacy competencies also affects the development of a self-efficacy belief which is vital for developing confidence and motivating individuals to work towards sustainable behavioural change (Almashard, 2017). Thus, most of my published research articles found that to improve environmental literacy in schools, policy systems guiding ESD implementation should be clear in terms of guiding the content, and support should be given to practices that are necessary for developing environmental literacy and promoting sustainable behaviour in schools.

#### 6. Research on strategies to infuse ESD in the basic education school curriculum

During the past eight years, one of my mandates in research was to review and evaluate strategies used by teachers to teach ESD. Hence, I was funded by Fundisa for Change, an NGO, whose aim was to improve teacher's pedagogical approaches, assessment strategies, and subject content knowledge by providing relevant resources and training for teachers for teaching environmental topics. My research has shown that the problem is that few teachers and schools participate in such programmes due to funding limitations. Only those teachers who have had the opportunity to participate in such programmes benefit while the majority struggle to teach environmental impact topics since they are not exposed to such programmes. Another notable strategy is that teachers need to develop professional communities of practice to share knowledge and resources relevant to teaching environmental content in the curriculum. From the research output I produced, it was recommended that the focus in the twenty-first century and beyond should be capacitating student teachers on ESD content. It is for this reason that I plan to extend my research scope in the next six years (2024-2030) to higher institutions where these teachers are being taught ESD.

#### 7. Research on Climate Change Education

An article authored by Mia Kreusch and Msezane , entitled *the relationship between learners' behaviour and academic performance to climate change*, to be published in 2024. In this study, data analysis and interpretation were conducted to understand the relationship between climate change, learners' behavior, and academic performance. We followed an inductive approach, initially collecting data from Grade 3 teachers about their learners' behaviour and academic performance in the context of climate change. The data collection spanned four months, with observations, interviews, and

recorded field notes contributing to the analysis. Results indicated a negative impact of climate change on learners' behaviour and academic performance, with varying effects observed in different seasons (Summer, winter, spring and autumn).

The discussion of results highlighted seasonal variations and their influence on learners' behaviour and academic performance. Each season presented unique challenges, such as aggression in summer, disruptions due to extreme cold in winter, and fluctuating concentration levels in spring. The study found that boys tended to be more vulnerable to climatic events, showing aggression in extreme heat and struggling to stay focused, while girls exhibited talkativeness in humid weather and sluggishness in the cold. The conclusion emphasized the need for teachers to adapt their teaching strategies to address the negative impacts of extreme weather conditions on learners' academic journeys. The recommendations urged teachers to be aware of the specific effects of weather patterns on learners, expand their knowledge, and proactively adjust teaching strategies based on weather forecasts to ensure successful learning experiences.

#### *Other research studies*

As mentioned earlier, my niche area of focus in the past eight years has been research about ESD which should be embedded in all subjects taught in CAPS. I was invited by UNESCO to contribute research on how we can ensure that quality education is sustained through efficient school evaluation strategies. Therefore, school evaluation is paramount in ensuring that education helps to minimise the scourge of environmental issues, enhance economic growth, ensure political stability, reduce inequalities, and reach gender equality. In this research, I linked Şahin and Kılıç's (2018) five processes of the school self-evaluation model, namely, preparation, monitoring, evaluation, planning, and implementation to the South African school system. My contribution to the growth of research in this field was the development of a new proposed school evaluation process model, which is slightly different from the Şahin and Kılıç (2018) model. My school evaluation proposed model is comprised of five steps, which are planning, development, implementation, action, and improvement. These proposed steps are designed to help the schools continue to improve their functions by allowing supporting structures such as school management

to ensure that learners are exposed to quality education that is inclusive of ESD content.

In conclusion to the seven key contributions I made in research, I have seen myself growing as a researcher in the education field. The interactions with local and international scholars in the ESD field and the research I have done in ESD have sharpened my knowledge and expertise as an ESD pioneer. I am looking forward to my next ten years. My research has shown that more research needs to be conducted to sustain the environment and the health of our current and future generations through quality ESD research that not only imparts knowledge but improves the lives of all living organisms. My interest in ESD envisages a world that is devoid of most environmental problems through quality research that results in change and makes a noteworthy contribution to quality education for all.

#### **Contributions to International and local research projects:**

In addition to my association with Fundisa for Change, I was also involved with the Southern African Regional Universities Association (SARUA) and UNESCO Regional Office for Southern Africa (ROSA) for a project namely *Sustainability Begins with Teachers* research which involves SADC countries. The project aimed to ensure that participating members infuse ESD into the teaching and learning materials of the universities. The findings of this project have been published in the world's largest editorial project on sustainable development ever undertaken as a book chapter for *Pedagogical Approaches and Teaching Methodologies on Climate Change* which was published in 2022. The book chapter I authored is titled: "Content and Teaching Methods of Climate Change: South African Curricula Perspective".

