Faculty of Education

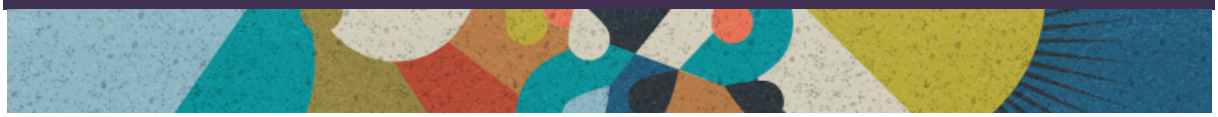
RHODES UNIVERSITY
Where leaders learn

Rhodes University/Umeå University International Exchange PhD Week 2023

PROGRAMME BOOK

26 OCTOBER - 3 NOVEMBER 2023

Rhodes University scholar contributions



WELCOME UMEA UNIVERSITY PHD LECTURERS AND SCHOLARS!!

THURSDAY 26th OCTOBER 2023

18:00 – 19.30	**Meet and Greet** the Swedish PhD team , **WELCOME & INTRODUCTION – PRESENTING INTRODUCTORY NOTES ON THE THEME AND PRACTICAL INFORMATION** Venue: Environmental Learning Research Centre Room 20
19:30	Dinner for Swedish team at hotel

FRIDAY 27TH OCTOBER 2023

8.30 - 10.00	**SCHOOL VISITS FOR SWEDISH PHD SCHOLARS** [3 groups, each with a local PhD scholar · Visit to Nyaluza (Clement to lead) · Visit to Holy Cross (Preven to lead) · Visit to Good Sheperd (Tammy to lead)
10.00-10.30	Tea and coffee
10.30-12.00	REFLECTION OVER SCHOOL VISITS IN GROUPS @ ELRC Room 20 Dr Clement Simuja to lead the reflections
12:00 – 13:00	Lunch (at ELRC)

<table>
<tr><td>13.00-14.30</td><td>PhD SEMINAR PRESENTATIONS AND FEEDBACK SESSION 1:
Group work: “My research as a national and global contribution”
3 parallel groups
<table>
<tr><th>Room 20</th><th>Room 10</th><th>Challenge Lab</th></tr>
<tr><td>Simon Lundberg:
Potential for developed intercultural history teaching beyond a best practise approach</td><td>Jonas Nilsson:
Digital transformation of education – connecting us, or dividing us?</td><td>Anna Westin:
Sense of Belonging, education and intellectual developmental disability - a national and global contribution</td></tr>
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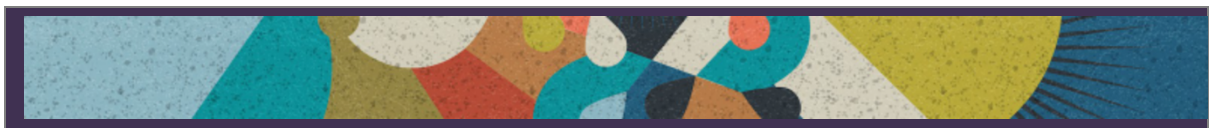
Mainstreaming inclusive education in teacher education in the context of ESD: A study in change projects from southern Africa</td></tr>
</table></td></tr>
<tr><td>14.30-15.00</td><td>Tea and coffee</td></tr>
<tr><td>15.00 – 17:30</td><td>AFTERNOON GAME DRIVE FOR SWEDISH PHDs to TEMBA PRIVATE GAME LODGE (group of 20, 14 in Swedish delegation and 4 of RU PhDs, and 2 bus drivers)
Bus will depart from the Bicycle Artwork Parking Area on Lucas Avenue at 15:00 for those going on the game drive.

For ELRC Group not accompanying Game Drive – there will be a second vehicle pick up at the Bicycle Artwork Parking Area on Lucas Avenue at 17:00 to join the dinner at Temba Private Game Lodge</td></tr>
<tr><td>17.30-19.30</td><td>Joint dinner evening event for all PhDs and accompanying academic team at TEMBA PRIVATE GAME LODGE (booking made for 30 people in total) - the lodge is 10 minutes from town, opposite Thomas Baines reserve.</td></tr>
</table>



SATURDAY 28th OCTOBER 2019

8.30-10.00	**LECTURE AND DISCUSSION: Education Foundations and Futures – introductory opening to contexts of South Africa and Sweden (interesting developments and perspectives)** Professors Heila Lotz-Sisitka and Ingrid Schudel (RU), Björn Norlin, Kirk Sullivan and Karin Sporre (UmU) - with 30 minutes for discussion Venue: Room 20 ELRC

<table>
<tr><td>10.00-10.30</td><td>Tea and coffee</td></tr>
<tr><td>10.30-12.00</td><td>PhD SEMINAR PRESENTATIONS AND FEEDBACK SESSION 2:
Group work: “My research as a national and global contribution”
Two 45 minute presentations including discussion by PhD scholars
3 parallel groups

<table>
<tr><th>Room 20</th><th>Room 10</th><th>Challenge Lab</th></tr>
<tr><td>Catharina Bergman:
Can Literature Show the Way Towards Reparative Futures?</td><td>Simon Skog:
The Contribution of Remote Teaching in a Global Perspective</td><td>Tobias Richard:
School leadership turnover: My research as a national and global contribution</td></tr>
<tr><td>Sidney Muhangi
A social ecosystem for skills approach to curriculum innovation for climate resilience in TVET colleges: A case of Eastern, South Africa</td><td>Sizakele Serami
GIS and geography teacher education
&
Iris Chimbodza:
The emergence of ESD Development teacher competences amongst pre-service teachers in a Geography Teacher Education Programme in Zimbabwe (online)</td><td>Nicci Hayes:
Flourishing in Makhanda schools</td></tr>
</table></td></tr>
<tr><td>12.00–13.00</td><td>Lunch @ ELRC</td></tr>
<tr><td>13.00-14.30</td><td>PhD SEMINAR PRESENTATIONS AND FEEDBACK SESSION 3:
Group work: “My research as a national and global contribution”
Two 45 minute presentations including discussion by PhD scholars
3 parallel groups

<table>
<tr><th>Room 20</th><th>Room 10</th><th>Challenge Lab</th></tr>
<tr><td>Susanna Sandberg:
‘A school lunch for all’ - My research as a national and global contribution</td><td>Zuhair Zahir:
Integrating computational thinking into classroom mathematics</td><td>Linn Antonsson:
Inclusive and Equitable Quality Education. The Task of Middle Managers in Local Education Administrations</td></tr>
<tr><td>Phindi Sithole
Social ecosystems for skills in aquaculture production within just transitioning of the food system:
&
Angela Chappel: School Food Gardens for a Just Transition: a case study of the social ecosystem for skills in school food gardens in the rural Eastern Cape (online)</td><td>Cosmas Kathumba:
Promoting and investigating the pre-service teachers’ computational thinking practical development in the physical sciences methods course</td><td>Lwanda Maqwelane:
Women farmers at the forefront: lessons learned from the past and international community in co-creating resilient developmental pathways for the emerging hemp industry in South Africa - to inform social learning ecosystems</td></tr>
</table></td></tr>
<tr><td>14:30 – 15:00</td><td>REFLECTIONS, WRAP UP AND PLANINING THE MOVE TO SAERA 2023</td></tr>
</table>

	Afternoon break
18:30	Dinner together at **the Pothole and Donkey, Graham Hotel** (booking for max of 30 people).
	For those with extra energy, it is the 'Springboks vs All Blacks' Rugby World Cup Final at 21:00 … which can be watched at the Pothole and Donkey after supper

NOTE ON THE WEATHER: We have been informed that it will be raining quite heavily on Saturday (hence the change in plans for the game drive from Saturday to Friday). Please also bring rain gear, warm jacket and comfortable shoes for the game drive, temperatures can be cold if the wind blows off the ocean.

Also please be sure to get SA Plug Adapters at the OR Tambo airport on your way through.

SUNDAY DEPARTURE for EAST LONDON: 10:00 AM OUTSIDE GRAHAM HOTEL, HIGH STREET

Swedish and RU PhDs depart to **SAERA Conference** depart on Sunday to join
SAERA CONFERENCE AND PROGRAMME
INFORMATION ON THE SAERA CONFERENCE WEBSITE :
https://saeraconference.co.za/

The shared seminar focus:

My research as a national and global contribution. To reflect on your work, consider the context of your work locally, and think about its relevance more widely i.e. international significance. To do this you can draw critically on the concept of educational futures and/or the sustainable development goals where relevant. Most importantly, reflect on your research and argue for its contribution.

This exercise is useful for 'making your claim to knowledge' in a context, field and wider educational arena.

DRAFT A SHORT PAPER (drawing from your proposal and/or a chapter / paper that you are working on / have recently produced / plan to present at SAERA) by 20 October … (this is to give our Swedish PhD colleagues time to read about your work). We will also share the Swedish short papers with you beforehand to help shape and inform the seminar sessions.

Word count: 2000 words (+/- 10%)

GOAL: To reflect on the relevance of the research presented / to be presented in your dissertation and broaden how the final paragraphs/sections of the conclusion are /might be articulated in relation to the Education for sustainable development SDG goals, and/or Educational Futures, in global and national contexts.

Suggested literature:

Facer, K. (2021). Futures in education: Towards an ethical practice. Paper commissioned for the UNESCO Futures of Education report. https://unesdoc.unesco.org/ark:/48223/pf0000375792.locale=en

Le Grange, L. (2023). Decolonisation and anti-racism: Challenges and opportunities for (teacher) education. The Curriculum Journal, 34:8-21. https://doi.org/10.1002/curj.193

Ramsarup, P., McGrath, S. & Lotz-Sisitka, H. (2023). Reframing skills ecosystems for sustainable and just futures. International Journal of Educational Development. (Online publication ahead of print) https://doi.org/10.1016/j.ijedudev.2023.102836

Sporre, K., Lotz-Sisitka, H. & Osbeck, C. (2022). Taking the moral authorship of children and youth seriously in times of the Anthropocene. Ethics and Education, (17)1:101-116. https://doi.org/10.1080/17449642.2021.2024991

UNESCO documents:

UNESCO (2015) Rethinking Education. Towards a Global Common Good? https://unevoc.unesco.org/e-forum/RethinkingEducation.pdf

UNESCO (2021) Reimagining Our Futures Together. A new social contract for education. https://unesdoc.unesco.org/ark:/48223/pf0000379707.locale=en

UN document:

The 17 Sustainable Development Goals: https://sdgs.un.org/goals

Seminar Programme: PhD contributions

SWEDISH PHD SCHOLAR CONTRIBUTIONS

Simon Lundberg
Potential for developed intercultural history teaching beyond a best practise approach

Anna Westin
Sense of Belonging, education and intellectual developmental disability
a national and global contribution

Jonas Nilsson
Digital transformation of education –
connecting us, or dividing us?

Susanna Sandberg
'A school lunch for all'
My research as a national and global contribution

Simon Skog
The Contribution of Remote Teaching in a Global Perspective

Linn Antonsson
Inclusive and Equitable Quality Education
The Task of Middle Managers in Local Education Administrations

Catharina Bergman
Can Literature Show the Way Towards Reparative Futures?

Zuhair Zahid
Can Literature Show the Way Towards Reparative Futures?

Tobias Richard
Leadership turnover in schools: My research as a national and global contribution

SOUTHERN AFRICAN SCHOLAR CONTRIBUTIONS

Preven Chetty :
Ecological literacy: Forgotten Rivers and Resonance Pedagogy

Lwanda Maqwelane:
Women farmers at the forefront: lessons learned from the past and international community in co-creating resilient developmental pathways for the emerging hemp industry in South Africa - to inform social learning ecosystems

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Nicci Hayes:
Flourishing in Makhanda schools

A note on the contributions: PhD Scholars in Sweden have done task this as a formal assignment as part of coursework for PhD studies.

PhD scholars at RU do not complete assignments as we do not do PhD by coursework. Works here are therefore constituted as part of 'works in progress', and are offered as summaries / contributions from different stages of the PhD study journey.

UMEÅ UNIVERSITY

Department of Education

Rhodes University/Umeå University International Exchange
PhD Week 2023

26 OCTOBER - 3 NOVEMBER 2023

Umeå University PhD Contributions

Can Literature Show the Way Towards Reparative Futures?

The aim of my dissertation is to examine education and Bildung as motifs in five contemporary Swedish working-class literary works, as well as the performative dimensions of these works, that is how the works function as sources of knowledge in an educational context. This paper is an exploration of how to make my research part of a bigger picture. I intend to highlight a few strands in three of the literary works I use as material in my study and I will then let them be engaged in dialogue with Keri Facer's view on futures in education. The purpose of this paper is to reflect upon how my research can contribute to ways of rethinking the educational system in Sweden as well as educational systems globally.

A global perspective in my study can be found in the concept of social class, but also in the conceptualization of working-class literature, that can be seen as a "world literature that move away from a literary historiography organized by national periodization to the crossings and crisscrossings of cartographies of labor" (Perera 2014: 6). That is, a genre that has expressions of experiences of labor as a cohesive force between literary works written in different nations. Class relation can be found in capitalist societies globally and that relation is a relation of power where the working-class is the part that has the least power. Working-class literature is written from a working-class perspective, which more often than not is a bottom-up perspective. The protagonist in working-class novels is sometimes a child, which enhance the bottom-up perspective as the child is subordinate to adults (Nilsson & Mieschliewitz 2011). My research is focused on Swedish novels and poems, but since there is a common ground for this type of literature regardless of country of origin I think my findings can be applied to literature from other nations and languages.

The three novels I will refer to in this paper are written by Eija Hetekivi Olsson and they form a trilogy about the protagonist Miira, who in the first novel *Ingenbarnsland* (*No child's land*, 2012) is a nine year old girl who is fifteen at the end of the novel. As a child brought up in a working-class home and as a child of immigrants, her perspective on the world is indeed bottom-up. Her world is mostly limited to the school where she experience that some of the teachers, in the novel representing hegemonic discourses, are telling her that she will not become anything, meaning she will not make a trajectory towards a future of possibilities to become anything else than a cleaner, like her mother. Keri Facer, who outlines five traditions (or orientations) for thinking about and working with ideas of the future in education" (Facer 2020: 2), claims that the reparative futures tradition is about "remembering that the past is also a site of unrealised possibilities, an abundant reservoir of lost knowledges, unfulfilled talents

and hidden capabilities, an ethics of futures in education might attend to lost futures from the past as much as projected anticipations of what is to come" (Facer 2020: 20). Hetekivi Olssons novels are bringing questions about how possibilities become unrealised and how capabilities become hidden through practices in and outside the educational system, why they are suitable to have as a starting point for a discussion about how to create a better and fair future education in my dissertation.

However, Miira is accepted to the Natural Science Program in upper secondary school and this is portrayed in *Miira* (2016). And she finds herself being in a middle-class world, in which she feels like she does not belong. She drops out of school and starts working. In the last part of the trilogy, *De unga vi dödar* (*The youths that we kill*, 2021), Miira is in her thirties. She is a student at university becoming an upper secondary school teacher in social sciences and history. The main theme in this novel is the mobbing her daughter suffer in lower secondary school.

Edutopism is a concept that refers to pedagogical utopias. There is always a dimension of utopian vision in major educational ideas, but the concept includes, besides ideas that education serves as means to achieve an utopian vision of society, notions of how education can uphold the utopian society (Peters & Freeman-Moir 2006; Wikström 2023).

In my research I bring the concept edutopism together with a concept that concerns the definition of working-class literature: utopian impulse. This concept is about the presence of a future-oriented vision that the working class has the potential to change the existing social order and to generate alternative – and better – ways of living and ways of organizing society (Friesleben Lund 2020).

However, my research shows that rather than showing us an Edutopia, the literary works, which portray contemporary working-class views and experiences of the Swedish educational system, that I use as material, are showing which damages that need to be *repaired* in the system in order to, for example, be inclusive to pupils and students outside of the middle class. The utopian impulse is somewhat present in all of the literary works, which is carried out through the protagonists and their pursuit to change the state of the present in order to make a better future. A clear vision of how a better future will look like is not articulated.

The urge to repair is visible in Hetekivi Olsson's protagonist's aim to become a brain surgeon because she wants to put things right. The dream belongs to Miira as a young girl and she has not yet started to articulate what needs to be fixed. However, she knows that she do not want her mother feeling constant back pain because of her work as a cleaner; she knows that it is unfair that she and her classmates are put in a Finnish language class (parents having

Finnish as a native tongue had the option to put their children in such classes in the 1980s, when *Ingenbarnsland* takes place). Miira thinks that not learning Swedish puts her behind Swedish native speaking pupils in terms of knowledge and the possibilities to learn more.

Later in the trilogy, in *De unga vi dödar*, she wants to change the future by becoming a teacher. Even this endeavor has a reparation goal – she wants to make things right and upheave the bad teachers she had in the past by becoming an ideal teacher, that brings perspectives Miira think is lacking in the teaching of history and social sciences. For example, she finds that the textbooks that are used in class are written from a neoliberal, patriarchal and Eurocentric perspective.

Mobbing is also a prominent issue in this novel. Miira's daughter Nova is a victim to mobbing and the school does not do enough to impede the mobbing. The head teacher of Nova's school is the person – as well as a representation of the school system – who allows the mobbing to proceed and hence causes Nova pain. The phenomenologist Sara Ahmed suggests that a perpetrator that causes trauma is also the person or institution that can heal the trauma (Ahmed 2004). The head teacher does not heal Nova's trauma. Yet, with that perspective a school or the educational system can act towards healing trauma it might have caused pupils for different reasons, like allowing mobbing or making pupils feel like they do not belong because of their social class. Miira, who strives for reparation through the trilogy, can not, however, heal her daughters trauma. The story comes to an open ending where Miira stands on the verge of the unknown, which can either be known as relief or the ultimate horror of loosing a child. Hence, there is no room for Utopia and maybe not even a future.

Hetekivi Olsson's novels seek to repair past and present damages and trauma, which somewhat alignes with Keri Facer's view on how the past and present can inform an establishment of an ethical education in the future. Facer suggests that there can be a reconciliation of history and futures. Knowledge of what injustices, trauma, violence and erasures has been done in the past (and present), can help us understand how to create futures that are "characterized by freedom and justice" (Facer 2021: 16).

Facer (2021: 19) is in her paper addressing powerful institutions to change education, namely addressing "UNESCO and others, who are seeking to mobilise communities at local and international levels around the discussion of education and its role in, for, against and beyond futures" in the end of her paper, where she is proposing elements towards an ethics of futures in education. In the proposition for the repair and healing element Facer (2021: 20) says that "[i]f there is a desire to create futures that do not reproduce the violence of the past, then an ethics of futures in education will turn itself to the task of listening to and engaging with

the experiences, desires and beliefs of those who have been harmed and marginalized, exploited and oppressed".

I argue that reading literature can give the reader knowledge about trauma and injustices. Hetekivi Olssons novels make trauma and injustices caused by, and in, the educational system. Hence, these novels have the potential to give an understanding of how to build an educational system that strives to be just and trauma free. That is, the novels can be seen as sources of knowledge. As literary works they have features that factual texts lack, namely aesthetic qualities that make it possible to *live through* portrayed experiences (Rosenblatt 1995). Facer (2020) claims that young people do not really have a voice when it comes to educational futures work. In my research I will discuss how reading working-class literature that portray experiences of being a pupil and/or a student as part of their literature education can help pupils and students reflecting on their own everyday life and thereby maybe come up with suggestions for how a better education and school would look like.

References

Facer, Karen (2021). Futures in education: Towards an ethical practice. Paper commissioned for the UNESCO Futures of Education report. https://unesdoc.unesco.org/ark:/48223/pf0000375792.locale=en

Friesleben Lund, Nicklas (2020). "Towards the Light, into the Silence: Danish Working-Class Literature Past and, Perhaps, Present", *Working-Class Literature(s). Historical and International Perspectives, volume II*, red. John Lennon & Magnus Nilsson, Stockholm 2020. http://urn.kb.se/resolve?urn=urn:nbn:se:mau:diva-37684 (15.9.2021)

Nilsson, Magnus & Sandra Mischliwietz (2011). "Barnet, arbetaren, arbetarförfattaren. Om barnet och den kulturella produktionen av klass i 1930-talets svenska arbetarlitteratur, *Tidskrift för litteraturvetenskap* 2011:2.

Hetekivi Olsson, Eija (2021). *De unga vi dödar*. Stockholm: Norstedts.

Hetekivi Olsson, Eija (2012). *Ingenbarnsland*. Stockholm: Norstedts.

Hetekivi Olsson, Eija (2016). *Miira*. Stockholm: Norstedts.

Perera, Sonali (2014). *No Country: Working-Class Writing in the Age of Globalization*. Columbia UP. https://doi-org.proxy.mau.se/10.7312/pere15194.

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Rosenblatt, Louise M. (1995). *Literature as exploration*. 5. ed. New York: Modern Language Association of America.

Wikström, Charlotte (2023). *Hjärnövermättning och hjärtehunger*. *Bildningsideal och pedagogiska visioner i Emilia Fogelklous författarskap 1902–1931*, Diss., Umeå: Umeå universitet.

Task 1, Stages 3, South africa
Simon Lundberg, PhD Student
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SIMON LINDBERG, PhD Candidate, UmU

Potential for developed intercultural history teaching beyond a best practise approach

Introduction

The purpose of this text is to briefly elaborate how my research might be understood in relation to Education for sustainable development goals (SDGs). Like the title suggest I intend to elaborate how a historical didactical study without a best practise approach indirectly still can contribute to an developed history teaching.

The Research Project

Ever since the end of the Second World War, Sweden has been changing from a relatively ethnically homogenous society into an increasingly multicultural one.[1] Compared to other EU member states, Sweden had the highest percentage of its population born outside the European Union (14 percent) in 2020 (https://ec.europa.eu/eurostat), and in 2021, 20 percent of people living in Sweden were born abroad (https://www.scb.se). It is uncontroversial to claim that this demographic development, during a relatively short span of time, has had an impact on the school which for example is visible in policy writings emphasizing that diversity is something to be affirmed and written demands in line with an intercultural approach (Samuelsson, 2017; Johansson, 2023). Despite these intercultural demands, the Swedish curriculum, and the history syllabi do not provide a simple answer to the normative question "How should the history subject relate to today's diverse society?" Tensions and contradicting formulation in the curriculum related to interculturality and epistemology enables teachers to answer above question in different ways (Brantefors, 2011; Åström Elmersjö 2021, Nordgren, 2006, Johansson, 2023).[2] Commonly research within the field of history education in ethnically and culturally heterogeneous societies has taken a normative approach in their attempts to develop models for intercultural history teaching or in other ways elaborated on a history teaching suitable for a diverse society (e.g Nordgren & Johansson 2014; Johansson, 2021; Körber, 2018; Parks, 2011) Less research-interest (at least in a national Swedish context) has been paid to teachers' thoughts and experiences of teaching history in ethnically and culturally diverse

[1] The word relatively is used to avoid the reproduction of a myth about a homogenous past. This myth ignores Sweden's national minorities and migration and their influence on social, political, and cultural development long before the Second World War.

[2] The tensions refer to are the inherent tensions within Swedish school-history between being culturally relativistic or normatively prescriptive, between nurturing culture bearers or culture builders and between in some cases urging teachers to (de)construct the historical content and in other parts reconstruct it.

classrooms even if there are exceptions, even within the Swedish and broader Nordic context (e.g. Virta 2016, Sandelin, 2020).

The aim of my research is to contribute to increased knowledge about the relationship between teachers' expressions of different roles school-history fulfill and their perceptions about what multi-ethnic classroom contexts mean for history teaching. The research aims to analyze described relationship based on 1) history teachers' statements which are anchored in their experience of teaching history in culturally and ethnically diverse classrooms, 2) history didactic theory, and 3) the educational philosopher Gert Biesta's concept for the social functions of education as an analytical tool. The described analytical framework will also be used to develop knowledge about the relationship between teachers' statements about the importance of their background and their descriptions of multi-ethnic contexts meanings for their history teaching.

The study's empirical basis consists of semi-structured interviews with 20 lower secondary school (students aged 13–15) and upper-secondary school (students aged 16–19) teachers. The empirical material is analyzed based on a reflective thematic analysis. As earlier described the analyze relies on the educational Biesta's analytical tools for various functions that education fulfills which are: qualification, socialization, and subjectification (Biesta, 2020).

The SDG

The 17 SDGs has been described as the heart of united nations 2030 Agenda for Sustainable Development which according to UN should work as a "shared blueprint for peace and prosperity for people and the planet, now and into the future" (https://sdgs.un.org/goals). A new social contract for Education is by UNESCO viewed prerequisite for repair injustices and transforming the future in a way that respect humans rights, human dignity and culturally diversity (https://unesdoc.unesco.org/ark:/48223/pf0000379707.locale=en). My research most clearly relates to goal 4 which reads: "Ensure inclusive and equitable education and promote lifelong learning opportunities for all". Even if my research also could be argued to relate to goal 16 which includes parts such as "Promotes peaceful and inclusive societies for sustainable development, provide justice for all […] I for this assignment only elaborate in relation to how my research could be understood to contribute to the progress of SDG4.