I was also invited to conduct research and publish with leading scholars in one of the largest projects conducted by the United Nations Sustainable Development Goals between 2019 and 2020. I grasped the opportunity for my work to be published by United Nations. This afforded me the opportunity for my research work to be exposed to the international community and thus contribute to knowledge generation in the field of education, especially in UN Sustainable Development Goals initiatives. The book chapter I authored is titled: "School Evaluation: Approaches, Frameworks and Indicators" In: Leal Filho W., Azul A.M., Brandli L., Özuyar P.G., Wall T. (Eds.). *Quality Education*, published by Springer. In this chapter, I was able to propose a model for a



school evaluation process that can be used by education specialists, policy makers, and school management teams when conducting school evaluations. The findings of this research were that effective school evaluations are the cornerstone for quality education that can lead to effective teaching and learning of any content, e.g., ESD topics.

Another international research project that I am involved in as a member is the International Climate Change project. We are currently involved in collecting data on climate change for 2021 to 2024 that will be used in a comparative study with our international partners which include countries such as Finland, Australia, Spain, the USA, Italy and South Korea.

I am also involved with internal community research projects at UNISA, where one is *Teaching Sciences in Schools*. My involvement with this project is to collect data, write accredited research outputs, and capacitate project beneficiaries on how they can implement ESD content in '*Matter and Materials*'. In 2019, after several interventions with participants, I published an accredited conference proceeding, where the findings revealed that teachers have challenges in teaching ESD content in NS and that the reconceptualised interventions on ESD assisted them in finding a way forward to teach ESD in the future in a modernised society. The second internal project is called *Parental Involvement in Teaching and Learning*. I was a project leader between 2021 and 2023. In January 2024, I published a co-authored research entitled "Examining Teachers' Views on Parental Involvement in Schools: A study of the Hlanganani District in Limpopo".

### **Partnership with the University of Reading**

I have adopted the Climate Change Framework that was developed by the University of Reading to ensure that issues of climate change education are infused into our university teacher training modules.

### **Mentorship and Collaborations:**

It is also important to mention that as a researcher, I am also promoting other young researchers in the form of mentoring. I collaborated with my mentor to write a research article on "Reconnoitring the Stimulus of Environmental Education in Reducing Improper Solid Waste Disposal: A Case of One of the Schools in the Mkhondo

Location of Mpumalanga in South Africa”. The findings of this research project revealed that ESD issues such as improper solid waste disposal are not prioritised by teachers, learners, school management, and parents. The research recommended practical strategies such as 3Rs (reduce, reuse, recycle), that can be used by participants to alleviate the scourge of improper solid waste disposal in school surroundings.

Another research study with a master’s student explored “Environmental Literacy Components in Promoting Sustainable Behaviour: A Case Study of Rural Primary Schools”. The research recommends that environmental literacy in schools can be improved by aligning the ESD content curriculum with teachers’ professional development and strengthening teachers’ ongoing development and support to build their expertise in terms of ESD content. To that end, it is important to mandate the inclusion of frameworks and policies that guide sustainable lifestyles and practices, to encourage the development of sustainable behaviour in schools.

I was also involved with two masters’ students separately in publishing accredited outputs. These former students have now completed their PhD studies and are employed as ESD lecturers at UNISA. The titles of the journal articles we published were “Insights Into The Integration of Environmental Education in the Senior Phase” and “Perceptions of Environmental Education Integration in South African Schools”. The findings from these research outputs revealed that teachers still lack content knowledge on ESD issues and recommendations were that education specialists need to infuse ESD teaching methods and strategies in all policy documents and textbooks used by learners.

### **Theoretical approach used.**

Most of the research I carried out in the last eight years used the realist social theory (RST) as its theoretical framework, deriving from Roy Bhasker’s (1978) critical realist theory which was further developed by Margaret Archer (1995). Grounded in critical realism, RST, according to Given (2008), encompasses three realms of reality: the actual, the real, and the empirical. The actual domain refers to events and outcomes, the real domain delves into underlying relations and structures influencing change, and the empirical domain pertains to individual perspectives. These realms have been significant in most of my research studies. Archer (1995) describes RST as an

explanatory framework focused on evaluating the effectiveness and challenges of programmes, assessing parameters like structure, culture, agency and their interrelationships. Using RST, as a social theory, in my research has allowed me to examine the interactions between individuals and society, exploring potential changes in the social context of interest. Hence, I have used Archer's (1995) concepts of structure, culture, agency and relations to investigate these dynamics in my research.