Task 1, Stages 3, South africa
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My research framed as SDG-contribution

In order to make my research's connection to SDGs understandable (and for that sake avoid a box-ticking presentation) I find it necessary start of with descriptions of some of my thesis' theoretical and philosophical underpinnings. School-history has a multi-layered moral, identity-forming, ideological and, moreover, citizen-forming potentials. My research can be seen as a contribution to an ongoing discussion about the role of school-history in a multicultural and democratic society. Highlighting ways teachers thinks differently about the role of history and multi-ethnic contexts meaning, rather than taking a best-practice-approach, is an attempt to listen to Keith Barton's warning that educational research often tends to polarize positions by generalizing from one's own experience and addressing the already convinced (Barton, 2012). The Canadian philosopher Charles Taylor has argued that the interpretation and articulation of the meaning of a social practice itself can change the actors' self-understanding and thus change the practice that the research examines (Taylor, 1985 referred in Kvale, 2015). My research might contribute to an increased awareness among teachers about how perception of the meaning of a multi-ethnic context can be understood in relation to their view on school-history's role. In other words, the contextual challenges and opportunities teacher perceive cannot be seen as disconnected from the teachers' described teaching intentions. The starting point is based on a tradition that sees context as an active relational process between the participants. It is a view that is inspired by what John Dewey defined as "transactional epistemology" - an approach that emphasizes that the knowledge we can obtain is knowledge about relationships between our actions and their consequences. The view is based on the premise that knowledge is a construction, but not a construction in our head, but in "transaction" - differently expressed in meeting and acting with the world. From a transactional perspective, we must interact with the world in order to gain knowledge about it, which inevitably means that we get to know the world as it responds to us (Dewey referred in Biesta, 2020).

Regardless of how successful the individual participant teachers are in realizing their described teaching intentions in teaching practise, the research has importance in creating a dialog between different views that other teachers can put their own practice in relation to. The direction of the dissertation study can be said to stand for a philosophy about history teaching with people in it, which aims to learn from the interviewees' thoughts, doubts, dilemmas, strategies, and ambiguities rather than a common understanding of a preferred direction. My research might in some sense contribute to that more history teachers in an informed way reflect on the expressed functions of their history teaching. That could further on contribute to make

more students, independent of ethnic identification and other group affiliation, feel that school history lessons are relevant for them which has clear connection to UNESCOs emphasis on making schools to a place were everyone is able to form their well-being (https://unesdoc.unesco.org/ark:/48223/pf0000379707.locale=en). Writing about participants teachers' reflections on diverse contexts meaning also indirectly and unavoidable contribute to the spread of strategies teachers perceive to be successful ways of using history in intercultural settings. Be a support or provision of perspective for a deepened reflecting process among history teacher rather than provide a best practice is my contribution for future changed educational practises. It can be interpreted as a respond to UNESCOs demand and conclusion that classrooms will need to be constructed and experienced differently in the future. To summarize, my contribution in relation to SDG4 should be understood as an attempt to bring new knowledge and perspective to and discussion about the role of school-history and the meaning of culturally and ethnically diverse contexts. The view on my research as a contribution in relation to above mentioned goal rest on a conviction that a reflective teacher that show a sensitive awareness of potential functional expressions of their teaching have greater opportunities to offer a history education that ensures inclusive and equitable education for all students.

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Digital transformation of education – connecting us, or dividing us?

The purpose of my Ph.D. thesis is to examine what conditions digitalization creates within music education and how pupils and teachers perceive these conditions in different compositional activities. The UNESCO report 'Reimagining Our Futures: A new social contract for education' speaks of the digital transformation of our societies having an 'unprecedented impact' on our lives and the fact that digital technology both offers opportunities and challenges for education (UNESCO 2021). For example, they mention the possibilities for digital technologies to connect and link us together, while some of the challenges include aspects of inclusion when it comes to access and knowledge of how to use the technology, commonly referred to as the 'digital divide'. This really resonates with the context of my study and some of the questions that drive me regarding the pedagogical possibilities and challenges pupils and teachers experience when composing music with digital technology.

The report also states that "technology is not neutral – it can frame actions and decision-making in ways that divide and reshape the world as well as human understanding and action" (UNESCO 2021, s. 34). This is really in line with my study where I apply a media ecological perspective. Through this perspective mediums can be seen as both extensions of our bodies and minds (possibilities), but also as amputations (limitations) of our actions (McLuhan 1964). This is due to the fact that mediums are not seen as neutral, since they have intrinsic biases that shape human actions, communication, and our construction of reality (Lum 2000). Because of this, new technology will always make an imprint and reshape the environments, or the contexts they are used in, for example in a classroom (Erixon 2016).

As both previous research and the UNESCO's report speak of the digital transformation of our society having a massive impact on our social lives and our education, I find my research to be of great importance. Because what does this impact really mean? This is a huge question and I see my contribution as a little piece of the puzzle. When it comes to my subject area, music, the most recent Swedish study, with a clear focus on digitalization and music education in compulsory school's was carried out over ten years ago. The study found evidence of a paradigm shift in the usage of digital technologies regarding online resources such as lyrics, chords, instructional videos etc. However, the lack of hard- and software in the schools of the study greatly limited the possibility to use digital resources for compositional purposes (Scheid 2014). Since this study, the numbers of pupils that have received a personal computer or iPad by their school have increased from 14 to almost 50 percent in the entire Swedish compulsory school system (Skolverket 2016, 2018) and to 75 percent in grade seven to nine (Skolverket 2018). During the last decade there has also been a rapid development of different cloud-based software for creating

music. Overall this development has greatly changed the prerequisites to use digital tools in educational compositional tasks in Sweden's lower secondary schools. However, no study has yet focused on the effects of this development. The most recent state inspection of the music subject in grade seven to nine indicate that music composition seems to be gradually shifting from an activity using traditional music instrument to an activity using different digital tools (Skolinspektionen 2019). This reinforces Websters (2011) and my own perception, as a former music teacher, that the greatest impact digitalization has had in the music subject during the last decade is within music composition. The lack of new research on this topic is what made me return to academia after 15 years as a music teacher in the compulsory school system – trying to shed some light on this development and more crucially – if someone benefits from, or is disadvantaged by this development.

The digital transformation of music education in Sweden

To understand the digital transformation of music education in Sweden, in which my study is situated I will here present a background.

In the early 1990s, Sweden saw a shift from a more society-oriented view of democracy to a more individual-oriented perspective, in line with the contemporary neoliberal transnational development trends. This transition from a welfare state to a welfare society marked a paradigm shift from a state-controlled educational system to a decentralized one (Wahlström & Sundberg 2018; Sundberg 2021; Bergviken Rensfeldt & Player-Koro 2019). During the decentralization of school governance, when municipalities took over responsibility for schools, the state's control over education changed to a model based on goal and performance management, as well as school accountability (Lingard 2013; Wahlström & Sundberg 2018; Bersviken & Player-Koro 2019).

During the 1990s, Sweden also had an increase of trust and hope in technology, both politically and in society at large, as new computer and IT companies emerged. The decentralization of the education system and this general technological optimism meant that market actors from IT companies became intertwined with political power through the formation of institutions such as the 'IT Commission' (Bergsviken Rensfeldt & Player-Koro 2019). In one of its reports, the IT Commission emphasized the importance of keeping up with technological developments, in statements such as: "falling behind in technological advancement is one of the greatest threats to a positive future in Sweden" (My translation, SOU 1994:118, p. 32). The IT Commission's report can be seen as an example of how the prevailing technological optimism at the time emphasized rapid actions to maintain Sweden's leading position in the global market (cf. Hansson 2014).

For the music subject, there were no specific provisions regarding the use of IT in the new curriculum for the compulsory school system, introduced in 1994. However, the general parts of the curriculum now fostered a positive attitude towards new technology as a tool for knowledge and learning (Forsman 2019, p. 152).

In the subsequent curriculum for the compulsory school system, adopted in 2011, there was an increased focus on measurable results, influenced by transnational discourses on measurability, particularly conveyed by actors like the OECD and the EU (Wahlström & Sundberg 2018). In 2006, the EU had adopted the policy goal of 'lifelong learning for all' in connection with what is referred to as '21st-century skills' (Forsman 2018, p. 26). To achieve this goal, digital competence was described as one of the eight key competencies that "all individuals need for personal development and development, active citizenship, social integration, and employment" (2006/962/EG). The concept of '21st-century skills' was developed by 'P21', an interest group that included various technology companies such as Microsoft, Apple, Dell, Cisco, and others with significant business interests in the digitalization of education (Forsman 2018, p. 26).

In the curriculum from 2011 (Lgr11), the term 'Digital Tools' replaced the previous term 'IT'. In the subject of music, the use of digital tools for music composition was emphasized as one of the central components of the subject for grades 4-9 and as a knowledge requirement for grades 6-9. Despite this strong emphasis on the use of digital tools and the hope for their adoption, the national evaluation of music education in 2013 shows that music composition using digital tools was not a common activity. Digital tools were not used at all in the schools that were part of the in-depth study (Skolverket 2015, p. 69). As mentioned earlier Scheid's (2014) study, conducted in 2011 also indicated that the lack of software and hardware in schools prevented the use of digital tools for music creation.

Alongside the introduction of the new curriculum in 2011, the Swedish government also adopted a goal for Sweden to "become the best in the world at using the opportunities offered by digitalization" (My translation, Prop:2011/12:1). In 2017, the government adopted a national action plan to achieve this goal. Because digital transformation in Sweden was considered to start with education, a specific action plan for the education sector was also adopted, where 'digital competence for everyone in education' was one of three focus areas (Utbildningsdepartementet 2017). The National Agency of Education (Skolverket) was given the task of implementing the digitalization strategy for the education sector and also the task of revising the curriculum. This was done through a project called 'Triple Helix – National Collection for School Digitalization', where stakeholders from education, industry, and academia were invited, which Bergviken Rensfeldt & Player-Koro (2019) argue can be seen as an example of the changing curriculum process where public governance is intertwined with and influenced by private actors and their interests (p. 53).

In this context, it can also be mentioned that Google's former CEO, Eric Schmidt's critical speech about the school's approach to digital technology at the Edinburgh TV Festival in 2011, according to Williamson et al. (2019), can be seen as a key catalyst that influenced the discourse on school digitalization in both England and Sweden. Williamson et al. (2019) describe a complex web of how key figures, commercial IT companies, nonprofit organizations, the development of alternative curricula and

teaching materials, educational fairs, and intensive lobbying at various levels, both within and between countries, contributed to the revision of the curriculum for the compulsory school system in Sweden, 2018 (Williamson et al. 2019). In this revised curriculum both programming and the concept of digital competence were introduced. However, the curriculum did not provide a definition of what digital competence entailed. The National Agency of Education only referred to the EU's definition of digital competence as one of the eight key competencies for lifelong learning (Skolverket 2017).

Epilogue

As this background demonstrates there has been quite an intense pressure on the Swedish school system to undergo a digital transformation. This pressure has many times been created by both political and commercial actors with no expertise in either education or pedagogy. As a researcher in educational science, I hope that my Ph.D. thesis and its findings will serve as a contribution to the larger body of research currently being conducted within this field and that political decisions in the future will be based on research results rather than the voices of commercial actors. Since commercial actors by their nature have economic interests, they are not necessarily keen on asking the critical questions we as researchers are obliged to do. This is essential if we are to address the global challenges and repair the injustices that UNESCO's report 'Reimagining our futures' speaks of.

The report argues that a new social contract for education must be "transformed around the principles of cooperation and solidarity, replacing longstanding modes of exclusion and individualistic competition" (UNESCO 2021, p 147). Unfortunately, the preliminary results from my study do not indicate that the use of digital technology for creating music in Sweden's' lower secondary schools has led towards such a development. First of all, my results indicate that teachers at the different schools did not share the same conditions regarding sufficient internet connection and finances to buy the software they wanted. Secondly, even if the software all my teacher informants used offered the opportunity for pupils to collaborate, they generally organized for the pupils to compose the music on their own. Lastly, my results also indicate that there is a gender difference in the pupils' attitudes toward composing music with digital technology. Girls have a more negative attitude and experience this type of composition as difficult. However, this gender difference does not exist when it comes to composing music with traditional music instruments. As a former music teacher, I find these results really interesting and important. As an aspiring researcher, I see it as my duty to convey these results to other music teachers if we are to reach a music pedagogy in the future that is based on cooperation, solidarity, and inclusion both in Sweden and elsewhere. Only when we are aware of the biases inherent in technology and how we use it can we implement it in education in such a way that it does not discriminate, but rather enables for future generations to connect with each other.

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Tobias Richard - School Leader Turnover: My research as a national and global contribution

Introduction

In a world facing challenges that cannot be solved by one country or continent alone, it stands clear that education systems must address issues overarching the local level. Hence, understanding and problematizing the purpose and effects of an education system becomes more than just a national concern. One of the UN sustainable development goals posits to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations, 2015). This goal aims to create a universal system of education that is both inclusive and provides quality learning opportunities for individuals at all stages of life. The goal pays particular attention to reducing gaps in educational access and outcomes, in relation to various societal or social factors.

One important part when trying to achieve standards of education from a global perspective, is to address the leadership level within the education system (Bush, 2020). As countries strive to develop skills addressing and facilitating both local needs and global challenges, both the continuity and visions of school leaders become important. Overall, school leaders are important in the process of transforming schools into sustainable organizations with sustainable structures and cultures that are able to handle challenges regarding both working environment and the content of education (Merchant et al., 2012). Thus, moving an organization and its staff from point A to point B is essentially what leadership in general and school leadership in particular, is all about (Yukl, 1989).

One central aspect of creating a sustainable education system is to ensure a school leadership stability and continuity. The frequency with which school leaders come and go can greatly influence the stability and long-term success of educational institutions (Yan, 2023). School leader turnover is not just a localized event; its repercussions can echo throughout the global educational community, affecting policies, methodologies, and the overall approach to imparting knowledge in our interconnected world. By delving into the research on principal turnover, we uncover the patterns, causes, and consequences that shape not just individual schools or districts, but the broader global educational landscape.

My research project

The issue of school leader turnover is a significant challenge in Sweden (Arvidsson et al., 2021), as well as on an international level (Snodgrass Rangel, 2018). In Sweden, the annual turnover rate of school leaders stands at an alarming 20-30% (Thelin, 2020), resulting in a median tenure of a mere three years at their current workplace, a figure that is shorter than the average tenure in other Nordic countries and the broader OECD average (OECD, 2019).

This high turnover rate has been identified by the National Agency for Education and the Swedish School Inspection Authority as a critical issue with far-reaching consequences for the education system (Thelin, 2020). The high turnover rate leads to a disproportionately large number of novice school leaders within the school system, which in turn sets off related challenges. Thus, The Teaching and Learning International Survey (TALIS) has provided evidence that Swedish school leaders have less experience as former teachers and current school leaders compared to the OECD average (OECD, 2019).

The repercussions of high principal turnover are manifold and have implications not only for the school leaders themselves but also for the broader school community (Béteille et al., 2012; Leithwood et al., 2010). The phenomenon of school leaders leaving their work is associated with the turnover of teachers (Sun & Wang, 2017) and school leader colleagues (Bartanen et al., 2021), negative impact on both student outcomes (Bartanen et al., 2019) and school development (Grissom et al., 2021). Schools that experience frequent leadership changes struggle to develop effective and sustainable organizational structures, which are crucial for promoting growth and success. Instead, these schools find themselves in a perpetual cycle of restarting initiatives and processes, hindering the development of the stability necessary for optimal performance.

Results so far

The two first studies of the dissertation explore the turnover intentions of novice school leaders in the context of psycho-social working conditions, organizational factors and leadership. Preliminary results suggested differences in turnover intentions based on whether the school leader was affiliated with a public or private entity. However, when controlling for organizational factors, such as organizational clarity and prerequisites, this distinction vanished. The study identified a pronounced link between turnover intention and the interplay of demands, autonomy, and support. Specifically, school leaders with low demands, increased

autonomy, and robust support demonstrated the least inclination towards turnover. In contrast, those facing high demands, limited autonomy, and inadequate support exhibited the most. This correlation remained robust across various actors and school levels, suggesting that working conditions play a pivotal role in shaping turnover intentions for school leaders, irrespective of their affiliations or school levels.

My research in a global perspective

My research sheds critical light on the nuances of school leader turnover, emphasizing its implications on the broader educational system. By analyzing turnover intentions in relation to psycho-social working conditions, the findings highlight the universal impact of demand, autonomy, and support levels on leaders' decisions to remain or depart. Such findings underscore that a sustainable education system is deeply intertwined with the sustainability of the leaders' work environment.

To recognize in what way the problem of school leader turnover may play a part in the sustainability issues globally we must first reflect upon an important ethical concern associated to the education system. This is how school leader turnover impact the voice of children in the education system. A sustainable leadership may have great impact on the culture that influence teachers' views on children, their rights and how their wishes and opinions are taken serious or not. The perspective articulated by Sporre et al., (2022) highlights a critical issue, highly associated to education, where children primarily are characterized by their lack of adult attributes such as autonomy and rationality. This viewpoint reinforces the idea that the value of a child's life is only seen through the lens of their transition into adulthood. Low turnover in leadership positions fosters a stable, consistent environment (Snodgrass Rangel, 2018) where the values of listening to and acknowledging children's moral authorship can be evolved and deeply integrated into the institution's culture. This continuity can be critical for children's reflexive engagements with the world. It also helps to solidify relationships with parents and the broader community, creating a unified approach to education that appreciates children as moral authors. Sustainable school leadership, therefore, serves as a critical factor in transforming educational spaces into platforms that uphold the intrinsic worth and moral agency of each child. However, the lack of school leader continuity may to the same extent impair the culture that recognize children as 'real' human beings whose lives possess intrinsic value in the present moment, independent of their potential future contributions or transformations. This

perspective aligns not only with broader notions of justice and equality but also enriches ethical theory by capturing the full scope of human experience.

The Pivotal Role of Leadership in Educational Systems

Leadership in education is pivotal for bridging policy with practice, converting broad educational aims into concrete strategies (Ärlestig & Johansson, 2020). In educational institutions, leaders not only drive academic achievements but also shape societal values, thereby influencing the society of tomorrow (Bush, 2020). Visionary leaders emphasize sustainability and long-term societal welfare in their approaches. Given this crucial role, the recurring phenomenon of school leader turnover is alarming, as it threatens to undermine these vital functions.

The sudden exit of a school leader has profound repercussions on the educational ecosystem. Over time, staff morale can decline, particularly if they were aligned with the departing leader's vision (Sun & Wang, 2017). This instability can strain relationships with external stakeholders, like parents and community organizations, who had fostered trust with the previous leadership (Prado Tuma & Spillane, 2019). It disrupts the consistent application of policies, challenging efforts towards educational equality and demanding additional interventions from educational authorities.

On the international stage, the implications deepen. Consistent leadership turnover not only impacts localized school outcomes but could also hinder global collaborations. In our interconnected world, inconsistent leadership can widen educational gaps, weaken global educational alliances, and deviate from the ambitions of the UN sustainable development goals. Stable leadership, thus, becomes paramount for advancing inclusive educational endeavors.

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Stages in the research process 3
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‘A school lunch for all’

My research as a national and global contribution

Introduction and study aim

Each school day in Sweden, approximately 1,3 million tax-funded servings of lunches are prepared and served to pupils in compulsory school age (6-15 years) (Swedish Food Agency, 2015). The school lunch is directed by the Swedish educational act, stating the obligation for all schools to serve a free and nutritious meal daily (SFS 2010:800). The historical evolution of the school lunch in Sweden unveils insights into the roots of the welfare system, as it has served as a promoter of equality among children and as it can be utilized for educational outcomes. The today almost century long welfare-concept of serving lunch was initially a matter of poor relief for families in need, later on evolving to include all school children aiming to foster and food-educated healthier citizens for the future (Gullberg, 2006). Guidelines by the Swedish Food Agency (2019) are promoting the healthy and nutritional aspects of the school lunch, but are also encouraging the school lunch to be taste, safe, sustainable, a pleasant occasion and to be integrated into curricular activities. Over the years, research worldwide has approached the school lunch from various interest topics, ranging from public health matters (Ask et al., 2010), educational aspects (Sepp & Hoijer, 2016) and the facets of school lunch as a social learning space (Lalli, 2020) However, little is known about the school lunch from a perspective of inclusive education and in relation to pupils in need of special education. The purpose of this research project is, therefore, to contribute to knowledge of the school lunch in relation to the theoretical framework ‘*A school lunch for all*’ and further explore the experiences of the school lunch for pupils diagnosed with neuropsychiatric disorders.

In the research project the theoretical framework *‘school lunch for all*’ is constructed as an analytical lens, built up by the democratic-oriented

definition of 'a school for all' and inclusive education (Gadler, 2011; Göransson & Nilholm, 2014) Drawn from these definitions, '*a school lunch for all*' underscores the creation of communities as central, where the school lunch is hospitable and where all pupils are valued members with equal rights, who are being cared for and respected for their diversity. The perspective will be underpinned by three facets of inclusion defined by Asp Onsjö (2006) as a spatial, social and didactic aspect. The spatial aspect concerns the physical placement of pupil and being part of the same environment and the activities in it. Social inclusion refers to interaction among pupils and school staff, where supportive and positive relationships are promoted and didactic inclusion concerns the conditions and possibilities to develop pupil's learning.

Research contribution and the relation to sustainable development goals

One of the key achievements of this research is to shed light on the importance of creating inclusive and accessible environments within schools, particularly when it comes to the school lunch setting. By examining the specific needs and challenges faced by pupils with neuropsychiatric disorders, the research offers valuable insights into the ways in which schools can ensure equal access to nutritious school lunches and a positive dining experience. Enhancing the school restaurant environment, may in turn be beneficial to all pupils, regardless of their background and needs. In a national context, by analysing the current practices and identifying areas of improvement, this research can contribute to the ongoing discussions and efforts toward improving the overall quality of the organisation of the Swedish school lunch. The findings may help inform the development of guidelines and strengthen existing school lunch policies and additionally ground for implementation of targeted interventions and support systems for pupils with disabilities, policies that are today based on limited research ground (Kost och Näring, 2023). The research project approaches '*a school lunch for all*' from different angles, not only from the pupil's perspective. One of the papers

within the project explores how school lunch staff describe their role and responsibilities in relation to the school lunch, which is also discussed in relation to the overall theoretical framework. The research finding describes the school lunch staff as an unacknowledged profession, who described lack of opportunities to be heard and influence in matters that concerned their daily job. The results may serve as a catalyst to strengthen the collaboration between the school lunch staff and decisions-makers in relation to the school lunch.

Moreover, the research project presented holds implications beyond the borders of Sweden. By publishing research on the school lunch, Sweden can serve as a model that other countries can learn from and adapt to their local contexts. School lunches were introduced in Sweden over 100 years ago with the aim of providing all children, regardless of socio-economic background, a free meal. School lunches have had an important impact on promoting health and reducing socio-economic disparities, albeit today the goal has shifted towards a public-health related focus (Swedish food agency, 2019). However, with the historical school lunch purpose in mind, education systems around the world can recognizing the potential of the school lunch as an opportunity to address social inequalities and advance social cohesion in their societies. These arguments tie on to both number 2 and 10 of the 17 UN sustainable development goals, aiming to '*end hunger, achieve food security and improved nutrition and promote sustainable agriculture'* and '*reduce inequalities within and among countries'*.

In Sweden, the school lunch is considered a teaching occasion. The activity where teachers eat together with pupils, is called 'pedagogic meal' and promotes the teacher to act as a role model and educate pupils about food and healthy eating (Osowski, Goranzon, & Fjellstrom, 2013). The is a learning environment and the school lunch are promoted by the Swedish Food Agency (2019) to be used as a pedagogical tool, with purpose to educate pupils about a sustainable and healthy lifestyle. As stated in the National guidelines for school meals (2019): *'the school lunch can be used to spark curiosity agriculture, ecology or mathematics or to discuss culture, society and democracy'*. Research on school lunches and the

concept of 'pedagogical meal' can serve as an inspiring model for international contexts to adapt, when aiming to educate their young citizens about sustainable and healthy lifestyle. This contribution to society aligns with the 4th goal for sustainable development, which focuses on quality education for all. Examining the 4th goal in detail, it also specifies inclusive environments in target 4.a:

'Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all'

This statement emphasizes the need to create learning environments that accommodate the diverse needs of pupils, regardless of their individual backgrounds, abilities, or disabilities, something that are specifically examined in this research project, with the school restaurant as a guiding example.

Furthermore, the research also has broader societal implications related to health and nutrition, relating to the SDG goal number 3, *good health and well-being*. In recent years, there has been an increasing concern about the high prevalence of childhood obesity and its associated health risks (Nga et al., 2019). It is well-established that a healthy diet during childhood is essential for growth, development, and the prevention of various chronic diseases in adulthood. The school lunch, both in relation to food education and the served meal, play a crucial role in shaping the eating habits and overall nutrition of children and has gained significant attention as a potential solution to improve child nutrition, facilitate the development of healthy eating habits, and reduce or prevent obesity (Andersen et al., 2014; Sabinsky, Toft, Sommer, & Tetens, 2019). By ensuring that all students have equal access to nutritious meals and a positive dining experience, schools can contribute to reducing health inequalities and promoting healthy lifestyles among the younger generation. This, in turn, can lead to long-term positive health outcomes.

Considering the school lunch as a part of food education, it is also relevant to explore it´s connections to our societal challenges regarding sustainable food production and consumption. Food education during school lunch may help pupils to understand the behavioural aspects of food choices and eating habits which in turn can serve as a lever to promote responsible consumption. Food education for a sustainable future can be connected to Facer´s (2021) argumentation which emphasises that future education is geared towards young people to adapt and transform in response to imminent climate challenges. Viewing food education as a form of preparation aligns to the 12th SDG, r*esponsible consumption and production*. Finally, on an organizational level the school lunch has other benefits related to the 12th SDG, as public meals can be a part of the shift towards sustainable food transition, by for example serving plant-based meals and work in frontline towards reduce of food waste.

Concluding remarks

This research underscores the vital role of inclusive and accessible school environments, especially in the context of school lunches. By examining the current practices in relation to the theoretical framework 'a school lunch for all', this study can to provide valuable insights and conclusion to enhance the organisation of the school lunch nationally and give ripples on the water worldwide. The findings can guide policymakers in developing guidelines and strengthening existing policies, bridging gaps in research.

Beyond Sweden, the research positions the country as a model for addressing social inequalities through school lunches. With historical significance, school lunches can address global goals, including limiting hunger, reducing inequalities, and promoting quality education. The 'pedagogical meal' concept, where teachers educate pupils about food and meals, aligns with assuring quality education to all (SDG). Furthermore, the research extends to health (SDG 3) by addressing childhood obesity, promoting healthy eating habits, and contributing to responsible consumption (SDG 12) through reduced food waste and plant-based meal

initiatives. By informing educational policies and practices in Sweden, serving as a potential model for other countries, contributing to the global conversation regarding school lunches, this research can create positive impacts.

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UMEÅ UNIVERSITET

The Contribution of Remote Teaching in a Global Perspective

Introduction

This assignment seeks to display how my research can make a national and global contribution. I start with a brief presentation of my research, and then shortly discuss the sustainable development goals (SDG) of the United Nations in their Agenda 2030. After that, I will argue for and problematize my research's contribution to the SDGs.

The Research Project

My research concerns remote teaching in K-12 schooling in Sweden. Remote teaching has only been an allowed teaching practice since 2015. It is described in the Swedish Educational Act (SFS 2010:800) as an interactive and synchronous form of distance teaching that is conducted with information and communication technology (ICT) in which teachers and students are separated in space, but not in time. A *facilitator* must moreover be on site with the students to manage social and practical issues in class, and students must be on the premises at a school unit's disposal (Pettersson & Olofsson, 2019).

The development of remote teaching in Sweden has to do with societal changes and school needs (Öjefors Stark & From, 2020). From the 1970s onwards, urbanization caused extensive closures of schools in sparsely populated areas. Due to the difficulty of finding qualified teachers, remote teaching appeared as a way to realize the vision of an equal and accessible school for all students regardless of place of residence. Remote teaching is, however, of a complementary nature in Sweden, as students are enrolled in a brick-and-mortar school and only have a few lessons with remote teaching each week in certain subjects. It is also limited in terms of age groups, scope, and subjects (Öjefors Stark & From, 2020) and has foremost concerned modern languages, mother tongue tuition, and Sami language[1] so far (Pettersson & Hjelm, 2020).

Regarding the use of remote teaching, it is mostly employed in sparsely populated areas with small school units in rather remote places. These school units therefore often collaborate and share a remote teacher, which means that the class can consist of, not only one student group but

[1] The language of the indigenous population in Sweden, the Sami.

two student groups participating from different locations. This makes the teaching situation different from traditional face-to-face teaching, along with the addition of the on-site facilitator. Based on this brief outline, my research more specifically concerns remote teaching as a new sort of *formal teaching practice,* and how the format of remote teaching affects the *pedagogical processes* in the teaching situation.

Halfway through the research project, a few things can be concluded. Remote teaching in Sweden does contribute to accessible and equivalent education. Without it, schools in remote places would not be able to offer qualified teachers in modern languages to students or even the possibility to choose a certain modern language to study (Stenman & Pettersson, 2020). In mother tongue tuition, on the other side, remote teaching above all means reduced logistics for teachers and the possibility for teachers to teach students from several different schools at the same time in larger cities (Pettersson & Hjelm, 2020). Something else that can also be noted is that administrative efforts and practical arrangements are required for remote teaching to be functional. For example, coordination between school units in terms of scheduling and the provision of a facilitator and a well-functioning digital infrastructure, such as a stable Internet connection and functional digital equipment at the school units. Other conclusions relate to the actual implementation of teaching. In particular, the cooperation between teachers and facilitators is of great importance for teaching (Skog, 2022). The facilitator is the person who welcomes the students into the classroom, starts the digital meeting with the teacher, troubleshoots technical problems, and ensures that there is peace and quiet during class. Furthermore, the facilitator can repeat the teacher's instructions, answer students' questions, and point out when students need help from the teacher. The facilitator's feedback to the teacher after the lesson is also of great importance. The conclusions therefore indicate that, in cases where the groups are large (10-20 students), the facilitator is a practical, social, and pedagogical resource, hence a resource indispensable for the teacher.

The SDG:s

What characterized modernity during the 20th century is the idea that the future is not given, but can be shaped by the individual's own choices (Lundgren, 1999). The basis for this, both at the individual and societal level, has been about education as a means to different ends. Ends that

have concerned individual goal achievement as well as political agendas to educate people to build a more functional and prosperous society and future. This has, however, not been the case everywhere in the world, and still isn't (Facer, 2021). To achieve more sustainable development UN has formulated 17 goals in its Agenda 2030 (United Nations, 2023). They span many issues, for example, decent work and economic growth, reduced inequalities, sustainable cities and communities, and quality of education. Concerning my research goal, number 4 is the most relevant one. It reads: 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' (United Nations, 2023). This goal points to the importance that every child is allowed to partake in education. United Nations (2023) argues that our common future relies on the shaping of young minds by giving them an equitable quality of education. This is also emphasized by UNESCO (2022), which states that "families, communities, and governments around the world know well that, despite shortcomings, schools and education systems can create opportunities and provide routes for individual and collective advancement." (p 10.)

Contribution to a global perspective?

Remote teaching is not a new phenomenon from a global perspective. In the U.S., Australia, and Canada it has been offered for over two decades on different educational levels comprising more and more students. And, as discussed above, my research confirms that remote teaching as a means of delivering education can be beneficial in terms of accessibility and equity. In some respects, this is a democratic aspect, providing education regardless of place of residence. Therefore, it can be connected to SDG number 4: 'Quality education', but also to number 10: 'Reduced inequalities'. As both Facer (2021) and UNESCO (2022) argue, quality education is the foundation and driver of personal development and well-being and of progress towards a more sustainable future at a societal level. The matter of qualified teachers and a wider range of subjects to secure the quality of education is something that Tawil and Locatelli (2015) point to. Even if it is not like in Swedish schools, where all students have access to a computer, some form of remote teaching can take place if there is a stable Internet connection and the possibility to show the teacher on a large screen. This can create an opportunity for expert knowledge in certain subjects, for example, expertise in environmental and sustainability issues or health issues. Remote teaching can also promote collaboration between schools in the same region. If

one school is lacking a qualified teacher in a certain subject, another school may take part in the teaching via synchronous remote solutions.

Another possibility with remote teaching that aligns with the SDGs is that it can bring together students from different locations. Students from different parts of a nation or the world can meet synchronously so that life experiences as well as cultural and religious experiences can be exchanged. This kind of gathering may therefore bring understanding to cultural and religious differences and may overcome and rectify preconceived ideas as well as widen the horizons (Tawil & Locatelli, 2015). This may also strengthen the voices of the students and give them a sense of belonging in a larger context (Sporre et al., 2022).

However, recently the Covid-19 pandemic put remote teaching in the spotlight. Although the kind of ‘emergency remote teaching’ school switched to had little in common with regular remote teaching, it revealed problems that arise when education becomes dependent on digital solutions. Inequalities in access to digital technology and other aspects related to socioeconomic factors were made visible (Johnson et al., 2023). In Swedish schools, all students have access to a computer of their own as said, but this is not the case in all countries. On the contrary, worldwide, many schools struggle to maintain good digital infrastructure and even to equip a classroom where it is possible to connect a teacher remotely (Johnson et al., 2023). These 'digital divide' issues are highlighted and problematized by UNESCO (2022), and they state that digitalization in many ways has increased inequality in education from a global perspective. This is true, because, even in the case of some form of basic remote teaching, the critical point must be overcome, which is the question of sufficient quality in terms of image and sound. But as UNESCO (2022) states, the tide of digitalization can’t be reversed, and therefore the affordance of digitalization has to be recognized in the re-vision of education for a global common good as Tawil and Locatelli (2015) argue. I believe remote teaching can be a part of that re-visioning towards a more equal and sustainable future as it all begins with accessible education. But as the conclusions of my research also show, this requires political decisions and courage. Financial resources need to be directed towards developing practical conditions for school units to conduct remote teaching, and in addition, teachers and facilitators need to be given the opportunity for regular and collegial in-service training.

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Sense of Belonging, education and intellectual developmental disability

a national and global contribution

Introduction

In the text below, my research is presented as a national and global contribution. First by describing Sense of Belonging and education for students with and Intellectual and Developmental Disability (IDD), that also includes Sense of Belonging in school and friendship in the students' everyday life. I then reflect and argue about my own research and its contribution based on Education for sustainable development (SDG- goals) and the future of education.

Brief description of the purpose of my study

In my dissertation project, I interview parents of children with Down Syndrome (DS) and students aged 9-14 labelled with IDD. The overall purpose of the thesis is to study the Sense of Belonging in school and friendship among students with IDD. The purpose is also to investigate the Sense of Belonging of parents of children with DS to parents in the child's class and their perception of their child's Sense of Belonging in the class in both short and long term. This in order to see how the learning environment can create conditions for students' social community and learning.

Sense of Belonging

Sense of Belonging has been described in studies as containing components such as inclusion, respect, acceptance, and support (Baumeister & Leary, 1995; Hagerty et al., 1992). One way of understanding belonging is related to something that someone is considered to 'be', for example through the categories and classifications that follow the welfare state's measures for support and assistance. Another way to understand the aspects of belonging

is to analyse the direction in which someone 'becomes'. Here, the continuously ongoing and changing aspects of belonging processes are emphasized. Regardless of what the person is considered to be (for example, how the environment categorizes), we can always adapt in different ways to the fact that we are 'on the way' in a certain direction or towards a certain belonging. Belonging is also spoken of as a lack of belonging outside the home, and that belonging is connected to social places, identities, and a Sense of Belonging, as well as how the individual stories are understood and connected to a Sense of Belonging (Phoenix & Faulstich Orellana, 2021). A third way of approaching belonging is to consider the 'longing' aspect of belonging. For example, people's wishes and dreams come into focus. In the aspect of longing, there are great opportunities to understand, for example, the parental perspective and the student's perspective, not least when it comes to how people develop and deal with everyday life and sometimes contradictory affiliations in the borderland between welfare arenas and civil society arenas (Hämäläinen, 2012).

The Sense of Belonging is a basic human need because people want to be socially connected to other people, to feel accepted and to be part of a group (Pesonen, 2016). Belonging is an important aspect when children's learning environment is evaluated (Peers & Fleer, 2014). Belonging is human existence, from everyday events an understanding of children's life experiences is created, their being changes to becoming (that child becomes). According to previous studies (Molin, 2020), the concept of identity has been discussed and how the concept can be understood in relation to other related concepts. Deaux and Ethier (1998) claim, for example, that social identities are constructions of the self that relate the person to a category or collective. Here above, it is illustrated how this meaning is often anchored in forms of alternative activity that take place in the borderland between school and civil society (for example in free time, on the Internet and social media). Yuval-Davis (2006) believes that identity narratives can shift, change, and be questioned and that identity is a transition that always produces itself through the combined processes of being, becoming, belonging and a longing to belong. This duality is often reflected in narratives of identity. As a rule, the more threatened and less secure they feel, the emotional components of people's constructions of themselves and their identities become more central. According to Karlsudd (2021), it is important that students have influence over the learning environment and activities in order for them to feel belonging and increased self-esteem. Teachers who are responsive can also pay attention to and confirm what the student is good at or in which the student needs support, which also strengthens the student's Sense of Belonging.

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Education and intellectual developmental disability

According to *The Right to Education for People with Disabilities* (UNESCO, 2019), individual differences should be viewed as *"opportunities to enrich learning rather than problems to be fixed"* (p .6), where teachers who have the knowledge and skills to teach inclusively are encouraged for employment. At the beginning of the 20th century, [Swedish] children labelled as uneducable were placed in institutions (Sandin & Sundkvist, 2014), and according to Göransson et al. (2021) the main reason for this placement was to protect the other students from the labelled students and vice versa.

Inclusion is a large part of the Swedish school system and is based on the Education Act (SFS 2010:800) which aims to ensure that everyone has the right to equal conditions for education. In Sweden, students have compulsory schooling in primary school, from pre-school class up to grade 9. There is also a special form of school for students with a diagnosis of IDD, the adapted primary school with its own curriculum. Students who have an IDD diagnosis can attend the adapted school or be integrated into the regular primary school. The Swedish school must strive for social community that gives students security at school (*Curriculum for primary school, preschool class, and after-school centre* [Lgr22], 2022; *Curriculum for adapted primary school* [Lgra22], 2022), where education must promote social community that creates a good foundation for active participation in community life (SFS 2010:800). Through the school's strive towards a social community, security is created and the students' desire to learn (Lgr22; Lgra22). Both within the primary school and the adapted primary school, a balance is needed between the social goals and the creation of safety and teaching. In order to create conditions for students' social community and learning, the students' voice needs to be heard (see e.g., Sporre et al., 2022).

At school, it can be difficult to pay attention to the student's difficulties when they arise in interaction with the teacher and the surrounding school environment (SOU 2021:11). Nilholm (2019) believes that there are preconceived notions about students labelled with IDD, where students are seen as a problem rather than an asset.

A Sense of Belonging in school can vary, and the social relationships are important for students to have a meaningful school day. Students spend a large part of their lives at school, so it is important that they feel a Sense of Belonging and have friends. Students with IDD often have a limited everyday life, and many express a lack of friends. Studies (Dolva et al., 2019) show that young [Norwegian] students with DS have one or more friends, however, it can be difficult to determine who is a friend, best friend, acquaintance, or neighbour, as the young people's definition of friendship differs. Several young people expressed loneliness, stories of past peer relationships and

pretend friends, and their free time was spent mainly with family or alone. They spent some time on the internet but were not active on social media.

The future of education and education for sustainable development (SDG-goals)

In Swedish schools, all students have the right to support if there is a need for it (SFS 2010:800). Education must create conditions which need to be provided so that the student reaches the school's goals, both social and knowledge goals, including inclusion, justice, cooperation, and solidarity to create participation (UNESCO, 2021).

My study focuses on ethics associated with exclusion and discrimination, and education of people with disabilities. Interviewing parent to students with DS regarding Sense of Belonging and friendship in school and during leisure time, the study draws on the theory Politics of Belonging (Yuval-Davis, 2006, 2011) and shares parents' Sense of Belonging to other parents and their perception of their child's Sense of Belonging. I also interview students with IDD age 9-14, about their future dreams, and the importance of friendship in school and leisure to enabling a Sense of Belonging.

A national contribution with my research concerns schools, both primary and adapted schools, that includes students with IDD. My research does not focus on the school forms, but on the students. During interviews with parents to children with DS, it emerges that in the meeting with principals, teachers and special educators in the primary school, there is a preconceived notion that children with DS should attend the adapted primary school, based solely on the DS diagnosis. There, it is important for principals to receive the students in primary school without judging them in advance, to let them start school, based on the students' conditions and needs, and when difficulties arise, proceed with mapping the learning environment. Globally it looks different, but my thoughts can be applied globally. It is basically about a view of people, but also about norms, deviation, and social constructions. It looks different in different countries regarding how education is organized, but there is a consensus that all students should be included (UNESCO, 1994). Listening to students is, according to Sporre et al. (2022), a part of autonomy, having faith in their ability and narrative.

During my interviews with students with IDD (under analysis), the students talk about their future jobs, for example working as a pilot, school nurse, baker and chef, hairdresser and driving cars. Just because they have an IDD

it doesn't mean that they haven't got dreams, on the contrary, getting to dream about the future is part of the meaning of life.

The relationship between education and the future is taken for granted (Facer, 2021). I somewhat agree with that, as far as the norm is concerned. When it comes to students with IDD, I don't see that connection as many of them are not offered jobs because of their disability. According to Facer (2021), the future of education is based on design and planning when it comes to long-term educational planning decisions, for example in the development and construction of new schools. Where are we today, where are we going and what do we want the schools to look like in the future? Based on the Education for sustainable development (SDG-goals) (United Nations, n.d.) and the future of education, I highlight the importance of three goals: no 3 *Good health and well-being*, no 4 *Quality education*, and no 16 *Peace, justice, and strong institutions*. *Good health and well-being* can be linked to the Sense of Belonging in school, *Quality education* is linked to the third goal where I mean that it is easier to absorb teaching if you feel well, but that there must also be trained teachers who offer a qualitative teaching. I link *Peace, justice, and strong institutions* to school which is an institution by accepting students for who they are, being a safe place, and that teaching takes place under equal conditions.

To summarize the above SDG-goals (United Nations, n.d.) for students with DS and IDD, I believe that a Sense of Belonging is linked to good health and well-being. If a student feels good at school, it is easier to acquire knowledge. When it comes to students with DS and IDD, it is important that teachers have the skills to teach this target group, but they must also understand that all students are individuals and that they are not their diagnosis. Teachers must teach with consideration of students' conditions and needs. The school as an institution is extremely important, students must feel welcome and included, and the school must be a safe and fair place for all students. Despite the free school choice in Sweden (SFS 2010:800), there is an assumption that students with DS or IDD must attend the adapted primary school, which can result in students with DS and IDD who attends primary school not getting their needs accommodated due to lack of knowledge.

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Integrating computational thinking into classroom mathematics

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A glimpse of my study

My doctoral project was motivated by the popularity of computer science in society, which led to initiatives to introduce computational thinking, a set of mental tools that allows one to think and solve problems like a computer scientist, into school curricula. While there is no agreement on the most appropriate way of the introduction, mathematics often is opted as the most appropriate subject to bring the notion into the classroom. My project, therefore, aims to contribute to gaining more insight into how this notion could be embedded in teaching and learning mathematics.

My project has two parts. The first part was inspired by the role of teachers as the critical element in transforming education. The close connection between mathematics and computer science was a starting argument for introducing computational thinking to mathematics teachers. Unlike teachers from other fields, mathematics teachers don't likely need to learn the content and pedagogy of computer science from scratch. They have already possessed their professional knowledge as mathematics teachers, and some parts of their knowledge could be interwoven with the knowledge required to bring CT into the classroom. My study explores how mathematics teachers view the computational thinking aspects when they reflect on their professional knowledge. Data reveals that computational thinking is predominantly associated with problem-solving. Some aspects of computational thinking, such as generalization and decomposition, were already familiar within mathematics education, allowing teachers to comprehend the concepts easily. However, abstraction is an exception. Grasping abstraction is an obstacle for teachers since they preconceive the aspect associated with the abstract nature of mathematical objects.

The second part of the project is exploring a didactical situation that exposes students to computational thinking and investigating if the situation could help or not help them in learning mathematics. Programming plays an essential role in this part due to an argument that it is a practical way to introduce students to computational thinking. A didactical situation was designed so that students could work to solve mathematics problems through programming. Students were observed and recorded when working on the problems. Preliminary analysis shows that when students engage in computational thinking practices, they create a sequence of reasoning creatively. This led to a tentative conclusion that exposing students to computational thinking in classroom mathematics could help them in learning mathematics.

In this text, I start by discussing computational thinking, a significant notion that colors studies in my project. The next part discusses the contribution of my project under the frame of sustainable development goals.

Computational thinking

Seymour Papert first mentioned the expression of computational thinking in his book Mindstorm (Papert, 2020). He built constructionism, a learning theory based on Jean Piaget's constructivism which advocates encouraging students to independently explore and discover new ideas rather than being told what to learn. Papert transformed Piaget's theory by adding that learning is effective when students are involved in the hands-on, active construction of meaningful objects. To facilitate students with the construction, Papert built LOGO, the first programming language intended for educational purposes that allow students to create, manipulate, and communicate with computational objects (Feurzeig et al., 1970, 2011). For Papert, computational thinking results from a constructionist approach to the education (Lodi & Martini, 2021).

The notion of computational thinking got a renaissance when Jeanette Wing brought it to the forefront of computer science educators with her seminal paper in 2006 (Wing, 2006). She characterized computational thinking as "recursive thinking" drawn from fundamental computer science concepts. Computational thinking shares abstraction with mathematical thinking as a mental tool for solving problems, and it requires an understanding of how a computer works so that one can use it to automate abstraction (Wing, 2008). Despite its vague characterization at that time, Wing believed people would benefit from mastering computational thinking (Wing, 2006). She argued that computer and computational thinking "will touch everyone directly or indirectly" since the indispensable change that the computer has made to how people work and that computational methods have influenced almost all research areas. Computer simulation is heavily used in all scientific fields and has triggered the emergence of new computationally influenced subfields, such as computational biology and computational microeconomy (Wing, 2008). In Wing's vision, computational thinking skills must complete the 3R analytical abilities (reading, writing, and arithmetic) currently learned by students in compulsory school (Wing, 2006).

Wing's idea of having computational thinking spread across disciplines ignited profound discussion in computer science, which has needed help articulating the scope of the field and has been burdened by the stigma that computer science is the same as the programming (Denning, 2009). While the computer science community accepted Wing's idea that computation has strongly influenced people's lives (Bundy, 2007) and that automation has changed people's work (Guzdial, 2008), many questioned the vague definition of Wing's computational thinking. If computational thinking, for instance, is characterized by abstraction, what makes it different from mathematical thinking, which already has been using abstraction for a long time? What could distinguish thinking recursively in computational thinking from what philosophers have done when they think about thinking? Another concern is decomposition, which characterizes not only

computational thinking but also problem-solving in general (Hemmendinger, 2010). Characterizing computational thinking has become a central issue for computer science educators' work since then, and the community still needs to agree on its definition. However, it did not prevent researchers from starting an initiative to impose computational thinking into K-12. It is argued that waiting for students to learn computing-supported problem-solving at the college level is no longer relevant (Barr & Stephenson, 2011). Instead, they should be exposed to the concept as soon as they start their education. The work then shifted to embedding the notion in the K12 curriculum by providing practical approaches grounded in an operational definition. The results were a more explicit façade of computational thinking (Barr & Stephenson, 2011), different dimensions of computational thinking (concepts, practices, and perspectives) (Brennan & Resnick, 2012), and a taxonomy of computational thinking in high school mathematics and science (Weintrop et al., 2016).

As soon as informatics and computer science gained popularity, Wing's idea of computational thinking got attention from policymakers (Bocconi et al., 2016). *CS4All* (computer science for all), an initiative to give US students a chance to study computer science in school, was launched in the US in 2016 (Vogel et al., 2017). At the same time, European Commission explicitly invited member states to "invest more in digital skills formation (including coding/computer science)" (Bocconi et al., 2016). Japan and Korea are two Asian countries that officially include computational thinking and programming in their school curricula (Lee, 2017; Nakamura, 2021). The main argument behind computational thinking inclusion on the policy level is to help individuals develop the 21'st century skills needed to thrive in the digital world. Another reason is that automation has changed how people work, and new skills are required to succeed in the job market (Bocconi et al., 2016). Furthermore, the approach to introducing computational thinking into school curricula varies between countries. Countries with a long tradition of computer science in upper secondary schools (e.g., Lithuania, Slovakia, Poland) moved forward by expanding Informatics towards secondary and primary levels (Bocconi et al., 2016). England used a similar approach by introducing a new computing subject in the national curriculum in 2014. The goal of the subject is to teach students from age five the necessary skills, knowledge, and thinking abilities to be digitally literate and able to participate in the digital world (Misfeldt et al., 2019). Taking advantage of the proximity of mathematics and computer science, the four Nordic countries (Norway, Denmark, Finland, and Sweden) use mathematics to introduce computational thinking to students. The Norwegian curriculum added visible computational thinking competence goals in mathematics, similar to the Danish way that appended technology comprehension to the description of the K-9 mathematics curriculum (Lindenskov et al., 2022; Nordby et al., 2022b, 2022a). In Finnish and Swedish curricula, programming has an essential role in the introduction, and mathematics becomes the embedded subject to deliver programming content (Fagerlund et al., 2022; Vinnervik, 2020).

In 2018, computational thinking gained global awareness when the Organisation for Economic Co-operation and Development (OECD) announced that Programme for

International Student Assessment (PISA) in 2021 would assess computational thinking. The primary domain of PISA 2021 is mathematics, and the OECD made significant changes in the draft assessment framework for mathematics by redefining how students could be recognized as mathematically literate. In their latest framework (OECD, 2018), OECD argued that the essential role of computing tools in daily life should be reflected in the assessment, and they expect students to be able to demonstrate their computational thinking skills in problem-solving practices (p.5). Therefore, in the 2021 edition of the PISA, computational thinking must be part of mathematical literacy, completing mathematics reasoning and problem-solving that already existed in the previous PISA assessments (OECD, 2013; Zahid, 2020). The inclusion of computational thinking in a worldwide educational assessment may be considered the ultimate success of the field of computer science and its way of thinking (Lodi & Martini, 2021).

The future of education and how my project contributes to the sustainable development goals

OECD is a forum that has a number of governments as its members. Its global assessment, the PISA, has influenced many governments in deciding the direction of their education. When computational thinking takes part in PISA, it has attracted countries worldwide to add the notion to their national curricula. Computational thinking, together with other technology-related conceptions, such as information and digitalization, seems inevitable to contribute to shaping future education.

Recent research (Ramírez-Montoya et al., 2023) shows that computational thinking and its subaspects were frequently linked to SDGs (quality of education), SDGs 5 (gender equality), SDG 6 (clean water and sanitation), and SDG 11 (sustainable cities and communities). My project particularly stands with Goal 4, which is to “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.” To be precise, the first part of my project relates to target 4C, and the second part connects to target 4.5.