Based on the initial work of Archer (1995), one of the findings of my research in education for sustainable development proposes a change of structural, cultural, and agency model that shows how the shifts in the curriculum have an effect, which can be **negative or positive** on the structure, culture, and agency. The proposed model seems to conform to the premises of Margaret Archer's structural and cultural morphogenesis concept. The findings of this study indicate that shifts in the curriculum contributed to several factors that culminated in the following.

- change of the way teachers presented lessons;
- changes in the resources used;
- changes in the content to be presented;
- changes to the assessment given to learners; and
- changes to the overall structure and culture of the school systems.

The changes seen in most of my research studies conform to Margaret Archer's theory of morphogenesis. Her theory stresses that there is an inter-relationship between social structures and human agency (Archer, 1995). Against this background, in my research studies, there was an emergence of structural and cultural morphogenesis. The emergence of structural and cultural transformation in the school environment relates to the RST concept of the context-mechanism-outcome configuration (Archer, 2003; De Souza, 2013; Pawson & Tilley, 1997). RST is an explanatory framework that focuses on the operations of programmes to evaluate their effectiveness and challenges. Apart from programme evaluation, "RST also focuses on the social theory about individuals in society, how individuals and society are related" (De Souza, 2013). Furthermore, RST also focuses on possible interactions between them that may result in or **affect change in the social context** of interest. I have noticed based on the findings of one of my research studies that the effects of the changes of old NCS (Grade 10-12) to CAPS resulted in changes in the environmental impact topics content

that is taught to learners. For example, teachers tend to be influenced by external agents such as subject advisors and structures such as documents (policies, textbooks, examination papers) in influencing the teaching of environmental impact topics. The proposed change model in Figure 1 is characterised by aspects of change that could be positive or negative in terms of structural and cultural context. The structural and cultural factors influence mechanisms related to ideas, roles, practices, resources, and processes as shown in Figure 1 below. In this study, it was important to emphasise that social structures influenced the culture of the teaching of environmental impact topics. Human agency (of the teachers) in one of my studies was seen transformed after being exposed to the Fundisa for Change capacity-building workshops.

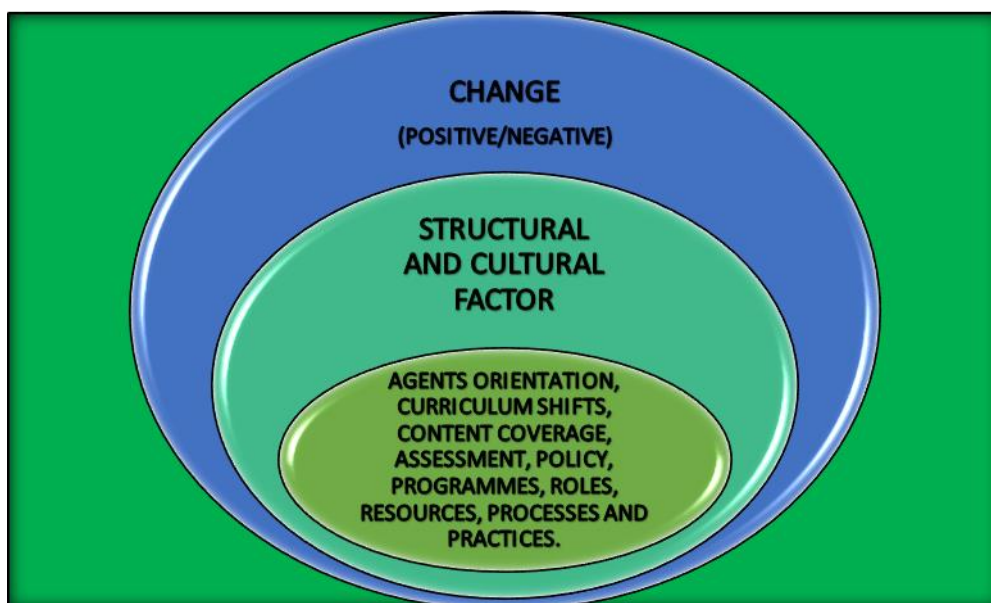


Figure 1: The proposed emerging change of structural, cultural, and agency (CSCA) model