The Goal 4C of the SGD relates to the increase in the number of qualified teachers. International Commission on the Future of Education argues that teaching is a complex and challenging profession. Teaching requires reconciling tensions between teachers' desires as individuals, curriculum demands, and public expectations (International Commission on the Futures of Education, 2021). There is always a need to train and facilitate teachers to keep up with the demands and expectations (UNESCO, 2015). My study came up with the results that grasping computational thinking aspects is not easy for mathematics teachers. The closeness of mathematics and computer science does not necessarily lead to the ease of understanding aspects used in both fields. The finding could serve as additional information for educational designers who want to prepare any support for teachers in embedding the notion into their classroom.

Meanwhile, another target in Goal 4 of the SDGs is that the number of youth and adults with relevant skills is substantially increasing. The advance in technology and digitalization has

shaped the way we live and demand us to acquire a new set of skills. In the educational context, digitalization provides the benefits of supporting students to optimize their learning and providing swift access to knowledge and information. This advantage, however, comes with some potential risks. The UNESCO report (2015) argued that digitalization and technology are not neutral and potentially frame the actions and decision-making. Even the algorithm is not value-free (Kraemer et al., 2011). It is essential, therefore, to equip students with such skills to understand what happens behind the screen when they search for information. Acquiring computational thinking skills, which means understanding the computer scientist's way of thinking, is relevant for this purpose. The second part of my project is working on designing a didactical situation that could expose students to computational thinking when learning mathematics. The insight offered by this study is that embedding technology and digitalization into learning mathematics could benefit students not only in acquiring a particular set of skills but also provide an advantage in learning mathematics itself.

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Stages in the Reseach Process 3
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Inclusive and Equitable Quality Education

The Task of Middle Managers in Local Education Administrations

Introduction

This assignment strives to shed light on how my research can make a national and global contribution. My research will be framed and informed by and through a chosen sustainable development goal (SDG). To start out with the research project will be presented. Second, a SDG relevant to the project will be introduced. And, lastly, a reflection of my research in relation to the SDG will follow where I argue for my research's contribution.

The Research Project

Achieving straightforward governance of education is challenging as responsibility is shared between many levels and actors. The Swedish education system is a decentralised system (Adolfsson and Alvunger, 2020, Lundahl, 2005, Magnússon et al., 2019) and local government self-governance is pronounced. Local councillors and education officers are obliged to adapt national goals to local structures. Goals formulated at the national level must be modified to suit the local context. Like the national level, the local level possesses means of governance and regulatory documents to exercise governance on education. In Sweden, the local level is made up of local governments.[1] According to the Swedish Local Government Act (SFS 2019:835), all Swedish local governments are required to have a council. The act (SFS 2017:725) further states that the local government council is responsible to appoint a local government board. Additionally, the council appoints committees to complete the work the local government is

[1] Education is to a different extent conducted by the national, the regional and the local level. Although the education system is decentralised the national level is central in many ways. The regional level is more peripheral but can sometimes function as organiser. Nonetheless, in this study the focal point is the local level which is very influential on educational matters and, not least, houses middle managers.

assigned to perform (SFS 2019:835). In many instances, the local education system incorporates an education committee and an education administration. The local councillors belong to the education committee while the local government officers reside in the education administration. All 290 local government councils in Sweden independently decide what committees and administrations make up their structure. Therefore, work can be organised in a plethora of ways. This regards both the physical structure of committees and administrations as well as the existence of local government officers. In a local education administration, the chief education officer is aided by an administration. Several administrations include middle managers positioned in an area between the chief education officer and head teacher (Blom, 2019, Jarl and Rönnberg, 2015). In the thesis at hand, focus is directed to managers who work with core processes in education, leaving out managers focusing on other concerns. The middle managers are either managing schools comprising pupils of a certain age (school form manager) or schools grouped together based on geographical area (school area manager).

The dissertation aims to study the influence of middle managers in local education administrations on school governance. It represents an effort to understand what middle managers do and what allows them to do it by exploring how the institutional structure and norms affect their autonomy and in turn school governance. Autonomy is inherent in the Swedish administrative model and the project intends to unravel how middle managers can, and do, make use of their autonomy.

The SDG

There are 17 sustainable development goals. SDG number 4 has been identified as the most relevant to the project at hand. The goals in themselves address various issues. Goal 4 reads:

> Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations, 2023).

For the purposes of this assignment, I choose to focus on equitable quality education. In the Global Sustainable Development Report for 2023 a troubling picture of the progress for quality education is depicted. The world was not on the right track even prior to the Covid-19 pandemic. Covid-19 is claimed to have possibly affected an entire generation of students. Those primarily affected are low-income countries and low-income households and in particular women and girls, those with disabilities, migrants and refugees (Independent Group of Scientists appointed by the Secretary-General, 2023). Sweden is not a low-income country and generally kept compulsory schools open during the pandemic. As a result, Swedish pupils are expected to suffer less consequences (Hall et al., 2022).

My Research's Contribution

My research contributes by illuminating the role of middle managers and where they fit in the process of the governance of education. The research shows that middle managers work on issues related to sustainable development such as described in SDG 4. In agreement with SDG 4, one of the cornerstones of Swedish education is the provision of equitable education for all.

According to the Swedish National Agency for Education (2023b), there are three paragraphs[2] in the first chapter of the Education Act which deals with equivalence and which fall under the responsibility and mission of the organiser. The paragraphs address that children and pupils have various needs and prescribe that these must be attended to in education. There must be a strive to counterbalance differences in prerequisites. All pupils are to have equal access to education independent of geography and social and financial circumstances. Lastly, equivalence in education applies within all school forms and after school care centres regardless of where in the country education is provided (SFS 2010:800). The Swedish Education Act furthermore regulates systematic quality work, it prescribes that the work is

[2] Paragraphs number 4, 8 and 9 in the first chapter of the Swedish Education Act.

to be enacted both on the national level, on the level of the organiser and on the level of the unit (SFS 2010:800). The purpose of systematic quality work is to uphold quality and equivalence departing from the Education Act, curriculum and education statues. The responsibility of the organiser is to plan, follow up and develop education but it is also to support quality work at schools and provide the right conditions to pursue quality work. Head teachers carry the responsibility for the quality work at their schools (The Swedish National Agency for Education, 2023b). The middle managers in my study belong to the level of the organiser. As a matter of fact, my data shows that the foremost task of middle managers is systematic quality work. Moreover, the middle mangers are the head teachers' closest contact at the local education administration and they are also their superior. As mentioned above, head teachers oversee quality work at schools. Given their position in the education system, middle managers in local education administrations are important actors in this regard, they work with quality work on behalf of the organiser and they work closely with those who oversee quality work at schools.

As referred to above, and in accordance with the Swedish Education Act, all pupils should have equal access to education independent of geography and social and financial circumstances. Given that there are 290 local governments in Sweden which differ in terms of population size, demography, geography, local tax revenue and so forth this is a considerable challenge. In Sweden there are also variation between areas within the same local government, there are schools with severe challenges and others that prosper. It is essential for a middle manager to know and adapt to the prevailing circumstances to successfully implement positive change. Ramsarup et al. also point to the importance of system knowledge in their paper on reframing skills ecosystems:

> Without sufficient understanding of a system or part thereof, it is unlikely that informed, careful and high impact interventions can be made (Ramsarup et al., 2023: 7).

For middle managers around Sweden then, it is essential to know about the conditions in their respective local governments. In the same paper the authors recognise that their 'cases involve multiple actors and systems that

are coevolving' (Ramsarup et al., 2023: 7). In my own research it is of utmost importance to recognise that middle managers in local education administrations are part of a much bigger system of actors who all participate in the governance of Swedish education. Although important, middle managers cannot achieve equivalence alone. As cited, systematic quality work is also to be enacted at the national level and the level of the unit. This is very much mirrored in Ramsarup et al.s' piece.

> Constructing the vertical domain involves policies, hierarchical structures, and leadership structures that exist at different levels, and how they may shape activity at the local level. In constructing the horizontal domain, the relationships between actors are examined, including the complex dynamic and multi-layered nature of relationships which may sit within and across various clusters as well as nested relationships associated with the cases (Ramsarup et al., 2023: 7).

Evidently, to be able to reach the sustainable goals different levels must work together; this is true regardless of domain, be it education or climate action.

In line with what has been described, there is no denying that Sweden benefits from easier preconditions than many other countries. The country is not a low-income country and did not suffer significantly from the pandemic, in terms of schooling, as most compulsory schools stayed open. That is not to say that Sweden does not have its own challenges. One of the challenges facing many local governments is to provide education for newly arrived immigrants. Systematic quality work can help in this regard as information from individual study plans can be incorporated into the organiser's systematic quality work making it possible to address needs (The Swedish National Agency for Education, 2023a).

One of the most important aspects of my research is to investigate the autonomy of middle managers in local education administrations. The middle managers who turn out to have room to manoeuvre could choose to focus even more extensively on equivalence in their effort to improve systematic quality work. Given their position in the Swedish education system middle managers' prospect to succeed is excellent.

This text has discussed the possibilities to work on inclusive and equitable quality education within the prevailing system to come to terms with present and future challenges. This way to see the world is termed adaptive preparation where:

> [The] politician, like a knight in shining armour, or a master engineer, rides to the rescue promising that education will ensure all children are equipped to thrive in this new world. Here the future is treated as if it is known and the primary question is how students can be equipped to live well in that world. Students' roles in relation to these futures, then are conceived primarily as adaptive – the future cannot be changed, the job is to work out how to thrive in these conditions (Facer, 2021: 8-9).

Middle managers exist in these environments working close to local councillors, the knights in shining armour. When contemplating the role of middle managers in systematic quality work, occasionally, it may be useful to look beyond current practices considering other, or additional, methods to approach the future of education in the best way possible.

Concluding Remark

Equivalence may have various implications in various settings. In this text I have primarily focused on the Swedish setting. The very term equivalence may have different connotations in separate countries; separate countries may or may not stress the term in their education acts; in Sweden the national and local level work on equivalence, this may very well be executed differently in other countries. Regardless of how the work is performed SDG 4 encourages us to ensure inclusive and equitable quality education for all; by bringing out national models we can learn from each other and pick bits and pieces that help us improve.

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Rhodes University PhD Contributions

ANGELA CHAPPEL, PhD Candidate, RU

PhD Candidate Environmental Learning and Research Centre Rhodes University

Provisional title: School Food Gardens for a Just Transition: a case study of the social ecosystem for skills in school food gardens in the rural Eastern Cape

My research, framed by the capabilities approach and social ecosystem for skills, is focused on school food gardens. Specifically, their interaction with surrounding communities and how these gardens can be supported to act as a stimulus for just transitioning into local food economies in the rural Eastern Cape, South Africa.

In the face of global unprecedented environmental and social crises; the links between people, nature and the origins of our food have become frayed and there is a definite argument to be made for the role of school food gardens for the future in education. This is relevant as we consider the Fracer (2021:3) framings: “what sort of education will prepare students for the future?; what will education be like in the future?; how can students learn to think reflexively about futures?; how can education be liberated from the future? and how might education heal the future?” To look towards the future of our food and education systems one must of course consider their histories.

Food Security in South Africa

Ledger (2016) notes that food insecurity in South Africa has historically been understood in the following way: poverty and high unemployment leads to not having enough food hence if we increase income and agricultural production people will have enough food. Although this causation makes sense at first glance, it does not consider a number of nuances related to poverty, distribution of wealth and agricultural production. Since increasing employment is a very difficult and slow goal, social grants have instead been used as a bandaid by the government (Ledger, 2016). The social grant system in South Africa pays out around R140 billion per year to 17 million recipients and as World Data Lab (2023:2) points out “Grants are often all that stands between beneficiaries and hunger”. The system is so fragile that if there is an issue with grant payments as there was earlier this year, chaos ensues very quickly. A study by SANHANES1 estimated

that the poorest people in our country spend between a third and a half of their income on food (Ledger, 2016:56). The agricultural value chain is also highly concentrated, with relatively few agro-industrial farms producing most products and around 70 percent of all agricultural income earned by less than 7 % of farms (NBI, 2021). The food system in South Africa is ultimately based on the goal of achieving economic efficiency rather than social justice (Ledger, 2016). If we are to change the system we will need to imagine and create a radical transformation and an alternative economic model.

The Eastern Cape is a clear example of how small-scale de-agrarianisation coupled with an increased reliance on welfare money has led to a rise in the purchasing of cheap and unhealthy food items from supermarkets and fast-food restaurants (Otterbach et al., 2021). Rural diets, particularly in the Eastern Cape, are changing towards higher consumption of highly processed, low nutrient-quality foods (Woodhill et al., 2022; Otang-Mbeng et al., 2017). Aside from being addictive and expensive, many fast food and processed food items have been linked to an increase in obesity, diabetes, and non-communicable diseases (FAO, 2021). South Africa actually has one of the highest rates of obesity in the world, with roughly 31% of men, 68% of women and about 13% of children under the age of five considered to be overweight or obese (ObeCity Index 2023). Moreover, 27 % of South African children are stunted (do not meet physical and cognitive development as a result of chronic malnutrition) (UNICEF, 2022). Obesity and malnourishment can in fact occur at the same time hence the phrase ‘stuffed and starved’.

History of school food gardens

Globally, food gardens have been incorporated into school systems since the 1800s. Fredrick Froebel founded and designed the first kindergarten in Prusha in 1837 to teach children through nature and gardening (Bowker and Tearle 2007). School food gardens differ in their objectives based on location, purpose, resources available etc (Gonzalez et al. 2020). For example in developed countries school gardens have served a broader education function, helping children understand science, nature, and the environment. In developing countries however, objectives include teaching improved farming skills,

supporting community food production, raising funds, and demonstrating agricultural practices to the communities surrounding the schools (Gonzalez et al. 2020). There is now also an increasing interest in the role of school gardens in environmental and nature education, food biodiversity, diets, nutrition and health across geographies in urban and rural areas. These lessons and processes are some of the pedagogies that we may be able to share across the globe.

Sadly, like all aspects of society in South Africa, apartheid has left a legacy on school food gardens much like a root knot nematode, that leads to a disease that forms on the roots of vegetables and stays in the soil even once the vegetable is removed. The South African school system from the 1930s to 1990s aimed to divide black and white children and prepare them for their respective 'low' and 'high' ranking positions in society (Morai Peddon, 2015). This meant that the Bantu Education system (officially implemented in 1953) trained black school children, mostly boys, in gardening (primary school) and agricultural education (high school) so that they could work as farm labourers in the homelands or under white control (Beery et al., 2014; Ncula, 2007). During this era young black girls were trained in sewing and house craft skills to prepare them for their imposed future roles in society (which also reinforced gender stereotypes around farming) (Ncula, 2007). Moreover, gardening has historically, and in some cases is still used as a form of punishment in schools. However, marigold flowers release a hormone into the soil that prevents root knot nematodes from forming. With acknowledgement of the past, sensitive reflexivity and future thinking education we too may be able to heal this trauma and repel the damaging legacy out of our schools to create multifunctional, abundant, holistic school garden spaces.

After 1994, changes in the national curriculum aimed to dismantle apartheid and promote social justice, human rights and a healthy environment for all (Ncula, 2007, South Africa, DoE, 2002). The National School Nutrition Program (NSNP) also started in 1994 in South Africa (initially called the Primary School Nutrition Program) with three objective i) to decrease hunger and malnutrition; ii) to promote nutrition and healthy food choices; and notably iii) to use food gardens to improve food production, farming

knowledge and natural resource protection (DBE, 2022:1).The immediate response to the NSNP was an increase in enrolment of children from the age of 5 coming to school to receive a meal (Albertse and Mancusi-Materi, 2000). Although food gardens are one of the core pillars of nutritional support, there are no policies mandating their implementation. A 2016 audit by the DBE showed that only 39.8% of NSNP schools had food gardens, and just over 31% of the NSNP schools grew vegetables and used their food to supplement school meals (DBE, 2016). It must be noted that the NSNP budget allocates 96% of its funding to school feeding so only 4% is available for gardens, nutrition education and other related components (Devereux et al., 2018). The Expanded Public Works Program (EPWP) provides stipends for workers in some school gardens across the country but this varies greatly across the provinces (Devereux et al., 2018). Schools without help from the EPWP are reliant on caretakers and voluntary support from community members and children. Hence, the responsibility of implementing school gardens has become the priority and responsibility of a number of other private sector and non governmental organisations and programs.

Kwatubana (2014) highlights that schools do not exist in isolation of their communities and whilst they provide the service of education they often need support, advice and labour from the community in order to fulfill their requirements. When it comes to school gardens, the support of the community is paramount to its sustainability and success (FAO, 2010; Wolsey and Lapp, 2014). Furthermore, schools are often seen as ‘anchor institutions’ that are community led and act as a driving force for action, especially in rural areas of South Africa (Laurie et al., 2017). As such, school gardens have great potential for enhancing community food security and stimulating the local food economy amongst a plethora of other ripple effects (Devereux et al., 2018).

There is extensive literature on the benefits and potential of school food gardens including improving the diversity of nutritional intake for children, a subsequent increase in cognition function, influence on children's eating habits, intergenerational learning as information and even tangible resources such as seeds are shared with surrounding communities. There is also a poignant potential for gardens to act as classrooms for

learning across different subjects such as history, geography, math, life orientation, biology etc.

Imagining a transformation in the school system

With this contextual background in mind, I would like to hone in on the question: “What sort of education today can help prepare young people for the future we envisage?”(Facer 2021:3). Facer also profoundly stated: “The practice of imagining alternative futures of education can provide an imaginative and creative space for playful exploration of what it might mean to do and think things otherwise, productively opening up the space for rethinking the present” (2021:7).

A recent study conducted by World Data Lab (2023) showed that by 2025, 48% of the Eastern Cape population will be food insecure of which 59% form part of the rural population. Hence, if we can learn to grow our own food as children in schools and these lessons and benefits can ripple into communities we may begin to imagine an alternative future of self-sufficient and empowered people. Moreover, as Devereux et al. (2018) argues although it is difficult to measure, nutrition at school, enhanced by food gardens, can amount to an investment in human capital that can break intergenerational poverty because well nourished and well educated children are more likely to be more productive as adults.

It must be cautioned that in food research, the dominant policy and research narrative tends towards paternalism, including assumptions related to what poor people want to eat, and why (Hunter-adams, 2019). And it may just as well be seen as paternalistic to suggest imposing farming on school children; the last thing I am advocating for is a bantu education style farm schooling technique. But in a social and economic climate that is so difficult to find employment and a corporate agrifood system, surely finishing school with a base level of skills for self sufficiency along with an awareness of a localized and decentralised food system is a good starting point for the adults of our future.

The capabilities approach is important here because it argues for peoples real freedoms to choose to live a life that is valuable to them and that they have reason to value. People can convert resources into capabilities through social, personal and environmental conversion factors and most importantly ‘capabilities’ are converted into ‘functionings’ (the actual realisation of capabilities) through agency and choice. Agency is the key as it is different to conversion factors because individual or collective agency is closely related to the freedom to choose. In other words “a person’s ability to get systematically what he or she would choose no matter who actually controls the lever of operation” (Alkire, 2005: 121). Similarly, in their paper Sporre et al. (2022: 103) refers to “strengthening the voices of children and youth in society and deepening respect for their moral agency”. In essence, creating an enabling environment for growing and learning about food and allowing individuals to then make their own choices.

Growing food in schools, linking this to surrounding communities and the associated skills system and pedagogy used may have an important role to play in current education and the roots of education for our future adults. School food gardens may also form part of a much needed just transition of our food system. My PhD research will continue to understand and explore this through a systematic literature review and field research in rural schools in the Eastern Cape.

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Snapshot of the PhD study

Mainstreaming inclusive education in teacher education in the context of education for sustainable development: A study in change projects from southern Africa

Research Problem

Some research studies from the Global North argue that ESD, especially its emphasis on transformative education, collaborative learning, the community of practice and the whole institution approach, can advance inclusive education in teacher education practices if grounded in social reality, not just ideologically framed. Put differently, these research studies suggest that ESD is a viable educational landscape for advancing inclusivity starting from teacher training, but this undertaking should consider the social contexts and trajectories of the education systems and practices. Such social contexts and trajectories include issues of educational funding, social status of learners, and cultural practices that shape schooling models.

For example, Nolet (2013) conducted a research study examining the vision, challenges and implementation that shape teacher education and ESD in the United States. The study found that ESD was not, to a larger extent, mainstreamed in teacher education in the United States. Nonetheless, the study found evidence that ESD is taken in teacher education through professional development programmes. In pondering ways to transform the education systems in the United States, Nolet's (2013) study concluded that ESD offers opportunities to reorient teacher education and promotes issues such as inclusivity that have shaped teacher education in the contemporary educational landscape. Another study by Fedulova et al. (2019) was conducted in the Russian Federation on how inclusive education can catalyse sustainable development. The study found that inclusive education was a difficult transformative agenda, including in teacher education, but it becomes integral to the societal agenda when discoursed through ESD framework.

The Global North research claimed that inclusive education could be mainstreamed in teacher education via ESD practices. However, more is needed to know about the relationship across inclusive education, ESD and teacher education in southern Africa. Data to understand the nexus across inclusive education, ESD, and teacher education is seldom available in southern Africa. Put differently, there is little systematic understanding of how inclusive education aligns with and is included in ESD teacher education praxis in southern African countries. We have concerns about inclusive education and ESD in southern Africa (see Chapter 2).

The 2020 Global Education Monitoring (GEM) Report found a need for teacher support, amongst other factors, that affect responses to challenges of inclusive education in southern Africa (UNESCO, 2020). The 2020 GEM Report recognised that focusing on teacher education capacity is one of the key areas needing attention for inclusive education to be more fully integrated into the southern African education systems, especially in the ESD context. The evidence from research needs to be more outwardly put if ESD could be a viable praxis arena for mainstreaming inclusive education in teacher education in southern Africa, hence the present study. Therefore, the originality and contribution of my study is in interrogating this supposed relationship across inclusive education, ESD and teacher education in a southern African context using Malawi, Tanzania and Eswatini as cases.

Main Research Question

The following was the main research question that guided and reframed the study:

- How can teacher educators in southern Africa mainstream inclusive education in teacher education in the context of Education for Sustainable Development?

Specific Questions

Specifically, the study intends to answer the following research questions:

1. What are the understandings of inclusive education and Education for Sustainable Development (ESD) in Malawi, Tanzania and Eswatini?

2. Which areas need strengthening for teacher educators to mainstream inclusive education in ESD teacher education programmes?

3. What strategies can teacher educators develop to mainstream issues of inclusive education in ESD teacher education programmes?

4. How can teacher educators monitor and evaluate inclusive education in ESD teacher education programmes across contexts?

Theoretical Framework: An Overview

The study was theoretically framed within the foci of human development and learning. The foci reflect the conceptual framework of inclusive education, ESD and teacher education, as we must situate them in human development and learning perspectives to engage with the three notions. In the quest to support teacher educators in Malawi, Tanzania and Eswatini, as cases of southern Africa, to mainstream inclusive education in teacher education via ESD practices, the study employed Urie Bronfenbrenner's Ecological Systems Theory of Human Development (2005) and Lev Vygotsky's Sociocultural Theory of Learning (1978) to come up with a theoretical framework which was a cognitive tool for co-engagement with the research participants. In both theories, the departure point is that an individual develops in and learns from interactions with their social and cultural contexts. Bronfenbrenner's theory gave the study a theoretical lens for examining systems that influence inclusivity in teacher education. For example, one of the study's objectives was to identify areas that needed strengthening for teacher educators to mainstream issues of inclusive education in their practices. Thus, the Bronfenbrenner's Ecological Systems Theory (2005) gave the mechanisms for identifying these areas from the participants' responses and practices. However, Bronfenbrenner's theory did not go far in analysing how teacher educators' knowledge of learning could be expanded, hence Vygotsky's Sociocultural Theory (1978). Vygotsky's theory enabled this study to look into strategies the participants could employ to improve their practices from ESD change project activities. Thus, the Sociocultural Theory was employed to look into potential learning areas and learn what is not already there, i.e., expansive learning.

Methodological Design: An Overview

This study took an insider formative interventionist design where change projects in the SST programme from Malawi, Tanzania, and Eswatini became case studies for co-design, co-

engagement and reflexive analysis. Put differently, I have been part of the SST programme, and this study was part of my intellectual existence there. In tandem with the insider formative interventionist design, the study employed a qualitative approach whereby document review, interviews, observations and workshops were used to generate data. The whole research design and methodological design were guided by a critical realist philosophy, which acted as an under-labourer for the ontological suppositions of the study. The critical realist ontology complemented the theoretical framework of Bronfenbrenner and Vygotsky in interrogating the nexus across inclusive education, ESD and teacher education. For example, one of the study's objectives was to surface monitoring and evaluation indicators for inclusive education in ESD teacher education programmes and practices. The critical realist ontological analysis looked into bioecological system theory (Bronfenbrenner) and zone of proximal development (Vygotsky) tools for co-engaging formative intervention research for supporting participants' change projects.

Potential Impact of the Research

The study may impact several educational areas. My perception of the impact of the research is at different levels: myself as a researcher, the participants as collaborators, theoretical and methodological contributions, and education policy and practice. As a researcher, the study was partly a response to UNESCO's 2020 PEER profiles, from which I intended to contribute to developing indicators for monitoring inclusive, quality education in Malawi, Tanzania and Eswatini, where they were non-existent. This contribution has broadened my knowledge sphere in the southern African context. For the participants, the study has the potential to help them and other teacher educators not involved in the research to bring the issues of inclusive education to the centre of discourse on ESD quality indicators and give practical meaning to UNESCO's discourse on 'inclusive, quality education' for Education Agenda 2030 and African Union's (AU) Agenda 2063.

Theoretically, the study has the potential to contribute to a theory development for inclusive education in ESD teacher education in a southern African context. The Global North studies that attempted to connect inclusive education, ESD and teacher education emphasized the essence of social contexts and trajectories. Thus, my study has theoretically delineated such social context and trajectories for inclusive education in southern Africa. Methodologically, the research co-design, which comprised critical realist ontology and an insider formative interventionist approach, can contribute to research praxis development using a contextually dynamic model for education research in southern Africa and beyond. In the same vein, regarding education policy and practice, the study can inform inclusive education policies and practices in the three southern African countries and the entire region.

Organisation of Chapters

This thesis is organised in nine chapters as follows:

Chapter 1: Past and Present Dimensions of Inclusive Education in ESD Teacher Education

This first chapter is an introductory one in which the context for the study has been given. The chapter also outlines the study's purpose, objectives and research questions. The main takeaway from this chapter is the research problem that although ESD has been designated as a viable platform for mainstreaming inclusivity in the Global North, there needs to be more evidence to support the same assertion in a southern African context, especially concerning teacher

education praxis. Thus, my study explored how such a relationship could look in a southern African context with Malawi, Tanzania and Eswatini as examples of practices.

Chapter 2: Inclusive Education and ESD Teacher Education Contexts in Southern Africa

This chapter reviews literature related to the study objectives on inclusive education, ESD and teacher education. The review is subdivided into four sections. The first section reviews the literature on understanding inclusive education and ESD in a southern African context. The second section focus on literature about areas that need strengthening for teacher educators to mainstream inclusive education in ESD teacher education programmes and practices. In the third section, the review focuses on strategies that teacher educators may develop to mainstream inclusive education in ESD teacher education praxis. The last section reviews the literature on indicators for monitoring and evaluating inclusive education in ESD teacher education programmes and practices. The main thrust of this chapter is that although some research studies attempt to connect inclusive education, ESD and teacher education, the evidence for doing the same in a southern African context needs to be concretely and outwardly revealed through research.

Chapter 3: Bioecological and Sociocultural Theories in Inclusive Education Research

The third chapter focuses on the theoretical framework for the study. In this chapter, I explain and motivate my theoretical choices and application. The chapter details Urie Bronfenbrenner's Bioecological System Theory of Human Development (2005) and Lev Vygotsky's Sociocultural Theory of Learning (1978) and traces their developing threads. The actual employment of the theoretical arguments in the study is discussed in this chapter. Importantly, the chapter argues that human development and learning processes shape inclusive education. As such, the chapter justifies that employing the bioecological and sociocultural theories was necessary to look into teacher educators' practices via ESD programmes.

Chapter 4: Insider Formative Interventionist Research: A Critical Realist Ontological Design and Methodology

In the fourth chapter, I report on the research design and methodology. It is explained in this chapter why the study took a case study design with an insider formative interventionist approach. Methodological choices such as qualitative data generation methods such as interviews and workshops are justified in this chapter. The chapter also explains the rationale behind the critical realist paradigm that the study adopted. In this regard, the chapter explains that the study employed the critical realist paradigm to challenge the dichotomic binary opposition (of Self/Other) that institutionalised exclusion in the education system by othering learners with disabilities and philosophised teacher education in the same trajectory of exclusion. As such, I argue in this chapter that critical realism is such a metatheoretical torch that disabilities the centre (that assumes that learners with disabilities are situated for special and segregated learning environments) and brings into discourse new and possible ontological spaces that require teachers and educators to embrace and sustain inclusive education within regular schools. I further argue that methodologically the transformative orientations of ESD (such as transformative learning, collaborative learning, whole school approach and community of practice) provide concrete strategies for mainstreaming inclusive education in teacher education when discoursed from human development perspectives.

Chapter 5: Supporting Inclusive Education in ESD Teacher Education: Malawi

The fifth chapter is a case analysis of Malawi. In Malawi, I originally worked with three institutions involved in the SST programme, focusing on inclusivity in their ESD teacher education practices. For the sake of research management and the deep focus of the study, I chose one institution where the full research process happened. Thus, this chapter reports the research process at Phalombe Teacher Training College and the findings that emerged from the co-designing and co-engaging with the participants through various data generation methods.

Chapter 6: Supporting Inclusive Education in ESD Teacher Education: Tanzania

In the sixth chapter, I do a case analysis of Tanzania, where I originally worked with two institutions but ended up with one for focus and scope. Thus, the chapter focuses on the co-engagement research process I did with SST participants at the Dar es Salaam University College of Education (DUCE). The DUCE case follows the same research processes as the one I did in Malawi, but a few adjustments were made to suit the circumstances of the context.

Chapter 7: Supporting Inclusive Education in ESD Teacher Education: Eswatini

The seventh chapter focuses on the case analysis of Eswatini. Unlike Malawi and Tanzania, I only came across one institution working on the inclusivity aspect in their SST change project. Since my study took a formative interventionist approach, the intention was not to introduce new concerns to the communities of practice but to intervene and support what they were already doing. Thus, this chapter reports my research process with SST participants at Eswatini College of Technology (ECOT). As ECOT is a polytechnic institution, it trains secondary school teachers, especially in science and technology. The research process at ECOT was the same for Malawi and Tanzania, but flexibility was employed to adjust to the institution's context.

Chapter 8: Mechanisms for Mainstreaming Inclusive Education in ESD Teacher Education

The eightieth chapter discusses the emerging regional knowledge in the southern African context. The discussion engages cross-country findings from Malawi, Tanzania and Eswatini. In this chapter, a thesis emerges that inclusive education can be mainstreamed in teacher education if taken in the context of ESD in the southern African context, but the process would require teacher educators to use transformative mechanisms for pre-service teacher training. The study proposes a Sustainable Inclusive Pedagogical Proficiency (SIPP) model, which is a policy-practice-research framework emerging from my research. The SIPP model may enable teacher educators to orient pre-service teachers towards inclusivity in which understandings of inclusive education are grounded in sustainability principles, areas needing strengthening are checked, strategies for inclusive teaching are promoted, and monitoring and evaluation of inclusivity is encouraged.

Chapter 9: Future Dimensions of Inclusive Education in ESD Teacher Education

The ninth chapter is a conclusion to the entire study. This chapter presents key findings on mainstreaming inclusive education in ESD teacher education praxis, and suggestions are made for further research in the same foci. The chapter also motivates why the future dimensions of inclusive education in ESD teacher education may be more proficient if practised in models such as the SIPP, which manifests in sustainability, human development and learning.

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Promoting and investigating the pre-service teachers' computational thinking practical development in the physical sciences methods course.

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Abstract

The recognition of Computational Thinking (CT) as a fundamental skill, on par with writing, reading, and arithmetic (Wing, 2006), has prompted researchers and educators to integrate it into disciplines beyond computer science, including science, technology, engineering, and mathematics (STEM). CT skill set is becoming increasingly essential for individuals to navigate the complexities of the 21st century education and beyond. However, there is a scarcity of frameworks to assist secondary school science teachers in South Africa with CT skills practical development. Given this gap, there is a pressing need to initiate interventions that work directly with teachers to develop these skills in a practical manner. This mixed methods research design underpinned by the pragmatism paradigm aims to investigate how Postgraduate Certificate in Education (PGCE) pre-service teachers develop CT within the physical sciences methods course. Data will be generated through document analysis, questionnaires, focus group interviews, and observations. Quantitative data will be analysed by using both descriptive and inferential statistics whereas qualitative data will be thematically analysed aided by NVIVO software.

Key words: computational thinking, problem-solving, pre-service teachers, physical sciences.

Introduction

This study will investigate the affordances and concerns of practical development of computational thinking (CT) strategy for teaching science and how pre-service teachers can be supported to achieve this development. For centuries, science education has been acting as a catalyst and arousing learners' curiosity to understand the world (Bilad, Anwar and Hayati, 2022) and high-quality science education worldwide is advocated for to promote sustainable development. However, in the 21st century, science education encounter new dimensions, and to foster a deeper comprehension of science, scholars and educators advocate for the integration of computational thinking into science education curricula (Angeli et al., 2016; Su & Yang, 2023). In general, computational thinking has been defined as the "thought processes involved in formulating a problem and expressing its solution(s) in such a way that a computer—human or

machine—can effectively carry out" (Wing, 2017, p. 8). CT key concepts such as decomposition, pattern recognition, algorithm and abstraction (Dong et al., 2019) form CT skill set that enhances problem-solving competencies across disciplines and in real-life situations.

CT in science education has potential to support a variety of competencies, including but not limited to scientific investigations, problem-solving abilities, and data analysis (Mohaghegh & McCauley, 2016; Chongo et al., 2021) which are also advocated by the South Africa Curriculum and Assessment Policy Statement (CAPS). However, science teaching and learning is considered a complex process by many people (Zion & Mendelovici, 2012; Windschitl, Thompson & Braaten, 2020) and incorporation of computational thinking to support science education compounds the challenges many educators already confront. So, meeting this challenge requires that science teachers not only have a good understanding of the underlying CT principles but also the hands-on experience to weave computational thinking seamlessly into their instructional strategies (Mouza et al., 2017; Yadav et al., 2017; Chongo et al., 2021;). Thus, the skilful integration of CT into science education programmes is eagerly anticipated. Hence, the need to integrate CT into the pre-service science teacher (PSTs) professional development programmes to prepare them to teach in the 21st century.

Despite rising interest in computational thinking in South African context (Tsakeni, 2021; Ogegbo & Ramnarain, 2022), a comprehensive study investigating how pre-service Physical Sciences teachers can practically develop CT skills and practices in teacher education programmes is still lacking. It is against this background that I propose to conduct an interventionist study working with pre-service teachers at Rhodes University, aiming at investigating their affordances and challenges when practically developing CT skills during physical sciences methods course.

The main research question is "how does the incorporation of computational thinking concepts in physical sciences methods course influence or not PGCE pre-service teachers' computational thinking practical development?" and specific research questions are:

1. What are PGCE Physical Sciences PSTs' computational thinking skills proficiency levels before participating in the physical sciences methods course?
2. What are PGCE Physical Sciences PSTs' computational thinking skills proficiency levels after participating in the physical sciences methods course?
3. How do PGCE PSTs develop CT practical skills in an intervention within the physical sciences methods course?
4. How can PGCE PSTs be supported to develop computational thinking practical skills in physical sciences method course?

Literature Review

Computational Thinking

Computational thinking is regarded as one of the most effective strategies that foster development of problem-solving skills among teachers and learners through a systematic approach. CT is also considered as one of the fundamental skills like reading, writing, and arithmetic, which every individual should possess (Wing, 2006). Different scholars and educators have attempted to define CT such as Wing (2006, 2008; 2017) and the International Society for Technology in Education (ISTE) and the Computer Science Teachers Association (CSTA) (2011). The ISTE & CSTA's CT operational definition emphasise on the following characteristics:

> "Formulating problems in a way that enables us to use a computer and other tools to help solve them, logically organizing and analysing data; representing data through abstractions such as models and simulations, automating solutions through algorithmic thinking (a series of ordered steps), identifying, analysing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources, and generalizing and transferring this problem-solving process to a wide variety of problems" (p. 1).

This definition covered components that are applicable across disciplines and not only to computer science where the CT concept originates.

Strategies for developing computational thinking.

CT-plugged-in and CT-unplugged are the main strategies scholars and educators use to develop CT skills (Chongo et al., 2021; Arık & Topçu, 2022; Chen, et al., 2023). Plugged-in strategy uses digital technologies whereas unplugged strategy does not use digital technologies but other available resources. For example, unplugged strategy can be used to develop CT skill set to enhance understanding of electrochemistry concepts such as electrolysis of solutions, however, to increase visualization of such concepts such as flow and exchange of ions at electrodes, CT-plugged-in strategy could be more effective (Chongo et al., 2021). The use of unplugged strategy also equips educators and learners with the competency to develop CT concepts such as problem decomposition, abstraction, pattern recognition, data representation, and algorithmic thinking. Furthermore, Peel et al. (2019) observed that integrating unplugged strategy into science education fosters learners to use the CT principles to explain the steps of a science process. Chen et al. (2023) concurs with Li et al. (2022) that adult learners (PSTs) could improve their learning through unplugged strategy because their cognitive and operational skills have gradually matured so that they can

easily understand the rules of the activity and master CT in a short time. Therefore, the use of CT plugged-in and unplugged strategies would promote the understanding of how to teach science content using CT strategy.

Integrating Computational Thinking into Initial Teacher Education Programmes

Integration of computational thinking into teacher education for PSTs' competency development depends on the level of engagement of teacher education programmes and what resources are available to support the integration (Ottenbreit-Leftwich et al., 2022). CT can be integrated as either a stand-alone CT course, in an introductory educational technology course or in a science/mathematics methods course among others. Integrating CT in an introductory educational technology course allows PSTs to have the opportunity to learn about fundamental CT concepts and practices before developing skills of implementing them in a specific discipline (Mouza et al., 2017). Similarly, integrating CT in specific teacher method courses fosters the development of CT competencies together with other teaching strategies (Mouza et al., 2017; Yadav, et al., 2018; Dong et al., 2023). This strategy might give a chance to teacher educator to infuse CT key concepts and practices into the lecture activities and assessments (Ottenbreit-Leftwich et al., 2021). However, effective integration demands examination of current science method curriculum and identifying opportunities to infuse CT key concepts. The initial analysis of the physical sciences methods course indicates possibilities of CT integration to promote practical development CT skills among PSTs.

Theoretical Frameworks

This study adopts Lev Vygotsky's socio-cultural theory (SCT) which acknowledges that learning has both social and personal origins, learning occurs along a continuum between what a student (a novice) now knows and what they might learn if they receive assistance from a more knowledgeable other (MKO) such as the course instructor or peers. This study adopts mediation of learning, social interactions, the zone of proximal development (ZPD) and self-regulation of SCT. On the other hand, this study also adopts CT specific models such as Code, Connect and Create (3C) Computational Thinking teacher professional development model (Jocius et al., 2020) and Computational Thinking in Mathematics and Science Taxonomy (CT-MST) (Weintrop, et al., 2016; Peel et al., 2021). 3C model helps to introduce PSTs to CT key concepts using both plugged-in and unplugged strategies, allowing them (individually or collaboratively) to connect these concepts to specific disciplines such as physical sciences and finally creating disciplined related content and activities to demonstrate their comprehension of CT skill set. CT-MST, according to Weintrop et al. (2016) and Peel et al. (2021), has six (6) practice categories, viz., computational modelling and simulation, computational visualization, algorithms, computational data, programming, and computational problem-solving. These practice categories are structured with a use, modify, assess, and create spectrum. Thus, CT-MST will be used as an analytical framework.

Research Methodology

This study will employ the mixed methods research paradigm which lies between the quantitative and qualitative research paradigms. The study is also underpinned by the pragmatism paradigm, which is regarded as the most appropriate worldview for mixed-methods research (Creswell, 2014). The Pragmatism paradigm deals with problems in a practical way rather than a theoretical way to gain insights about participants involvement in the problem. This is a central component of this study because it provides a qualitative and quantitative interpretation of the affordances and concerns of PSTs as they participate in physical sciences method course (Creswell, 2012). I will adopt the convergent mixed methods design because this design enables researchers to simultaneously collect both quantitative and qualitative data, merge the data, and use the results to understand a research problem. The mixed methods design supported by the single-case design (Creswell, 2012) will enhance and enrich the researcher's view of PGCE pre-service teachers' affordances and concerns during the development of the CT skill set in the physical sciences method course. This research design will also foster data triangulation, complementarity, and extrapolation of findings.

Research sampling and participants

Non-probability sampling techniques will be used to select participants from the group of student teachers who will be studying at Rhodes University in the 2024 academic year. According to Creswell (2012), this sampling technique enables the researcher to select participants because "they are available, convenient, and represent some characteristic the investigator seeks to study" (p. 145). A convenience sampling approach will be used to select pre-service physical sciences teachers from PGCE group. On the other hand, purposeful sampling will be employed for a qualitative perspective of the study which focuses on developing a deeper understanding of a central phenomenon (computational thinking development) (Creswell, 2012; Neuman, 2014). I will use homogenous sampling, a purposeful sampling strategy that involves selecting participants or sites depending on their membership with a subgroup that has defining characteristics.

Data generation tools

Several data generation tools will be employed including the participatory observations to help gather and document open-ended, firsthand information from participants at a research site (Creswell, 2012; 2014), two different types of questionnaires will be used to assessment participants understanding of CT at different phases, focus group interviews to collect data through interviews with a group of PSTs by allowing them to share insights about the problem and document analysis to help researcher gain insights and develop empirical knowledge.

Data analysis

Data analysis in mixed methods research involves making sense of both quantitative and qualitative data. Quantitative data such as scores from the self-assessment questionnaire will be analysed by using both descriptive and inferential statistics. The Statistical Package for the Social Sciences (SPSS) software will be used to compute mean, median, mode, standard deviation, and paired *t*-test. Inferential statistics will enable the researcher to make inferences and conclusions that are data-driven and objective about the phenomenon. Qualitative data analysis will be aided by NVIVO software to foster inductive thematic approach. Inductive data analysis is a method that extracts information from raw textual data. For example, Thomas (2006, p 238) defined inductive analysis as "approaches that primarily use detailed readings of raw data to derive concepts and themes". The inductive analysis approach will help in uncovering patterns, themes and meanings that emerge from the pre-service teachers' experiences during the professional development from the interviews, observations, and documents.

Validity, Reliability and Trustworthiness

To ensure validity, reliability and trustworthiness research, various strategies including the use of questionnaires, interviews, document analysis and observations, and presenting in various forums for criticism will be used. The use of multiple sources of data will allow the researcher to triangulate the data, provide saturated evidence, find converging patterns and remove potential biases (Aldiabat & Le Navenec, 2018; Amin, et al., 2020).

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Title: The emergence of Education for Sustainable Development teacher competences amongst pre-service teachers in a Geography Teacher Education Programme in Zimbabwe

Context: A brief introduction to the research with a focus on part of the research results.

Rationale of the study

At the time of this study, teacher education curriculum in Zimbabwe was still subject content-oriented, guided by professional teacher competences expected by the University of Zimbabwe's Faculty of Education (Moyana, 2013). These competences are discussed in detail in Section 2.3.4. There was a gap between the knowledge about learner competences expected in the competence-based curriculum implemented in the primary and secondary schools since 2016, and knowledge about competences, both learner and teacher competences, in the teacher education curriculum. Pre-service teachers went to the secondary schools for teaching practice. The teacher education curriculum and the secondary schools' competence-based curriculum needed to be aligned. There was need to transform the teacher education curriculum, including the Geography education curriculum.

Main Question: What ESD teacher competences amongst pre-service teachers were evident during a two-year Geography Teacher Education programme in Zimbabwe and what practice architectures influenced the emergence of these ESD teacher competences?.

Sub-questions: 1.What Education for Sustainable Development teacher competences are evident in the sayings, doings and relatings of geography pre-service teachers **before and during** the Teaching Practice phase of the Geography Teacher Education programme?

2. How do practice architectures influence the emergence of Education for Sustainable Development teacher competences across the two phases of the Geography Teacher Education programme?

Conceptual and Theoretical Frameworks

The global UNECE (2012) ESD teacher competences framework was adopted to explore the emergent teacher competences. The Practice Architectures Theory (Kemmis et al.2014) guided the study by being used to explain what and how practice architectures influenced emergent ESD teacher competences.

Methodology

This study is a qualitative educational case study and uses an interpretive approach for data generation to gain deeper understanding of pre-service teachers' experiences during the teacher education programme. Teaching and learning srategies and activities I engaged pre-service in as a contribution towards developing ESD teacher competences before teaching practice are discussed. The teaching practice phase was effectively done for 3 out of the normal 8 months due to disruptions by the Covid-19 pandemic. Data generation methods used included a pre-teaching practice focus group interview, ESD lesson observations,

reflective semi-structured post-lesson interviews, a questionnaire and telephone interviews. In addition, document analyses of ESD lesson plans and ESD lessons learnt presented in the Environmental and Sustainability Education projects were done. Abductive data analysis using the UNECE (2012) ESD teacher competences and the theory of practice architectures is discussed in two analytic phases before teaching practice and during teaching practice focusing on how practice architectures influenced the ESD teacher competences.

Trustworthiness

The validity constructs discussed were an audit trail, content validity, investor and methodological triangulation, and constant reference to the conceptual framework on UNECE (2012) ESD teacher competences as well as citing relevant literature throughout the study. Ethical considerations were also discussed.

Emergent ESD teacher competences amongst pre-service teachers before and during teaching practice and the influencing practice architectures.

This chapter is still in progress. The research findings are presented in three tables, where each table represents one of the three ESD characteristics, namely, a holistic approach, envisioning change and achieving transformation and corresponding learning experiences (UNECE, 2012). This is the first level of the data analysis and discussion addressing sub-question 1. Practice architectures (Kemmis et al. 2014), which are the cultural-discursive arrangements, the material-economic arrangements and the social-political arrangements that influenced the emergent ESD teacher competences are discussed after each table. This is the second level of data analysis and discussion addressing sub-question 2.

Table 1 : Emergent ESD teacher competences before and during teaching practice representing a holistic approach ESD characteristic

Competence and learning experience *The educator*	**Pre-teaching practice**	**During teaching practice**
4.1 is able to connect the learners to their local spheres... of influence *Learning to do*	✓	✓
4.2 is able to create opportunities for sharing ideas and experiences... from different disciplines *Learning to do*	✓	✓
4.3**...**works with others in ways that actively engage different groups...*Learning to live together woth others...*	X	✓
4.4**...**understands ways in which natural...systems function and how they may be interrelated *Learning to know*	X	✓
4.5**...**understands the basics of systems thinking *Learning to know*	X	✓

The competences representing a holistic approach refer to a **t**eacher's ability to apply systems thinking, for example, by demonstrating how change in one part of the world can impact upon other parts (UNECE, 2012). A holistic approach also demonstrates connections. Learning to do' refers to the teacher's ability to develop practical skills and action competence in relation to ESD.

One of the ESD teacher competences suggesting a holistic approach to ESD is 4.1 'In the pre-teaching practice stage of the teacher education programme, data indicating an understanding of a holistic approach is presented in the focus group interview data below.

> The Geography and Environmental Science Section used the local environment to help learners to apply the reality that they saw and interacted with using the local environment (FGI P1);
>
> I have also participated in a drama whereby we were trying to give people an example of how they can manage the environment through traditional ways (FGI P6).

These first two quotes reflects the college preparing pre-service teachers using local links. More specifically, local engagement was linked to sustainability practices. The examples given mentioned the litter clean up activity facilitated by the college. Two participants mentioned having preceded their clean ups with environmental audits they had been involved in as part of their course. Focus group participants' quotes supporting this are:

> I have taken part in the environmental audit which the Geography and Environmental Science Section conducted in the college. I later participated during graduation whereby we were picking papers and we were the environmental agents representing the geography section. (FG1 P6).
>
> We conducted an environmental audit during our first term at college and I observed that people have a tendency of littering everywhere. As a result, I made it a policy, that I personally, won't litter everywhere even if I eat something, I have to put that litter in the bin. I also participate in the cleaning campaign every first Friday of the month (FGI P10);
>
> I participated in college involving picking litter on the first Friday of every month, and I have also encouraged my peers in the hostel to fetch water in order to make the toilets clean (FGI P4) and
>
> Actually, I am actively participating in cleaning the environment of the college yard through the presidential cleaning campaign. So I am participating in each and every programme every first Friday of the month (FGI P8).
>
> The lesson I plan to teach will help me to engage learners in problem-solving and hands-on or practical activities, for example, I will also be filling gullies. (FGI P10).

All these data signify local engagement on a personal level by the pre-service teachers. Personal commitment to local action is also demonstrated.

The data above is evidence that some participants had understood the significance of sustainability in college. This was as a result of the introduction and whole class discussion of the UNECE (2012) ESD teacher competence framework together with lectures and discussions on the nature and characteristics of ESD as a teaching and learning strategy as well as engagement of pre-service teachers in a college environmental audit and action plan. These were the practice architectures that influenced the ESD teacher competences in

Table 1. According to Hemmings et al. (2013, p.475), the teacher's practices are interactionally secured in the teacher's sayings, doings and relatings which are bundled together in the teacher's projects (purposes), their agency and dispositions (habitus) to act, enabled by their situated knowledge (how to say, do and relate in this practice). Kemmis (2019) adds that practice architectures are the conditions that make practices possible, and are composed of arrangements that enable and constrain action and interaction. These are cultural-discursive arrangements, material-economic arrangements and social-political arrangements which are bundled together in characteristic ways in practice landscapes and practice traditions. These arrangements influenced ESD teacher competences across the two phases of the teacher education programme.

Table 2 : Emergent ESD teacher competences before and during teaching practice representing envisioning change ESD characteristic

Competence and learning experience *The educator*	**Pre - TP**	**During TP**

Table 3: Emergent ESD teacher competences before and during teaching practice representiong the achieving transformation ESD characteristic

Competence and learning experience *The educator*	**Pre-TP**	**During TP**

My research's contribution to knowledge

This study made a contribution towards Geography teacher education curriculum as it provides insights into how ESD teacher competences emerge in a teacher education programme. The other contribution to new knowledge is that of linking the ESD teacher competences in the UNECE (2012) conceptual framework with the theory of practice architectures, hence addressing a knowledge gap of such a link in the geography education curriculum. From the literature searches I conducted, this is the first time the two frameworks have been presented as complementing each other in a study on teacher competences.