This study on the analysis of the coverage, teaching, and examination of environmental impact topics in the FET phase revealed changes emanating from structural and cultural factors. This agrees with Margaret Archer, who believes in socio-cultural interaction that results in structural morphogenesis for example, structure is reproduced through agency which is simultaneously constrained and enabled by structure. In line with Archer, who argues that structure, culture, and agency need to operate in unison for transformation to emerge. This conforms to human interactions that take place in a context that has been conditioned by the effects

of both structure and culture (Archer, 2003; Case, 2015). As seen in one of my studies it was impossible to separate social structures such as rules, resources, powers, relations, and practices from culture and agency as they operate in unison and can only be separated analytically as explained by Archer. Therefore most of my studies findings revealed that shifts in the curriculum affected structures related to the roles of teachers as they deliver the lessons in the classroom, mechanisms related to teachers' orientation, content coverage, assessment, policy, programmes, resources, and teachers' practices. This has led to these results being aligned with Archer's morphogenetic theory. Thus, a model emerged in the way in which teachers use documents in the analysis of coverage of environmental impact topics in the new curriculum which shows the cultural factor that comprises ideas on how to use documents like past examination question papers and the culture of teachers using ideas from the Fundisa for Change programme to teach environmental impact topics. The proposed change model also shows the interaction between the factors and the mechanisms that result in the changes in the learning process. These changes can be **negative or positive** depending on whether there is transformation or reproduction after curriculum changes, programme training, and the use of new teaching and learning materials by teachers. The proposed change of the structural, cultural, and agency (CSCA) model can be useful in the analysis of the operations of a programme that could lead to social change. It can also be used to evaluate the effectiveness and challenges brought about by shifts in the curriculum as seen in one of my research studies. The model in Figure1 shows the relationship of change/transformation of structures, cultures, and emergent properties such as teacher orientation, curriculum shifts, and content coverage.

In sum, the proposed CSCA model can be of use to the education fraternity as it can easily predict the results of curriculum shifts where structural and cultural factors affect agents (teachers) positively or negatively based on the changes in **content coverage, assessment, policies, educational programmes, roles, resources, processes, and practices**. Positive changes to agents that can be brought by the curriculum shifts can lead to individuals possessing the following UNESCO approaches to EE/ESD which are **interdisciplinary and holistic, value-driven, critical thinking and problem solving**, and taking good decisions towards environmental issues. The interplay of culture, structure, and agency through social interaction leads to social

reproduction and transformation or, in Archer's (1995) terms, cultural and structural elaboration. This proposed model of the interplay of culture, social structure, and agency casts considerable light on the **educational change** in the schooling sector

### **Opportunities for personal development:**

As a lecturer, I am presented with numerous opportunities to enhance my professional growth and contribute meaningfully to academia. Embracing a diverse array of responsibilities, including teaching, assessing, conducting research, and managing administrative tasks, provides a fertile ground for enriching my skill set and expanding my knowledge base. Balancing these commitments becomes an opportunity for holistic development, allowing me to navigate through various facets of academia with resilience. The ongoing demand for time and attention in teaching and research offers a chance for continuous improvement, fostering adaptability and innovative thinking. Addressing the diverse needs of students presents an opportunity to craft versatile teaching strategies, tailored to accommodate a range of learning styles and backgrounds. Moreover, staying updated on technological advancements is an exciting opportunity for continual learning and the integration of cutting-edge methods into my teaching practices. These collective opportunities contribute to the multifaceted nature of my role as a lecturer, encouraging a proactive approach to further research and professional development.

### **Other Research Activities for the next six (6) years**

My mentor at the University of Reading (UK) has exposed me to the work her university is doing in climate change education. I have formed a strong collaboration with the University of Reading Institute of Education. I am working on integrating the Climate Change Framework developed by the University of Reading into programmes at UNISA. When I came back from the UK, I was tasked to establish a Climate Change Education Project at the CEDU. One of the project's goals is to use the concept of "**Greening the Curriculum**" to ensure that environmental topics, such as climate change education, are integrated into CEDU programmes. The project has planned a series of research-related activities for 2024 and beyond.

In the coming years, I will be strengthening research on climate change education and agricultural sciences education. In the previous years at CEDU, we have been **Transforming** the curriculum through **Africanising** the curriculum. The time has

come when we need to start **GREENING THE CURRICULUM** to ensure that our student teachers can know how to embed climate change effects, impacts, mitigation, and adaptation strategies in their lessons.

### **My advice to young people**

- Stay focused and composed.
- Your limitations are not your greatest enemies.
- Never reach your heights keep on climbing.
- You are the architect of your destiny.

### **Conclusion:**

My extensive research, spanning multiple projects and collaborations, addresses critical gaps in ESD. The impact of my work is evident in the positive outcome's contributions to local and international initiatives, making my research highly relevant and influential in shaping the academic discourse on education and sustainability.

### **Closing Remarks**

In closing, I extend my deepest gratitude to every one of you for gracing this inaugural lecture with your presence. Thank you for being an integral part of this journey towards knowledge and enlightenment in our efforts to change the world and make it a better place for future generations. **Let us ALL Navigate the Educational Landscape for Environmental Stewardship. Let us ALL Broaden our Sustainable Horizons to Save the Future Generation. I thank you.**

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