Lwanda Maqwelane, PhD candidate, RU

Title: An expansive learning social ecosystem for skills investigation into reframing the agrarian political economy for inclusive, just and economically sustainable value chains for the emerging cannabis industry [WORK IN PROGRESS]

Background and Context

I aim to conduct a qualitative research study that aims to facilitate the conceptualisation of change models and or practice(s) of the agricultural expert system (AES) through the use of cultural-historical activity theory (CHAT) as a research methodology. Generating developmental pathways that are socio-economically sustainable and commercially viable are premised on inclusion and equity. The study aims to reframe and expand the conceptual framing and understanding of the AES, the existing (dis)continuities and how these configure "agri-business, food manufacturing, input industries and, at the retail and of the value chain, the market" (Hall 2014, p. 9). For just and equitable transitions and development for black women farmers in the emerging cannabis industry.

The research will attempt to engage the existing "institutional and discursive linkages critically" (Hebnick et al., 2011, p. 222) and understand how these interdependent systems of practice continue, according to Maqwelane (2019) influence and or shape the contemporary agrarian political economy agrarian. The AES, as defined by Maqwelane (2021), will be used as an analysis tool to measure the "extent to which transformation of institutional infrastructure in agriculture has proceeded unchanged in its content" (Hebnick et al. 2011, p. 222). The analysis, in turn, will be used as a working document in cultivating an "alternative and inclusive" (Maqwelane 2019, p. 2) agrarian political economy premised on inclusivity and equity as a foundation for sustainable development.

What is needed going forward

The market system has failed to address Africa's "underlying structural problems" (Adedeji 2004, p. 86), which is not new or recent (Heidhue and Obare 2011). Instead, the African agrarian political economy has been confronted, according to White, with "policies and protocols favouring capital-intensive agro-exporting at the expense of their lands and farming operations and deepening historical patterns of dispossession" (2020, p. 17). It is, therefore, within this contextual overview given above that Adedeji (2004) argues for a more people-centred economic framework that is responsive to socio-economic need(s) existing and emerging in attempts to reframe the agrarian political economy for black farmer development and the inclusion of women farmers in economic frameworks.

Poole et al. (2013, p. 157) subsequently suggest the need to focus on "how knowledge is built up" in order to challenge existing power relations through epistemological and methodological shifts in the legitimisation of knowledge production (Feldman and Biggs, 2012). The paradigm shift suggested in the above demands investment in strategic thinking (Bryceson 2004) by African policymakers in generating contextually responsive programmes that can speak to "national, sub-region and regional development agendas" (Adedeji 2004, p. 96) that are geared towards inclusive economic frameworks in aims of establishing and or strengthening "resilient public institutions, reduce poverty, develop new technology, create more employment and develop and implement

climate change adaptation strategies" (Michalopoulos and Papaioannou 2014, p. 160).

Alternative policy framework(s) will need to go beyond techno-bureaucratic capacities and must be able to advance contextually responsive programmes that support "multiple livelihood strategies and promote equitable access to competitive markets" (DIF 1992, 4) contrary to the liberal market system that has characterised much of Africa's developmental agenda (Adedeji 2004). These proposed frameworks must be anchored in robust monitoring and evaluation systems that can anticipate and engage global trends pertaining to sustainable growth and development (Bryceson 2004). As a result, a concerted effort is needed in order to address actively:

- trade barriers and increasing the role of regional trade associations;
- agreeing on rationalised product specialisation to reduce competition among countries of the same sub-regions and
- avoiding unnecessary duplication of large-scale industries by establishing and harmonising sub-regional industries.

To conclude, reframing the AES aims to transgressive, transformative and boundary-crossing pedagogy due to its historical use of domination and marginalisation of black farmers, particularly women farmers (Nagda et al., 2003). The need to exist actively to problematise the "overtly and convert exercise of domination subordination" (Nagda et al., 2003, p. 167) structurally and contextually prevalent in the agrarian landscape to enable an environment in which transformation occurs through changing "environmental, cognitive and pedagogical contexts" (Nagda et al., 2003, p. 167; Gay 1995, p. 160).

Contextual background

According to Lowitt, in South Africa, "little value is attributed to the less beneficiated products of the industrial hemp value chain" (Lowitt 2020, p.19). However, South Africa is at a crossroads of exploring possibilities and the potential of Industrial Hemp. Furthermore, the country has "the processing knowledge and capability to produce the end uses of industrial hemp shown to be most profitable" (ibid., p. 20). Lowitt argues that the country has sufficient existing "relevant knowledge, capacity and capability; it is also actively undertaking R&D in production processing and alternative uses for industrial hemp" (ibid, p.28)

The 2018 Constitutional Court's decision to decriminalise Cannabis for personal use in South Africa has significantly explored the potential economic impact. This holds particularly true for the Eastern Cape, which is uniquely positioned to respond to "rural poverty and underdevelopment" (Gerwel 2018, p. 1), which continues to prove a significant problem for the Eastern Cape.

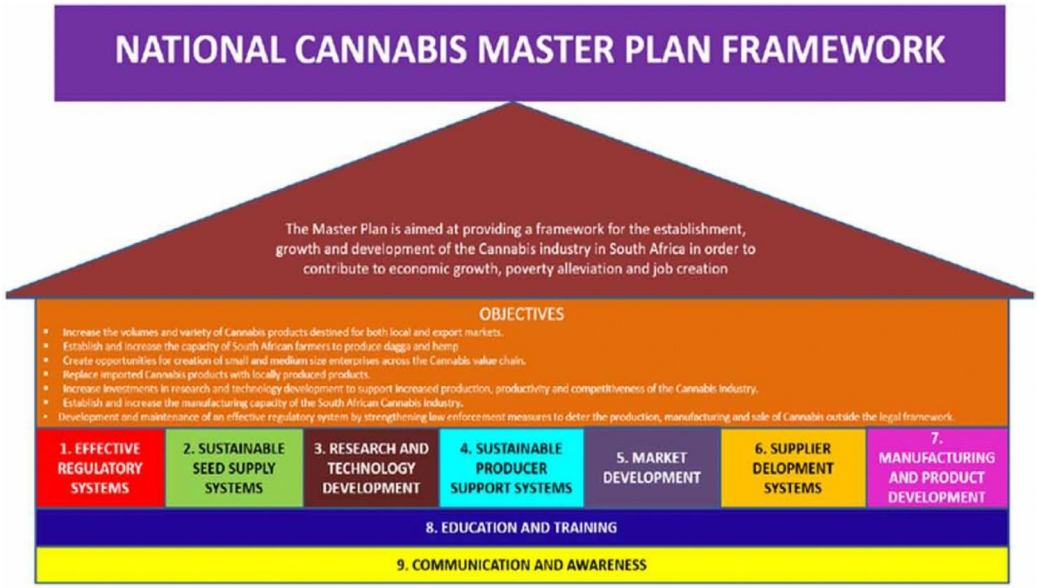
South Africa started growing hemp in 1999. Moephuli said, "The responsibility for breeding and agronomic research on hemp was delegated to the Agricultural Research Council" (2017, p.1). The CSIR preliminary report, according to Wynn (1998), highlights that for the basis of the programme, the Eastern Cape, Western Cape and KwaZulu-Natal regions were earmarked as the key strategic areas for implementation. The National Hemp Pilot Initiative was carried out through a joint effort between the Department of Agriculture in the Eastern Cape, the National Department of Agriculture and the Department of Trade and Industry to establish a "hemp industry in South Africa" (Moephuli 2017). Commercial experiments were carried out with the help of the DAFF, ARC, and Eastern Cape Department of Agriculture.

Table 4: South African hemp research trails and results to date Source: information drawn from (Tabacco and Cotton Research Institute, n.d.: Nel, 1998, Blouw and Sotana 2005 Brough et al., 2005; Sotana, 2013; Wynn, 2015)

Research trails	Stakeholders	Purpose	Funding	Outcomes
Intial feasibility trials (1994/96)	Initated by the Southern African Hemp Company and conducted by the Agricultural Research Council Department of Health Issue permits	To test the agronomic feasibility of gemp in South Africa	Southern African Hemp Company	European cultivatars unsuitable for large-scale production in all parts of the country Suitable for the Eastern Cape and Western Cape
PG Bison and Masonite Africa partner with ARC and Southern African Hemp Company (1997 - 1999)	**Private sector:** Southern African Hemp Company. PG Bison & Masonite South Africa **Public sector:** ARC, Department of Health	Private-sector players interested in exploring potential of hemp to replace high-carbon materials such as wood pulp	PG Bison & Masonite South Africa	Evolved into Southern Africa Bast Crop Consortium
Southern African Bast Crop Consortium (1996 -2005)	**Private sector:** Southern African Hemp Company, PG Bison, Masonite Africa Ltd, Mondi and Safol **Public sector:** ARC, Council for Scientific and Industrial Research (CSIR), Department of Agriculture Department of Health	To develop localised hemp cultivators with European Union certified low-THC hemp cultivators crossbred with local or equatorial varieties of Cannabis at the ARC	ARC and House of Hemp	Expanded agronomic trials and breeding at the ARC's Tobacco and Cotton Reserch Institute at Rusternburg and at agricultural, experiment stations in the Eastern Cape Two localised hemp fibre cultivators (SA1 and SA2) developed
Eastern Cape Hemp Pilot Project Initiatives (ECHPP) (1999 - 2005)	**Public sector:** Eastern Cape Department of Agriculture and Land Affair, ARC, CSIR, Fort Cox College and University Fort Hare, Department of Health	Phase 1: To prove the agronomic feasibility growing hemp as a bast fibre in the Eastern Cape to publish a growers guide	R15 million from Department of Agriculture R1 million from Department of Science and Technology through the CSIR for equipment	Establisment of National Hemp Foundation (NHF) in 2001 Trials extended to more farms (orginally 15) agronomic feasibility provded

	Private sector: House of Hemp and Southern African Hemp Company			Need for more research into raising the yields to an economically feasible level ; Extension of the value-chain through a subsidy programme
Commercial feasibility trials (Phase two of ECHPPI and expanded beyond Eastern Cape)	**Private sector:** House of Hemp (NHF coordinator who coordinated trials), Hemportuim, three original small-scale farmers from the Eastern Cape Rapula farming and Bruintjies River (Western Cape), Bulwer, KwaZulu Natal Public sector: ARC, CSIR, Department of Trade and Industry, Department of Health	Phase 2: Prove the commercial feasibility of hemp and confirm THC stability in Southern Hemisphere	Rapula Farm self-funded Department of Social Development willing to Eastern Cape 2011 planning, but seeds arrived too late, they didnt renew subsidy in 2012 House of hemp assisted farmers in the Eastern Cape and KwaZulu-Natal with funding	Report due by ARC and House of Hemp on the findings of the commercial feasibility thesis (2010-2015)

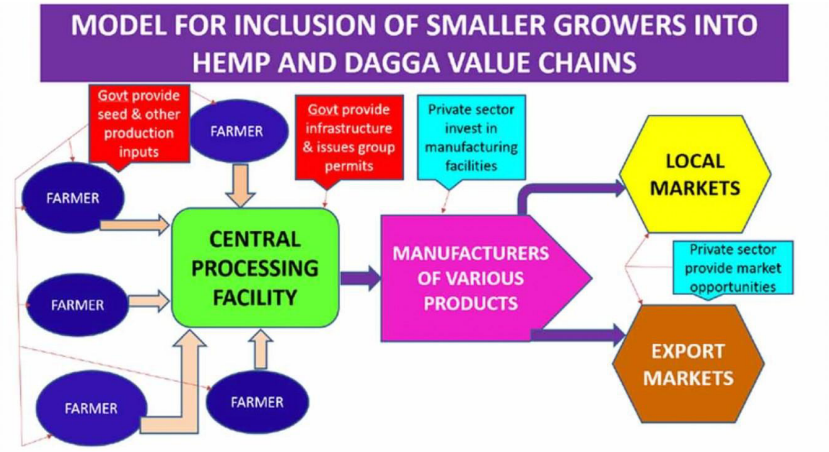
Figure 7. The South African Cannabis Master Plan Framework (Source: DRDLR)



Gwala argues that the South African Cannabis Masterplan Framework looks good on paper (de Wee and Asmah-Andoh, 2022); however, many questions remain about "will such a policy ensure that the cannabis market favours South African development and value chain creation that will develop local development in favour of

rural and township economic; has the lack of policy development prior to the clear Masterplan already opened economic floodgates in favour of western markets" (2023, p. 107).

Figure 9. The South African Cannabis Model that includes small growers in the value chain. (Source: DRDLR)



However, the challenge in the sector is how the state purposefully includes "women, youth, and those on the economic margins considering that since the market is still emerging", local competitors are currently at a disadvantage. Gwala argues that "according to the Department of Agriculture Land Reform and Rural Development (DALRRD), the South African cannabis business is expected to be worth 28 billion in 2021(Daniel 2021) however, the current legislation, despite the private use of Cannabis being decriminalised by the Constitutional Court CC in 2018, is a significant hurdle in realising the economic potential of commercialisation (Dostal 2021) (Gwala 2023, p. 110). When creating a policy, decision-makers must strike a balance between conflicting socially desirable objectives (Gwala, 2023, p. 112)

Gwala argues that the prosed conceptual value chain framework is regressive in that it allows corporations to "buy government favours, dictate to governments or use legislations and courts to bulldoze and undermine the local suppliers who are small and underdeveloped" (2023, p. 113). To continue in this trajectory is to entrench continuous monopolisation of the sector that "destroys any plans to create new and emerging farmers" (Gwala 2023, p. 113)

Therefore, the study attempts to be "deliberate, it must be legislated, and it must be government-led and government supported for some before it is allowed to be ruined by the dictates of the market." Similar to the international community of practice, South Africa's legalisation of Cannabis is understood by the state as an economic developmental mechanism that can used to catalyse the development of the rural economy. Alexander (2010) and Neocosmos (2016) argue that within the context of South Africa, however, "ordinary people's struggles have created ways to exist that are progressive because they tend to be labour-centred and viewed from a lens that reveals the emancipation and rebellion of the poor" (Moore 2023, p. 14). Within that context, I agree with Moore that "legal contemporary cannabis development is not solely about entering 'the market' or gaining liberal democratic capitalist consent" (2023, p. 13).

I argue, however, that the cannabis development framework "rehabilitates 'other' discourses about the plant to initiate their use in a post-legalisation era that seems to be side-lining them" (Moore, 2023, p. 15). The emerging cannabis/hemp industry must recognise and attempt to restructure the longstanding sectoral socio-equity challenges by recognising that "the important labour agency black people, the poor working class and women have given to the plants global recognition are being dispossessed in the plants' contemporary development plans" (Moore 2023, p. 15) continuing to underscore that "the contemporary South African development illustrates how ordinary people's history and labour is flouted when policies are written.

This study aims to ensure that positive market engagement of Cannabis is not monopolised and or captured by conglomerates and "maintain power over merchandises, even those it formally dismissed" and find ways in which the state can facilitate inclusive developmental pathways that empower, grow and development small scale producers "the state, as well as broader neoliberal agendas remain reliant on free market economic planning that has benefited a minority rather than most black people" (Moore 2023, p. 15; Chatterjee, Czajka & Gethin 2020; Gordon 2008; Neocosmoss 2016; Schneider 2003). Therefore, the need to look at "cannabis development in South Africa therefore, has to escape the capital limitations of materialism if it wants to include the lessons of its history into its contemporary drive" (Moore 2023, p. 15). I define development as a means by which societies create and sustain "progressive change, including economically and politically within and without" (Moore, 2023, p. 17). I argue that most of our development can not be separated from the political history of South Africa as the "apolitical recreational and medicinal categorisations that are disassociated from the plants' natural agrarian labour setting are being ushered into the plants' development" (Moore, 2023, p. 17). Such cannabis development is flawed for three fundamental reasons.

1. They still rely on prohibition-era accounts of the plant that remain heavily attendant to the false association to drugs and criminality (Scheibe, Shelly & Versfeld in Buzton et al. 2020);
2. The discourse of cannabis medicalisation remains the preserve of a problematic liberal democratic capitalism, and big pharmacies attempt to get a slice of the lucrative cannabis market (see London 2009) and
3. They rarely promote black people, the poor working class and women as the driving force behind developing a labour-centred cannabis sector (see Transform Drug Policy, Accessed September 30, 2021).

I argue how the emerging cannabis and hemp industry respond to the "unequal reality of the country's contemporary economic geography" (Moore 2023, p. 18). Cannabis and hemp research subsequently become a "conduit through which critique of the various sets of relations that continue to influence South Africa's history, political geography and development can be made" (Moore, 2023, p. 18). Therefore, this study needs to respond to the prudent question of finding sustainable and meaningful ways to integrate small-scale farmers' response to "unemployment and poverty are exposed alternative forms of development may be stimulated into practice (see Clarke & Riboulet-Zemouli 2021). As such, this study attempts to open up the space in which black people, " the poor working class and women have a say in the design of contemporary development" (Moore 2023, p. 20) in light of the current cannabis masterplan in South Africa is "failing to ensure all those who worked with the plant even during prohibition are justly incorporated into its future sites of trade" (Moore, 2023, p. 20). To do this I will investigate narratives and approaches being used for inclusion in this new value chain in the social learning and education and training space.

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MZU KUSE, PHD CANDIDATE, RU

***Title**: Exploring expansive learning and co-management in the uMzimvubu catchment*

***Author:** Mzukisi Kuse*

South Africa is a water stressed country which is currently confronting numerous water challenges which include security of supply, degradation of ecological infrastructure, poor landscape governance and resource pollution. These are compounded by built infrastructure which is ageing, an increasing population and the impact of climate change (Department of Water and Sanitation, 2019). Water scarcity poses a serious threat towards growing the economy as the development agenda of the country's most strategic sectors such as agriculture, energy security, mining, tourism, urban and rural development are entirely dependent on adequate water supply (Department of Water and Sanitation, 2019). South Africa's water issues are influenced by a myriad of factors such as weather patterns, governance issues, historical apartheid policies, structural integrity of ecological and built infrastructure, and general provision of services. The most vulnerable members of society, usually positioned in low-income communities are the ones which mostly bear the brunt of these harsh occurrences. These communities are usually positioned in catchments and strategic water source areas, which are important for water security in South Africa.

The Living Catchments Project (LCP) is a collaborative project, situated in four catchments in South Africa, with the aim to strengthen the enabling environment for governance of water in South Africa (SANBI, 2020). The central focus of the Living Catchments project is on co-learning and co-creation through communities of practice in order to enable, collaborate, and amplify the practice of transformative social learning and improve the policy advice practice and engagement with the water sector to contribute to the Water Research, Development and Innovation (RDI) Roadmap (SANBI, 2020). The study I embarked on was geared towards assisting in providing insights and lessons learnt, in order to produce recommendations for other catchments in and beyond the Living Catchments Project, including future studies relating to collaboration among stakeholders positioned in diverse activity systems and their co-learning journey towards working on a chosen object.

The study sought to explore expansive learning and co-management in uMzimvubu catchment, which is one of the strategic water source areas in South Africa and forms part of the Living Catchments Project. This study is positioned within the environmental education field, focussing specifically on collaboration, co-learning and transformative agency in co-

management of water resources. The study was aimed at understanding how the expansive learning process can potentially assist in surfacing transformative agency among the learning participants in the various activity systems, and how that can then help in promoting collaborative efforts in securing water resources in the catchment. The changes which have occurred in the water resource management policies and laws have brought various implications for the management of water resources in the country. South Africa has adopted an integrated water resources management (IWRM) approach, and this has implications for communities on the ground in catchments and other sectors of society. For this reason, I chose to adopt the position of a formative interventionist researcher. In the past, colonial research methodologies tended to be primarily extractivist in orientation and have left most communities with detailed diagnoses of problems but with few co-engaged ways emerging that were able to collaborate with communities to achieve alternative futures (Mukwambo et al., 2023). Adopting the formative interventionist research approach assisted me in constantly reflecting and orienting me as a researcher in the new research space, as I had previously been involved in more “hard science” research approaches, which most often are characterized by extraction of information, independence and no collaboration with communities. The formative interventionist research role makes one to be aware, to accept and to understand their positionality within the research space.

In order to address the gaps in knowledge, this study explored the utilization of the expansive learning processes, with the associated practices and procedures, including the use of the Value Creation Framework (VCF) tool, as both a double stimulation tool and a tool to evaluate or assess any social learning. The Cultural History Activity Theory (CHAT) was the foundational theory of this research, with a particular focus on 3rd generation activity analysis. CHAT is important in innovation because its approach bridges imagined, simulated, and real situations that require personal engagement with material objects and artefacts (including other humans) that follow the logic of an anticipated or designed future model of the activity (Nussbaumer, 2012; Engeström, 2007). CHAT, as an analytical framework, is able to offer understanding of how solutions can emerge through contradiction analysis and how societal activities can be transformed in the future. The intervention I embarked on was unique, because it evolved focusing on an issue (water co-management in my case), and instead of just delineating the solving of the problem to science and technology, new type of innovation was in focus that is multi-stakeholder based, composed of diverse knowledge systems and action orientated In rooting my research in a real and local context in one of the living catchments that are part of the Living Catchments Project, through the use of the expansive learning cycle, I sought to facilitate the process of contradiction analysis: a process that

involves analyzing the tensions and conflicts associated with water security in the catchment, but still working with the learning participants to formulate solutions.

Expansive learning was beneficial to this study because this process enabled collaboration and boundary crossing across activity systems; this being an important tenet in the desire to attain co-management of water resources in the uMzimvubu catchment. This study sought to show that it is both imperative and beneficial, to all parties concerned, to have learning platforms convened to facilitate expanded learning on water resources security and management. These co-learning platforms are able to provide the applicable and appropriate educational tools for the learning participants to address contradictions, engage in modelling contextual solutions, surface the emerging and demonstrated agency, and reflect on the value accrued during the expansive learning cycle. These above-mentioned outcomes of the expansive learning process are needed to support the stated intentions and objectives of the policies related to water governance in the country, in order to ensure their realization. The realization and practical implementation of the integrated water resources management approach has potential to aid in the securing of the water resources in the country and moreover, aid in the development and establishment of transformative agency in traditionally marginalized voices.

The study's contribution to new knowledge lies in relation to the expansive learning process and how it did not only expand the learning, but it changed the nature of the indicators. Monitoring of expansive learning occurred in two different phases; before the expansive learning process (A-View), and after the expansive learning process (View). The VCF tool possesses indicators which express the type of value that learning participants can potentially accrue from a learning endeavour. From this study, the expansive learning process embarked on qualitatively changed the nature of the indicators. A better set of indicators was attained following the expansive learning process, which are more aligned with the nature of transformative social learning. In this study I was also able to develop a culturally, historically grounded expansive learning process which strengthens collaboration and transformative agency in co-management amongst and across activity systems, especially to include the marginalized voices. Although the contributions emerging from this study may be at the niche level innovation, they have a potential to influence other catchments and also other policies. The expansive learning process assisted in supporting the subjects in the diverse activity systems to be better aware of and exercise their agency, for co-management of water resources in Just Transitions. The Change labs (learning and data collection platforms) I

facilitated went beyond the confines of being learning platforms, they also took on the role of being discussion platforms between the stakeholders involved in water management in the catchment. This was an important for pursuing just transitions towards water provision for the uMzimvubu catchment communities.

The second contribution was the provision of a robust social learning methodological approach, and tool to evaluate social learning and assess the zone of proximal development (this is a concept of the gap, between one point and another desired point, in terms of learning); using the VCF tool, to support the expansive learning process, underlain by the CHAT theory. This was important to evaluate if any learning occurred, with regards to co-management of water resources. Social learning in natural resource management is important, and this approach has been used as an alternative to other technocentric or extractive ways of managing the environment. The methodological approach has the potential to be added to the already existing repository of citizen science tools in the Living Catchments Project because this tool/approach has the ability, if properly translated, to facilitate and capture the social learning journeys in other catchments. The issue of the zone of proximal development (ZPD) being assessed is important for learning and fulfilling the learning objectives related to the Living Catchments Project, for monitoring and reporting purposes. Therefore, this tool which I provided offers a practical way to demonstrate how much learning is occurred in the project, meaning that it is potentially able to assist the living catchments project in its reporting needs to the funding bodies. Associated with assessing the ZPD was understanding the value indicators which were present at the A-view of the study and the new value indicators, which were present in the B-view of the study. The development of new indicators highlighted a shift and a change, both in expansion of the learning and transformative agency, which occurred as the participants worked through the surfaced contradictions.

The third contribution was the provision of tools and learning theories for the catchment participants. This is related to the fact that tools which were previously inaccessible to most of the people who were in the study were democratized and freely provided. This is important because the change labs held a generative space where people could collectively come together to advance the object of co-management of water resources. The expansive learning actions which occurred in the study also, were in line with the defining characteristics of learning communities. It was important that these theories and tools, namely CHAT and VCF, be brought closer to the communities so that they could be used by the participants in their

own context. What had started to occur was that the participants began using the activity system analysis to resolve the contradictions as individuals. During the course of the different Change Labs, it was also noted that as the participants used the activity system analysis, they became more sophisticated over time, up to a point where they could even do a PowerPoint presentation in front of various stakeholders, who came inside and outside of the catchment.

Phindile Sithole PhD Candidate, RU

Title: Social ecosystems for skills in aquaculture production within just transitioning of the food system: Case studies in Eastern Cape, South Africa and Mangochi, Malawi

(work from the PHD proposal)

Introduction

In 2019, the United Nations (UN) Secretary General asked Member States to initiate food system dialogues to leverage the power of the food system to meet all the 17 Sustainable Development Goals (United Nations, 2019). The countries had to come up with bold solutions to food systems challenges: poverty; hunger; malnutrition; food insecurity; inequality; exclusive economy and to report progress at the UN Food Systems Summit. The UN Food System Summit stems from the significant impact of the Covid 19 pandemic to reform the food system "building back better" by rethinking how we produce, distribute and eat food.

In order to do this the Southern African Member States including South Africa and Malawi participated in the UN Food Systems Summit held by the UN General Assembly in New York September 2021. Amongst the key priority areas was the need to promote aquatic foods in the food basket and to produce these at household level, promoting marine and inland fresh-water species and aquatic farming to address challenges faced by small fishers, harvesters and farmers. However there is no clear path or plan from the member states on how they seek to promote aquaculture. Moreover, not enough is being said about the kinds of skills development that are needed if we are to promote aquaculture in the food basket.

Aquaculture and Skills

Southern Africa is a food insecure region (FA0, 2022). With increased levels of hunger and job losses due to the Covid19 pandemic (Rouhani, 2020) aquaculture is being given renewed attention. Aquaculture is being recognized as an important contributor to food security, and provider of nutrition, employment, socio-economic growth and environmental recovery in Malawi and South Africa (FAO, 2022; United Nations, 2019; Isaac et al., 2004; Mukute & Lotz-Sisitka, 2012). However, this will require further development of the aquaculture food system and associated skills system development.

Aquaculture is a process of farming aquatic organisms (e.g. fish) in selected or controlled aquatic environments (marine, freshwater and brackish water). This farming involves human intervention in the rearing process to enhance production of aquatic organisms (Rouhani, 2020; Hara & Isaac, 2012).

Aquaculture practice began in the 1940s and 1950s when colonial powers saw the potential of aquaculture as a viable means of food production (Brummet et al., 2008).

Amongst the obstacles to stepping up aquaculture to contribute to food system challenges is the lack of skills development, especially in South Africa. There is a lack of participation in the formal Technical Vocational Education and Training (TVET) system (ILO, 2020) on the part of fish farmers, which would enable them to practice aquaculture in an environmentally compatible yet profitable manner that conserves resources. Furthermore, the lack of skills in aquaculture (ILO, 2020; Agri-SETA, 2020) deprives the local population of income and employment opportunities and the possibility of consuming affordable and nutritious fish products.

The notion of skills is a complex discourse, in Southern Africa it is highly contested, socially and politically constructed (Sawchuck, 2006; Allais, 2012). Sawchuck (2006) proposed some basic consensus around the concept of skills for skills research, outlining that at its most basic, skill includes internalized capacities resident in the individual worker. In addition, skills includes job design, division of labour, technologies and control. Furthermore, the concept of skills has limited meaning without reference to knowledge, values and attitudes (Ramsarup, 2017).

Aims, research questions and objectives

The main aim of this research is to understand how the position practice systems of involved actors enable or constrain skills development in the aquaculture landscape in two case study contexts (Eastern Cape and Mangochi). Understanding the mediating role of the various position practice systems in the skills system is critical if we are to promote aquaculture in the food system. The research seeks to contribute towards developing social skills ecosystems that serve the local aquaculture food system in more inclusive, socially just and sustainable ways. It further seeks to explore ways in which aquaculture can contribute to just transitioning of the food system.

MAIN RESEARCH QUESTION: How are various position practice systems in the aquaculture skills ecosystem enabling or constraining development of aquaculture production in the food system?

SUB QUESTIONS:

- What is the social ecosystem for skills that currently exists and could exist around aquaculture?
- What are the existing position practice systems in aquaculture social ecosystems for skills in two case contexts, and how do these position practice systems interact?
- What mechanisms are influencing the various position practice systems in the aquaculture social ecosystems for skills, and how are these enabling or constraining the production of aquaculture?

- How can the skills ecosystem be better supported/enhanced to transition aquaculture in to a more locally just and inclusive food system?

Social ecosystem for skills in aquaculture production

This research recognizes that the notion of 'skill' is a both narrow and blunt concept and mainly used to address the formal labour market (Warhurst et al., 2017). Aquaculture as an emerging contributor to the food system has technical, economic, as well as cultural and socio-political dynamics to consider, however there is lack of engagement with the diversity of these aspects. In addition, the research recognizes that majority of the population finds employment outside the formal labour market, hence this research expands to include skills in the informal economy. In order to promote aquaculture in the food basket, we will require initiatives to nest skills in wider strategies of economic renewal which includes both formal and informal economy and not just economic growth. Moreover, the research acknowledges that skills alone cannot promote aquaculture production unless broader forces shaping the local economies are tackled.

In light of the above insights, this research shifts from main stream economic thinking in the form of human capital that suggest that higher skills acquisition provides higher income. The human capital theory suggests that sectors/firms benefit from higher skilled individual through productivity gain. This research argues that the main stream economic thinking with regards to skills development does not recognize the complexity of the African context with regards to learning, living and working. The food system challenges and emerging food production systems (aquaculture) are forcing us to rethink the work that we do and to recognize the wider societal dimensions that are outside the formal labour market. Hence this research adopts a metaphor of 'skills ecosystem' towards recognizing the various players in aquaculture landscape both in the formal and informal economy. It seeks to highlight how the interaction the between the various agents and their position practice system may promote aquaculture to serve to local food economy.

The research recognizes the importance of context or setting in which skills are developed. The research seek to contribute to the skill ecosystem in aquaculture production. The social ecosystems for skills model recognizes that economies, labour markets and skills are embedded within a wider social, spatial and ecological context (laminated ontology) in which a broad range actors and positions practice systems have legitimate voice. This study will draw on and contribute to the work of Hodgson and Spours (2016) as developed by Ramsarup, Lotz-Sisitka and McGrath (2022) as their work promotes a more socially oriented application of mainstream skills ecosystems research in diverse settings, including African contexts for vocational education and training (VET Africa 4.0 Collective, 2023). Moreover, they adopt a

perspective that connects working, living and learning and enables a more place-based orientation that can also support skills for inclusive and local economies (Lotz-Sisitka, 2020; Ramsarup et al., 2022; VET Africa 4.0 Collective, 2023).

The social ecosystem for skills model stresses the importance of looking at the whole skills formation system, and the use of 'social' emphasizes that attention in skills system research is not just on a narrow employability-entrepreneurial or productivist agenda, but that it considers wider societal and educative dimensions of the skills system including informal learning. Moreover, it foregrounds the importance of a range of actors that influence skills development (e.g. farmers associations, NGOS) in addition to mainstream formal skills development players (e.g. Colleges, Universities), and includes small-scale role players, informality etc. in building skills networks and institutions. This study uses the ecosystems metaphor consciously not only to understand and describe the current state of aquaculture skills system and the skills needs but also as a tool for imagining and contribution to the possibilities for just transitions in the aquaculture skills system (Lotz-Sisitka, 2019).

Just transitions is a policy framework that seeks to guide many areas of practice to transition out of the legacy of century's colonialism and extractive economy to more sustainable, just and equitable economy (Justice and Ecology Project, 2016:3). This study seeks to contribute to skills development for the aquaculture food system as a process of just transitioning towards a more inclusive, and sustainable practice and value chain. As noted in Rosenberg, Ramsarup and Lotz-Sisitka (2020) and in the VET 4.0 Africa Collective (2023) increasingly, there are realizations for radically different systematic alternatives that are more inclusive and sustainable and the skills development system cannot ignore this. In the context of this study, the concept of 'concrete utopianism' can align well with this ethical intention, and the social ecosystem for skills model.

The idea of concrete utopianism is that the possibilities that are envisaged for building a better world are real and realizable, they align with the idea of 'build back better' following the impetus for advancing areas of food security following the COVID-19 pandemic. The just transition framework offers conceptual tools to think about transitioning the aquaculture skills landscape, especially the quadrant that focusses on systems approaches, which also aligns with the social ecosystems for skills conceptual framing in this study.

This research will contribute to the concept of just transitions by providing a way of commenting critically on the social ecosystems for skills directionality, as it applies to aquaculture skills development (i.e. is it aiming to be more socially just and sustainable?). It will also contribute in probing whether the actors in the various position practice systems are considering what they do in relation to contextually relevant just

transitioning. The research will focus on contextually relevant just transitioning through skills development to avoid the critique of the macro-level just transitioning policy which has been said to face the burden of unrealistic expectations (CSIS & CIF, 2021)

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Preven Chetty, PhD Candidate, RU

The Forgotten River (a short overview): enabling ecological literacy through resonant encounters along fluvial systems

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Introduction

The forgotten river is a doctoral study that looks at how ecological literacy and resonance building praxis can be accessed through fieldwork practical's that are closely aligned with school curriculum in a naturalistic setting (i.e.: on the banks of a river or within a botanical garden). The study is located in primary and secondary schools in South Africa as well as from archives of engagements along the Umgeni River. Presenting an array of data from both historical sources (in which I was an active participant/ activist) and generative work gathered primarily for the purposes of this study, I will elucidate how resonance building activities can be created by focused fieldwork practical activities. Personally I have been involved in the field of river quality monitoring and environmental education in Kwa Zulu Natal where I was born and this is the beginning of the inspiration for this project. In 2010 I started The River Project which hoped to capture voices and stories of communities along the banks of Umgeni River. In 2012 I initiated and helped implement the Mayday For Rivers Walk with the support of the Duzi Umgeni Conservation Trust and we conducted river monitoring data from source to sea of the entire length of the Umgeni River (305 kilometres). The resultant blog www.umgeniriverwalk.co.za and report chronicled the hope and dreams for a river heavily beleaguered by pollution, overflowing sewerage, alien invasive and sand mining to list but a few of the issues that plagued the river. Since then I have begun walking the tributaries of the catchment to paint a fuller picture of the water crisis in KZN from 2012 to 2017. I was amazed at what I saw. Instead of water quality being the highest at the source and then steadily begin to deteriorate as it flows towards the river mouth, which is what one will naturally assume, I found a highly responsive river system. A riparian system that dipped in quality from poor to pristine in the space of a few kilometres and all seemingly dependant on the impact and practices that people who took care of the rivers, be they, farmers, conservation groups or schools. Beginning a doctoral study to examine the effects of resonant building praxis activities and its effects on people and places seemed to be the next step in this long meandering journey.

Water quality and scarcity is a major concern in Southern Africa especially as the threat of climate change looms even closer. The last decade of droughts have exposed the brittle nature of Southern Africa's resilience to water shortages. Compounded to this is the fact that most rivers in South Africa are not adequately cared for and are under tremendous strain by (and not limited to) pollution, excessive alien vegetation, malfunctioning sewerage lines, sand mining, agricultural impacts (water pumping and animals using the rivers), eutrophication, litter from towns and villages, illegal dumping and industrial waste (Millennium Ecosystems Report, 2005).

In the background of the context of the economic and technological juggernaut that is *advanced capitalism,* is the current social and ecological crisis faced by all life on this planet. Southern Africa is "geographically at the bottom of a continent that will be hardest hit by the reality of climate change" (IPCC, 2013, p.23). Currently global human lifestyle practices and consumption indiscriminately dislocate the Earth's fragile ecosystems. The IPCC (2013) report also states that the "warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia… and the concentrations of greenhouse gases have increased" (p.4). In the coming decades one of the issues which will prove disastrous for most communities will be droughts. Lack of water will be the death knell for many human societies. And yet modern humanity being so far removed from the natural environment still believes water comes from taps or at the very best the numerous dams that are studded across our river systems.

Yet freshwater is predominantly found in rivers, and rivers need to be protected, cared for and nourished, if the promise of renewable water is to be a reality for all who require it (which is everyone). Helping youth and communities gain ecological literacy on what makes a healthy river ecosystem and what enhances the health of their surroundings is vital in providing the basis for a more reciprocal relationship between humans and nature. The effect of working with different modalities in creating meaningful relationships with nature will also be explored. These interventions are displayed on a multimedia website that accompanies the thesis which also has an archive of the relevant blog post cited conversations with landscape artists of the resonant meanings of their work as well discussion with teachers and river walkers about their impact that being in the field has on them and the learners who engage in these activities.

In order to research such elusive concepts I had to look back through archives of blog posts conducted on the numerous river walks along Umgeni River of which I was a part of as well as my own experiences of ecological literacy and my growing experience of being in resonance with nature. This was also

supplemented by further investigations in Makana with local environmental groups and learners in both primary and secondary schools.

Resonance

The era that we are in of "late capitalism" has created three forms of social acceleration: technical change, the shrinkage of the present, and changes in the forms of practice (Rosa, 2015). This social acceleration has produced a sense of alienation and disconnect amongst the Earth's human inhabitants and we are seeing the cracks of the dominant worldview of rampant consumerism taking its toll on society and the natural environment. When value is placed on things and consumption instead of connection, be it with the natural world or each other, then we begin to feel alienated and when alienation sets in it is hard to create effective change or become change agents.

Rosa (ibid) finds this current trajectory expressed in the "diverse, multifarious reflections of the first generation of Critical Theory, which time and again – from Benjamin, Adorno, and Horkheimer to Fromm and Marcuse – gave expression to the concern that the modern relationship to the world could be quite problematic, misguided, even dire" (p.44). From these indictments is the clarion call of Marcuse and Adorno for a different mode of existence. Susen (2019) states that the dialectic between resonance and alienation lies at the heart of Rosa's argument concerning the ambivalence that pervades modern societies. If one totally conforms to the dominant social hierarchies then one loses one's sense of self actualisation and potential and one can become a one dimensional man (cf Marcuse above) subject to administration and conformity

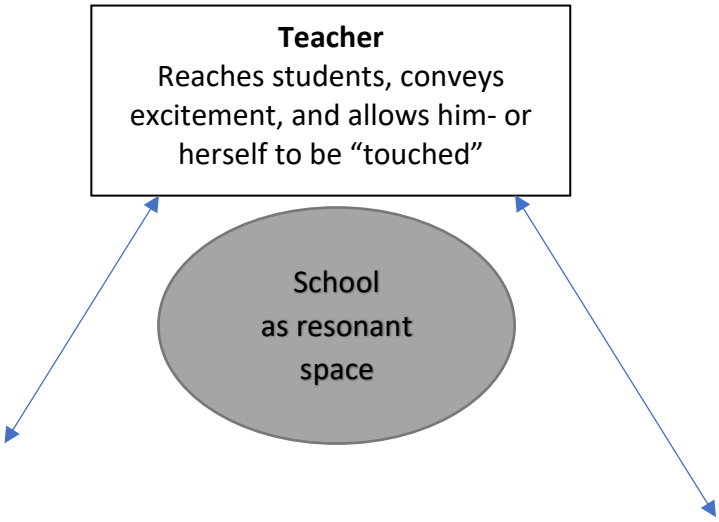

Figure 1:**The triangle of resonance, adapted from Rosa, 2015, p.243**

When the school becomes a zone of resonance that enables learning and discovery then creative and critical learners can emerge and less destructive nature-culture relationships can be cultivated. Rosa (ibid) describes an unsuccessful educational event where "teacher, student and material have nothing to say to each other" (p.242) while a successful event will be where all speak to each other and there is a crackling of excitement to the lesson.

The use of voice is a very prominent theme in Rosa's resonance. We use our voice to express ourselves but also to communicate and resonate with the world. The arc of education also rests on allowing the student to find their voice and the most gifted students are the ones who are open to all subjects and find that things speak to them and they resonate with it. Being in resonant spaces however helps one find one's voice and potential and thus one is able to find ways to transcend the boundaries and alienation of modern society; resonant spaces can be found everywhere, in books, art, music, sport, family, friends, schools and nature. It is at the nexus of nature and schools, the fieldwork practical, embedded in environmental education through the natural science and geography curriculum that I wish to examine if and how resonance can grow from structured activities in a school based setting and in community fieldwork activity. This is what Rosa (2015, p.243) calls the successful triangle of resonance as seen in Figure 1 and adapted to the school context and the pedagogical process interaction between teacher, student and material. Something magical happens when the classroom comes alive with resonance, when students, teachers and the environment are in synch. Yet these moments of resonance seem to be rare and are hard to create.

Thus according to Rosa the core aim of resonance theory is that it "can be defined as resonance if it meets the following four criteria:

"1) Af←fection: A subject (or an entity more general, but for the scope of topics discussed here, we can safely talk of a subject) feels 'called upon' and is touched, moved or gripped by something or someone 'out there', as part of the world he or she encounters.

2) E–>motion or Self-Efficacy: The subject responds to this affection in a self-efficacious mode of reaching out and touching or influencing the object or entity encountered.

3) Transformation: In this dynamic, two-way process of encounter, both sides – self and world – are transformed to some extent. Hence, resonance is not about the affirmation of identity, but rather about its transformation.

4) Uncontrollability [Unverfügbarkeit]: Finally, resonance in this sense is essentially open ended, i.e. uncontrollable and unpredictable in two respects: First it is constitutionally impossible to predict its occurrence, and secondly, if it happens, it is absolutely impossible to predict or control the outcome or result of the ensuing transformation" (Rosa, 2020, p.237)

These parameters helps define resonance and its occurrences in an educational setting and through the use of these categories I will be able to identify when resonance occurred during the interactions of the study (see Introduction, Methodology). Resonance thus becomes a marker of quality education and a answer to the alienation of modern society. Rosa also claims that "it is precisely experiences of resonance which allow for individual, social and moral change" (ibid).

Conclusion

Curiosity and exploration indeed seems to be education's essential character and it truly comes alive when students and teachers alike are engaged in the field and in the natural world. Lotz-Sisitka (2016) also states that it is also "the influence of early critical educational research theorising that gave rise to the emergence of a differentiation between education in, about and for the environment" (p.209). It is this crucial difference in all its imbued meaning that gives gravitas and a sense of place to environmental education. Fieldwork in environmental education is as much about reconnecting young minds, body and spirit with the natural world as it is about allowing the space for critical thinking about environmental issues and solutions to emerge.

A reckoning or social movement is thus called for, one that illuminates our current generations to the weight of colonial history and more importantly a way out of it that embraces indigenous cultures and active learning experiences. A social movement that helps the current generation rise out of apathy, hopelessness, alienation and despair to being co-creators of a new world, citizen scientists with a vision of a new earth, artists and creators who can translate their vision into works of art and poetry that can touch those around them and resonate deeply within their core to spur more action and inspire change.

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Sidney Muhangi, PhD Candidate, RU

Building climate resilience for a sustainable future of smallholders and extension work: Reframing extension occupation in response to climate change

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Introduction

With climate change bringing new challenges for work and livelihoods, agricultural extension systems have found themselves trapped with limited capacity to respond. Agricultural extension plays a significant role in developing farmers' skills and knowledge in most African countries where agriculture is the mainstay for economies and livelihoods. Statistics show that agriculture contributes approximately 23% of Sub-Saharan Africa's (SSA) Gross Domestic Product (GDP) and engages over 60% of the continent's population, primarily through smallholder farming (Goedde et al., 2019; Mutimba, 2014). Countries like South Africa and Uganda demonstrate agriculture's significant socio-economic impact. In South Africa, for instance, the agricultural sector supports over two million active smallholder farmers (Agricultural Sector Education and Training Authority [AgriSETA], 2020), and in Uganda, over 80% of the rural population is employed in subsistence agriculture [MAAIF], 2018; World Bank, 2021). Despite agriculture's vitality, climate change-induced challenges, like droughts, floods, pests, and diseases, impede smallholder productivity, exacerbating food insecurity across the continent (FAO et al., 2022).

Addressing these challenges requires robust agricultural extension systems, emphasising knowledge development to promote farm productivity and climate resilience (Abdu-Raheem & Worth, 2011; Ozor & Nnaji, 2011). Especially with the unpredictability of climate change, there is an increased focus on agricultural extension as a tool for imparting climate resilience knowledge (Lipper et al., 2014). However, extension agents face sustainability knowledge and skills gaps (Rosenberg, 2020) and need skill adaptation to better assist farmers in this changing climate. In addition, the occupation itself, which is the mechanism through which their skills are planned and developed, is not responsive to climate. The evolving nature of climate change necessitates re-evaluating traditional extension approaches and occupational systems to develop skills for a more sustainable agricultural future of work and livelihoods.

Occupations: origins and the evolution of extension occupation in the African context

The concept of occupation has evolved, and for decades in Africa, occupations have been employed as primary mechanisms for structuring work and labour and for planning and developing skills. Freidson (1985) described an occupation as a combination of tasks in role bundles that exist when workers perform the same activity and develop methods that are passed on to new recruits. Clarke (2011, p. 103) observes an occupation as a "formally recognised social category" that involves a regulatory framework encompassing aspects such as vocational education and training

(VET), qualifications, promotion, and the encompassing range of practical and theoretical knowledge needed to perform its tasks. Occupations are also understood by their characteristics, such as being heterogeneous, being temporary constructs, and having internal contradictions (Blum et al., 1988; Standing, 2009).

Abbot (1993) presents two ancestries in the genesis of occupations. The Hughesian narrative emphasises ecological institutionalism and social psychology. The ecological institutionalism narrative is more associated with occupations, while the social psychology perspective focuses more on professions. Hughesian ideas formed the earlier understanding of occupational structuring and provided three origins of new occupations, including new social institutions, technical developments, and social movements (Kuhlmann, 2013). This perspective underscores how occupations emerge and disintegrate.

This study traced the historical sociology of occupations to understand how current skills planning and development systems have embraced the occupational discourse, including in the agricultural extension in most Sub-Saharan African countries. Literature has suggested that the history of occupations dates back centuries in many parts of the world, from pre-industrial to feudal medieval societies and the Industrial Revolution eras. However, the documented history of occupations extends back to the medieval period from the 1300s, characterised by occupational guilds encompassing diverse fields, including trades, artisans, and merchants (Ogilvie, 2014). During this era, an occupational guild broadly associated people with similar characteristics pursuing a mutual purpose (Ogilvie, 2014). These occupational guilds, mainly economic guilds, exhibited characteristics apparent in contemporary occupations, such as control of knowledge and training (Boldorf, 2009; Epstein, 2008), occupational entry through accreditation and licensing (Caracausi, 2016), and influencing government authorities to regulate competing occupations, protection and favours (Davids, 2008; Ogilvie, 2007). The decline of occupational guilds coincided with the emergence of the Industrial Revolution, mainly in Europe in the 1800s and brought a shift in the structuring of work and labour (Ogilvie, 2014). The Industrial Revolution, which favoured large-scale industries over small artisanal occupations, accelerated the decline of the guilds (Crowston & Lemercier, 2019). Despite the decline of occupational guilds, the occupational discourse did not wholly disappear. The emergence of new occupations such as meat packing, steel mills and refineries prompted the establishment of new and structured ways to categorise them, including systems like Masse's (from the 1750s) and Patrick Colquhoun's (1800s) tables (Lindert, 1980)

Consequently, these ideas were transferred to other areas across the global South, mainly Africa, during colonialism. Furthermore, because agriculture was the dominant mainstay in most African societies, these ideas began with the agricultural transformation, where colonialists encouraged agriculture mechanisation and other agricultural innovations for subsistence farmers to improve their production for export to colonial countries (Mukembo & Edwards, 2015). The assumption was that all innovations were helpful to farmers, irrespective of their economic, social, or cultural orientation and the imposing of European-style freeholding and land ownership to replace communal spread during colonialism (Mamdani, 1996). Over time, the agricultural extension

became one of the earliest and most sought-after occupations due to its promotion by European colonial administrations. Since then, like other sectors, the extension occupation has become a primary mechanism for planning and developing skills in the agricultural sector.

What is the nature of extension occupation in Africa?

Answering this question requires a deeper analysis of the nature of occupation to offer a broader understanding of how the extension officer occupation is constituted. The extension occupation can be described in terms of its niche, how it is organised, the policy environment in which it operates, how it is professionalised, and common approaches employed in extension delivery.

In Africa, extension is famous for supporting smallholder farmers. Abdu-Raheem and Worth (2016) assert that the primary beneficiaries of agricultural extension services are small-scale and smallholder farmers, majority women who collectively represent the vast majority of the smallholder farming community in Africa. Extension agents are key agricultural informants among most farming communities in Africa, which, in addition to providing information and knowledge, help the government distribute farm inputs to the farmers (Adegboye et al., 2013).

Regarding extension organisation, in Africa, extension is organised in a pluralistic and decentralised fashion. Traditionally, the extension systems inherited from the colonial era were centralised in which the government was the primary provider of extension services to the farmers. This trend changed in the 1980s when the World Bank introduced structural adjustments that required the government to restructure extension systems to allow private providers, both for-profit and non-profit extension providers, to steer the system to pluralistic (Stringfellow et al., 1997). By decentralisation, the central governments shift extension delivery responsibilities to more localised tiers of governance, such as district or county administrations (Abdu-Raheem & Worth, 2016). Nevertheless, governments in a pluralistic extension system in Africa still possess the duty of supervision and role delegation resting on Ministries or Departments of Agriculture (Davis and Terblanche, 2016).

The common approaches employed in most extension systems across Africa are diverse due to the pluralistic nature of the systems. As a result, context-specific approaches are employed depending on who the service provider is and how the service is provided. However, these dissemination approaches can be classified into three categories: top-down, bottom-up and participatory (Scoones, Thompson & Chamber, 2008). Some of these approaches have evolved from previously colonial-inherited approaches, such as diffusion models and the use of progressive farmers, to demand-driven such as farmer field school (FFS) and the current employment of ICT-based approaches using applications and internet to provide information and learning platforms to the farmers (Aker, 2011, Mutimba, 2014; Röling, 1988).

Given the pivotal role of extension agents, governments in Africa have sought to regulate extension occupation by ensuring that extension agents meet specific standards, qualifications, competencies, and skills to maintain service quality and credibility of the profession among farmers (Shemfe & Oladele, 2018). For instance, in South Africa, the minimum qualification for extension professionals is a Diploma in Agriculture or equivalent. In Uganda, the government mandates a Bachelor's degree in agriculture, extension, or a related field for public extension positions. This contrasts the traditional African extension systems, where qualifications and other professional standards were not a yardstick for extension agents. However, the prevailing challenge to the professionalisation of extension occupation is the absence of adequate accreditation authorities, as highlighted by Shemfe and Oladele (2018).

Policy is a significant aspect of agricultural extension in Africa. In Sub-Saharan Africa, agricultural extension policies are notably sparse. Of 27 nations examined by Oladele (2011), only three had concrete extension policies. Similarly, Abdu-Raheem and Worth (2016) found just one legislated extension policy among 17 West African nations. The norm is reliance on implied policies present in government documents and other informal sources. Thus, despite the importance of agricultural extension, Sub-Saharan Africa's efficacy is undermined by the lack of robust extension policy frameworks.

Contextual findings on extension occupation in Uganda and South Africa

As literature has indicated above, occupations, particularly agricultural extension, have roots in historical occupations and permeated African skills planning systems during the colonial era facilitated by the Industrial Revolution. Extension occupation is employed as a mediating unit of intervention for skills planning and development for the agricultural sector in many African states. Study findings from Uganda and South Africa have shown that the extension occupation exhibits similar characteristics to occupational guilds, such as training, qualifications, licensing, and regulated entry. Furthermore, the occupational structures currently employed to categorise occupations, such as the Organising Framework for Occupations (OFO) and International Standard Classifications of Occupations (ISCO) used in South Africa and Uganda, respectively mimic traditional occupational structures such as Masse's and Patrick Colquhoun's tables.

The extension occupation in both countries was found to be inflexible for climate resilience and ecological concerns. This was vivid from the labour market analysis, which showed that due to its alignment with extension occupational demands, the recruitment process, as highlighted in job adverts, does not emphasise climate resilience expertise and skills. In addition, the Vocational Education and Training (VET) extension training was found not to adequately mainstream climate resilience expertise, as evidenced by the curricula review. This can be attributed to VET's alignment with the occupational requirements and the labour market demands, mainly oriented to commercial farming and urban industry, not the smallholders who require skills to adapt and mitigate climate-induced impacts. This occupational framing that influences VET training and the Labour market had negative implications for policy implementation. Although policy on extension

was found to emphasise climate resilience for extension work and VET extension training, this has not gained traction in the labour market and training aspects.

On the other hand, the labour market analysis of South Africa and Uganda revealed distinct workstreams within the agricultural extension field of practice. Several knowledge and skill sets were identified by assessing job advertisements and associated academic qualifications, both formal and informally obtained and were subsequently categorised into broader workstreams. The broader workstreams identified include monitoring and evaluation, agricultural research, agricultural production and value chain, policy, community liaison, and marketing and agribusiness.

Reimagining the extension occupation for climate resilience

The traditional occupational model, such as that of agricultural extension, is ensnared in a rigid historical system and is falling short in confronting the challenges ushered in by climate change in agriculture. The findings gathered in the study underscore the urgency to transition from these constricted occupational systems to more expansive and adaptive structures.

Recognising this entrenched rigidity and historical situatedness of existing extension occupational configurations, which are ill-equipped to meet the evolving demands of climate resilience, the study underscores the urgent need for a departure from the traditional. At the heart of this research is the pioneering workstream mapping approach. Unlike conventional systems, this approach does not adhere strictly to job roles or occupational boundaries. Instead, it adopts a flexible and dynamic model, mapping skills and knowledge areas across various domains pertinent to agricultural extension and embedding climate resilience. Notably, due to their diverse academic and occupational underpinnings, these extension workstreams exhibit potential adaptability to climate resilience, in contrast to the existing rigid extension occupation.

In summary, recognising these shifts and limitations in the extension occupation, transitioning from a narrow, historically defined occupational framework to a more adaptive and holistic ‘workstream mapping approach could offer a more comprehensive and contextually pertinent knowledge base for climate-responsive extension work, VET learning and sustainable smallholder farmers’ livelihoods.

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Sizakele Serame, PhD Candidate, RU

PhD study: GIS and Sustainability in Higher Education

Introduction

The ratification of the Sustainability Development Goals (SDGs) came after the Millennium Development Goals reached their target date. The SDGs have provided detailed guidance on the various ways stakeholders can contribute towards sustainable futures. These goals have permeated through different industries; the education sector being one of the most impacted as practitioners are tasked with adapting and including the SDGs into their curricula and syllabi (Kagawa & Selby, 2012). Primary and secondary education have successfully adapted their curricula, including the incorporation of campaigns and awareness drives on sustainability, supported by the Department of Basic Education and the private sector. On the other hand, tertiary education is lagging with the curricula, policies and activities. Sustainability is evidently still an afterthought, let alone the SDGs, only brought up at events aimed at sustainability (Nhamo, 2020; Bartlett et al., 2020). The SDGs are yet to be taught in core modules and not as extra courses that are not mandatory for students to complete.

This study aims to integrate sustainability competencies into the undergraduate Geographic Information Systems curriculum at the University of Fort Hare. The justification for sustainability competencies, and not SDGs, will be elaborated below.

GIS Education in Higher Education

Geographic Information Systems (GIS) mapping plays a role in spatial thinking education, especially when studied at higher education institutions. According to Coetzee et al. (2013) GIS has become a valuable analysis tool in a variety of fields, including geography, urban planning, forestry, wildlife management and more. GIS technology allows different aspects of reality to interact and intersect for spatial analysis and planning (Coetzee and Eksteen, 2012). Several standards of competency have been used to assess, evaluate, adapt and improve GIS education. The most used models in international tertiary institutions are the University Consortium for Geographic Information Science Body of Knowledge and the National Centre for Geographic Information Analysis. South African tertiary institutions use the South African Qualifications Authority registered Unit Standard Based Qualifications (USBQ) and the South African Council for Professional and Technical Surveyors (PLATO) GI Science Model (du Plessis and van Niekerk, 2012).

At the Department of Geography and Environmental Science at the University of Fort Hare, GIS is introduced to students at an undergraduate level. This creates a gradual introduction and exposure to

students, an opportunity to explore basic GIS technology, and their spatial awareness skills. Undergraduate studies are aligned with Marble's (1998) pyramid of GIS competency (Figure 1). That is levels One, Two and Three. The first three levels will inform the learning intervention designed for this study.

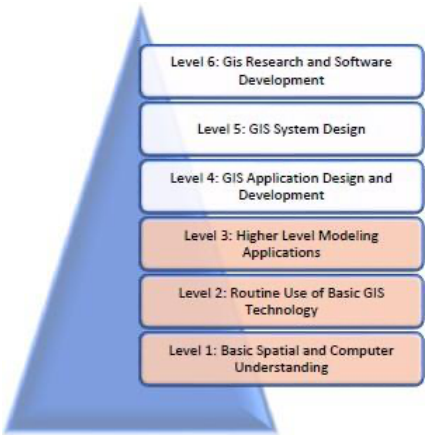

Figure 1.1 Pyramid of GIS Competency (Source: Marble, 1998)

Higher education in South Africa is regulated by several interested parties, such as the higher education national department, the South African Qualifications Authority (SAQA), professional bodies and professional associations. The Council on Higher Education is responsible for quality assurance for GIS teaching in higher education (Department of Higher Education, 1997). The South African Geomatics Council (SAGC) is a professional body that registers GIS technologists and practitioners.

Sustainability in Higher Education

According to Sterling et al. (2012) higher education can help shape the future by training future decision-makers, policy makers, professionals and responsible citizens. In agreement with this sentiment, the UNESCO Futures for Education report (2020) emphasizes the need for a new social approach to education, one in which learners become ethical thinkers, doers, responsible citizens and people with agency. The report highlights the need for new pedagogies, approaches to curriculum and a new vision of schooling. The latest significant initiative for guiding Education for Sustainable Development is the UNESCO Futures for Education (2020), which aims to reimagine education and how it can be used to shape the future. The Global Action Plan for Sustainable Development (UNESCO 2015) identifies five priority areas and one is directed at addressing the transformation of educational environments by incorporating sustainability

into campus operations, governance, policies and administration. These initiatives share the common aim of incorporating sustainability into education, at all levels.

Whilst the importance of education is noted, localisation of sustainable development remains a challenge as some institutions are still lagging (Nhamo, 2021). At the 6th International Conference on Sustainable Development, in 2018, various scholars explored sustainability in higher education. For instance, Molosiwa and Boikhutso (2020) explore pedagogical practices and assessment practices that are more likely to promote education for sustainable development in social sciences at the undergraduate level. Another study by Bartlett et al. (2020) identified areas that institutions need to focus on to achieve an across-the-board implementation of the Sustainable Development Goals, including staff and faculty professional development, sustainability learning competencies, and awareness and assessment. Tandon (2017) states that the localisation of SDGs in teaching and learning includes curriculum revision, the introduction of new courses and engaged pedagogy. In this study, the SDGs will be a springboard for sustainability education, serving as guidance on how some of the sustainability challenges identified by participants can be sustainably addressed. The SDGs will be taught as part of the interventionist learning experience, and participants will use them as a guiding tool for sustainability action projects which will be part of the research intervention.

The South African Department of Higher Education (Department of Higher Education, 1997) recommended that higher education institutions should develop a sustainability policy, however only two of the four universities in the Eastern Cape have a readily accessible sustainability policy on their website. The University of Fort Hare and Walter Sisulu University do not have sustainability policies on their respective websites. It has been confirmed by the Property and Services Department that the University of Fort Hare does not have a Sustainability Policy. Nelson Mandela University and Rhodes University both have comprehensive policies, guided by the Higher Education Act 101 of 1997 Reporting Regulations. Nelson Mandela University has a “Green” Index, from which sustainability initiatives can be implemented. Both policies have various themes including, but not limited to, water sustainability, energy sustainability, sustainable waste management, sustainable travel and sustainable procurement (Rhodes University, 2015; Nelson Mandela Metropolitan University, 2015). These themes tick off the areas highlighted by Bartlett and colleagues (2020).

For the teaching and implementation of sustainability efforts, Wiek, Withycombe and Redman (2011) and Rieckmann (2012) developed the following competencies:

- ✓ Systems thinking;
- ✓ Anticipatory;
- ✓ Normative;
- ✓ Strategic;
- ✓ Collaborative;
- ✓ Critical thinking;
- ✓ Self-awareness;
- ✓ Integrated problem-solving.

GIS and Sustainability in Higher Education

According to Wiek, Keeler and Redman (2010: 203) the introduction of sustainability education in the academic field, aims to "…address complex anthropogenic challenges with a variety of research and teaching approaches that are problem-driven and solutions-oriented." The above-discussed competencies of both GIS and sustainability competencies share commonalities and can be fulfilled in similar ways, these similarities will allow for integration during the reflection and review of the participants' sustainability projects. The competencies will be integrated in the following manners:

- ✓ Systems thinking and analytical competencies: The study participants will be given activities to develop their abilities to recognise and understand complex relationships and analyse, problem solving and research skills during the planning, implementation and reporting back on their sustainability action projects. These will include quizzes during the learning intervention;
- ✓ Interpersonal and intrapersonal competencies: The participants will form groups, and negotiate a sustainability issue of their interest that their sustainability action projects will take forward. The participants' individual experiences with the selected sustainability issue will be discussed, giving them an opportunity to highlight their personal contribution towards this issue;
- ✓ Visioning and anticipatory competencies: The participants will need to envisage a "bigger picture", and to understand and evaluate multiple futures when conducting their sustainability projects. These competencies are likely to emerge during the identification, selection and response to sustainability challenges discussed during the intervention, as they trade off on the different possibilities;

- ✓ Technical competencies: The participants will use different research resources and tools, ranging from multi-media tools such as cameras, GPS, voice recorders, GIS software and hardware. Their ability to understand and use these resources effectively to achieve their aims will be an indication of technical competency;
- ✓ Strategic competencies: The participants will develop and implement sustainability action projects that further sustainability on campus; and
- ✓ Normative competency: The participants will, within their groups, negotiate and prioritise sustainability values, principles, goals and targets that will be addressed by their sustainability action projects.

The GIS competencies lean more towards "hard" skills that are removed from the relationship humans have with the environment. The combination of GIS and sustainability competencies will provide a more holistic learning experience, as the sustainability competencies are reflective of relations between humans and their environment.

A South African Perspective: Cart before the horse

As discussed above, South African higher education institutions have been slow to incorporate or integrate the SDGs into their curricula, but we have seen additional courses on SDGs being offered. The University of Johannesburg, amongst many others, has a course on "Understanding the Sustainable Development Goals" that is offered to both students and non-students. However, this course does not carry any credits or contribute towards the completion of any formal NQF qualification. Thus, the discussion on integrating SDGs into curricula seems a bit premature since we are still grappling with the understanding of these goals and what they could mean to students and the academy as a whole.

Prior to introducing SDGs, teachers and lecturers should be informed on the competencies that students need to understand and fulfill what the SDGs entail. This brings us to the conversation on sustainability competencies, which are also not integrated into the curriculum, especially the GIS curriculum in South African universities. As stated above, this study aims to integrate sustainability competencies into GIS undergraduate curriculum, with the hopes of equipping students with the knowledge and skills necessary to undertake the targets stipulated by the SDGs and the South African National Development Plan, which is guided by the SDGs.

It may come as a surprise that GIS curriculum, as part of the earth sciences, is not inclusive of sustainability. However, as stated, sustainability is still an afterthought in many higher education institutions. It is not any

different at the University of Fort Hare, a historically Black university in the country. The institution boasts six faculties, with the Department of Geography falling under the Faculty of Science and Agriculture. The department offers GIS at both undergraduate and postgraduate levels, with the undergraduate modules serving as introductory modules to GIS theory and practicals.

My Research as a National and Global Contribution

The necessity for the integration of the SDGs into curricula is clear and has been reiterated by various scholars and organisations. However, there are multiple factors to consider prior to engaging in the integration. As highlighted above, some institutions may lack the resources, skilled personnel and administrative support to be able to achieve this. However this should not be a hindrance to efforts to incorporate the SDGs into higher education institutions. Hence my study aims to integrate sustainability competencies into GIS undergraduate curriculum in the Department of Geography and Environmental Science, at the University of Fort Hare. A historically Black institution, with limited resources, skilled personnel and administrative support.

The study will be guided by situated learning theory, which is defined as a process of collaborative participation in everyday situations (Lave & Wenger, 1991). Multiple scholars agree that situated learning is context-specific, emphasizing the idea that "…much of what is learned is specific to the situation in which it is learned" (Anderson et al., 1996:5; Lave & Wenger, 1991; Greeno et al., 1992). The research is two- phased:

I. Desktop review: A review of GIS undergraduate curricula in four higher education institutions in the Eastern Cape, to benchmark and highlight learning outcomes and competencies that will be used to guide and create content for the next phase;
II. Situated learning intervention: A workshop for second-year Geography students to learn about GIS and sustainability localization. Students will undertake sustainability action projects to address sustainability issues on campus. The situated learning intervention aims to develop and cultivate GIS and sustainability competencies for second-year students. Prior to and after participation in the learning intervention; there will be discussions to establish and review the students' competencies and knowledge.

The situated learning process will be evaluated to establish whether situated learning affects competence development amongst the students who participated in the learning intervention. This will be achieved

using a framework adapted from situated learning characteristics identified by Herrington & Oliver (1995), and Edwards (2014).

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NICCI HAYES, PHD CANDIDATE, RU

Nicci Hayes

Provisional title: Fostering flourishing: An investigation of the understandings and practices of flourishing in Makhandan high schools

Section A below is the first section of my proposal which gives an overview of the hopeful impact of this research, Section B is a very brief section on the limited data collected thus far.

Section A

Abstract

This study will seek to tease out understandings and practices of flourishing in high schools in Makhanda. I want to investigate what flourishing means locally and how high schools do and can nurture flourishing. Further, might collaborative discussions, referencing literature and local research enable principals to amplify the flourishing of pupils? Data generation will involve discussions, focus groups and photo collages from principals (between 3 and 12), pupils (60) and alumni (hopefully around 30). I hope to map out systemic flourishing in schools based on the assumption that "we measure what we value, and we value what we measure"[1]. Thus, I hope to contribute to a shift in current narratives around "good schools" which tend to split down historic lines of division. This will be a qualitative study, undergirded by bounded relativism and constructionism using Capabilities Theory and Appreciative Inquiry (AI), both of which have both theoretical and methodological aspects. Content coding will be used for data analysis using the constant comparative method.

[1] The phrase is borrowed from an engagement session by Robyn Whittaker of EcoLab. She based it on a book entitled *Measure what matters: How Google, Bono, and the Gates Foundation rock the world with OKRs* by John Doerr (2018).

Context and Problem Space

To begin to frame this study I will start with two deliberately provocative questions, "What is 'good enough' for the education of an African child?" and "Can a child born into poverty and trauma truly flourish?" I hope that readers will be outraged by both these questions. I hope that you will want to dissect them and challenge me on what I mean by "good enough" and what I mean by "African child" – how dare I draw a distinction? And how dare I imply that flourishing might be inaccessible just because of poverty or trauma! Hopefully, you might also ask "What do you mean by flourishing anyway? Whose version of flourishing?" Yet despite your horror at the audacity and political incorrectness of these questions, I hope you will respect my bravery in asking them anyway because I believe they need to be answered (if not asked). I believe that we have settled for second best in many of our schools. I believe that our narrow definitions of success in education belie the enormity of the task that schools should fulfil. And I believe that even in our so-called 'best' schools we need to constantly be questioning what we provide and the extent to which it is 'enough', the extent to which it truly serves the 'flourishing' of our children. I believe we should be seeking to understand what such flourishing can, could and should, look like. On the other hand, I know that many schools and individual teachers and principals care deeply about the 'whole child' that is in their care. I know that many practices in our schools do nurture our children and I know that we all (including the children) have an idea of what flourishing means to us. I thus hope to bring to light these notions of flourishing and the practices that foster them. I hope to make them explicit enough that they can be measured and thus become part of the narratives on educational success. Perhaps we might be able to say that we are x far on the journey of fostering locally relevant but globally responsive flourishing in our schools.

I will outline the global and local contexts below.

The UNESCO conceptual framework of education for the future argues that flourishing and education should be seen as mutually dependent (Duraiappah et al., 2022). As educators, we try to wrestle with improving outdated industrial models of education with something more fit-for-purpose, however, we find ourselves caught between two poles. A desire to create a system that has the individual child's wellbeing and development at its heart is counterposed with the recognition that too much focus on individual wellbeing at the expense of collective wellbeing has created many of the entrenched injustices of our current reality which, as educators, we hope to rectify through education. This study is located at the fulcrum of that balance beam.

International conversations around flourishing in the context of education include but are not limited to, ideas and practices springing from Social Emotional Learning and Positive Education (including Positive Psychology Interventions (PPI)[2]). Wellness studies and Quality of Life studies also weigh in including work on happiness and well-being and well-doing Life Projects (Little, 2014). Whole School interventions (which mean whole community interventions) based on the ideas of Bronfenbrenner's (1994) ecological systems are suggested as models more suited to diverse school communities and collectivist societies, as are systems-based models. Conversely, increased understanding from neurological evidence highlights the adverse effects of childhood trauma on educational outcomes and brain architecture (Robeyns, 2005; National Scientific Council on the Developing Child, 2020).

On the whole, these fields are under-researched in South Africa. There are few studies on the effect of the positive psychology movement in South Africa, but international research suggests that there is a strong motivation for the introduction of programmes of this nature (Shankland, 2017; Waters & Loton, 2019). Allison et al. (2021) highlight the individual focus of many such programmes and suggest a flourishing classroom model that focuses on collective wellbeing rather than individual wellbeing. This approach has promise for South African schools given its predominantly collectivist cultures.

Capabilities Theory is another way of defining flourishing, though having a strong focus on justice and human development suffers similarly from a focus on individual choice. Though this critique is predominantly laid on Nussbaum (1997) for her "universal list" of human capabilities (Walker & Unterhalter, 2007) the flaw is at the heart of Sen's (1985) conception of each person having the freedom of being able to live the life that they have reason to value. Despite this, Capabilities Theory offers a tool to give voice to a local definition of flourishing and has been used to define flourishing in higher education (Walker et al., 2022) and in addressing gender disparities in schools (Walker & Unterhalter, 2007). The concept of Ubuntu or collective flourishing was highlighted in the definitions of flourishing emergent in a higher education study (Walker et al., 2022) and similarly in work on defining a local concept of flourishing with isiZulu speakers in Gauteng (Cele et al., 2021).

Against this global landscape of attention to individual flourishing in schools, with a balance of Global South communalism, I seek to study flourishing in a particular local context.

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[2] Positive Psychology is based on the Aristotelian principal of Eudiamonia (happiness that comes from living a good moral life) and is related to Sen's concept of flourishing (a life that upon reflection one has reason to value).

Makhanda context

Makhanda is situated in the Sarah Baartman District of the Eastern Cape. The region and indeed the entire province have historically been associated with poverty but also with determination and resilience. In recent years, water scarcity, the COVID-19 pandemic and ever-escalating unemployment have taken a further toll. Despite this, the city remains a vibrant hub of education and culture.

The context of Makhandan schools while perhaps similar to others nationwide is special in that they are situated within a small university city. Rhodes University is a beacon of hope (at least according to its own publicity) given that unemployment statistics drop to 9.3% with a university degree (BusinessTech, 2021) whereas "according to official definitions, the unemployment rate of young people [in Grahamstown] aged 15-24 years is 54 percent, but expanded definitions that include young people not actively seeking work suggest it is as high as 65 percent" (Nissen, 2017, p. 10). Thus, quality education offers a tangible route out of poverty.

However, despite outstanding work from other individual schools, the Rhodes 'VC's Initiative' and the Makhana Circle of Unity Education Cluster in recent years; even with 305 pupils from the matric class of 2022 having achieved bachelor passes, this is still only 39% of state matriculants in our town (Westaway, 2023).

Our schools in Makhanda are a veritable physical manifestation of the GINI index which South Africa infamously tops now. In our context, many children have experienced multiple levels of trauma: "The Eastern Cape – one of the poorest provinces in South Africa, with 67.3% of adults living below the poverty line – reported the highest prevalence of adverse childhood experiences" (Craig, 2023, n.p.), yet paradoxically, all but a few fee-paying and independent schools can offer consistent psychosocial support for pupils who need it. At the time of writing, one psychologist is allocated to the entire Sarah Baartman District to serve all public schools.

Happily, research suggests that positive emotions are a buffer against trauma and, much like our basal metabolism which can be elevated by frequent bouts of exercise, we all have a basal happiness level which can be shifted upwards by frequent experiences of joy and happiness (Sirgy, 2021). Research further suggests that various practices promoted by positive education can affect our joy and happiness, such as mindfulness or mediation, a consistent focus on gratitude (Duraiappah et al., 2022), personal characteristics such as resilience, and, perhaps more surprisingly, aspects of our physical environments (Lee, 2018). Discovering this excited me because, while most individual schools can do little to impact the systemic

shortage of psychosocial support, most can change the colour of a wall, integrate practices of gratitude or plant trees thus supporting the happiness of learners.

While work has been done at a national level (for example in the NEEDU "Schools that Work II" report of 2017) into the factors contributing to successful schools, these types of studies tend to focus only on academic results (NSC, PIRLS, TIMMS and SACMEQ) as indicators of success; similarly, recent work on reducing inequities in schools (Pearson & Reddy, 2021). The importance of academic results cannot be denied, but this study seeks to explore more nuanced definitions of success considering other factors such as perceived happiness, perceived self-actualisation, capabilities and functions all through a specific local lens. As noted by Nunn, "Students construct their success identities in the context of their local school environments. Their school's local understandings of what it takes to succeed become a powerful framework for individual students' understandings of their own school success" (Nunn, 2009, p. xiv).

Significance

The niche that I hope to fill is by working specifically in a local context:

- to define what is meant by flourishing locally and
- to highlight excellent practices currently extant in schools thus capturing examples of local flourishing.

Thus this micro-research will hopefully make a small contribution to the collective exploration of flourishing in South Africa and offer a perspective on positive education in the Global South. Furthermore, it may start to contribute towards a broader narrative of success in local schooling.

SECTION B

Initial responses have elicited multi-faceted complex notions of flourishing, sometimes contradictory (even from a single respondent). These ranged from heightened individual expertise in a specific field (like an expert diver) to the development of a basket of diverse interests and skills that fulfil different aspects of a person. Spiritual elements of flourishing came to the fore as well as notions of abundance, materilism and complexity. The freedoms to grow and explore were highlighted. Conversely, some saw flourishing as existing in a well structured and predictable environment. Metal health, and down time weighed more heavily that productivity though purpose is valued. Loosenings and divergence in schools were suggested along with nourishment, and

joyous laughter. However, the idealism of many notions of flourishing was also acknowledged. Most respondents feel that their schools nurtured flourishing only somewhat. Thus suggests that there is room for growth or perhaps rather relaxation in our schools, and that further exploration may prove meaningful. (Below are two collages of some initial responses from alumni- left - and teachers - right.)