# Communicating in/from the Cave: A Communication for Development/Social Change project aimed at enhancing communication, action and learning within the Science Cave, a learner-led Grade 10 science club in a public school in Makhanda.

A thesis submitted in fulfilment of the requirements for the degree of Master of Arts Degree in Journalism and Media Studies

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By

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To all the stakeholders that we interacted with during the intervention, this research is as much about you, as it is about the Science Cave. Thank you for your contributions and efforts. If the thesis is too long and complicated to understand then please read Chapter 4 as it was written with you in mind.

# Dedications

This research is dedicated to the members of the Science Cave and to my family.

To the Science Cave:

There are not enough words in the world to articulate how honoured I feel to have been a part of the cave. During that time, I learned so much about science, about communicating with teenagers and about the potential there is for the future of this country. You were all very kind, confident and curious about the world. I hope the Science Cave has given you the confidence to show the world how amazing you are. I hope that the world too, is inspired enough by you enough to dedicate the time and resources you need, to work towards your development.

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# Abstract

This research seeks to design, execute and reflect on a process where the principles and techniques of Communication for Development and Social Change are applied to enhance, support and develop qualitative changes within a learner-led Grade 10 science club at a public school in Makhanda. It draws and reflects on an ethnographic action research (Tacchi et al 2003) cycle proposed to explore the club's communicative ecology (Foth & Hearn 2007) and resources, and understand how these have the potential to encourage the expression of voice (Couldry 2010: 580) and participation (Carpentier, 2011) in the members of the club. The research then attempts to understand the kind of communication, action and learning that takes place as well as the ways in which the framework is able to support the club (or not).

The research uses an ethnographic narrative, told from the perspective of the researcher informed by field notes, interviews and participant reflections written during the intervention. This narrative, alongside an analytical summery of the club's complex communicative ecology, tells the story of a club building confidence within a closed group and using that to connect with a wider public, articulating its needs, resources and potential supporting stakeholders for the club's future development. The club is able to share its achievements with a community of peers and uses the platform of Facebook, to communicate with and inspire other like-minded people with an interest in science and their community.

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# Introduction

## Origins of and context of the research

This study stems from my experience of working at South Africa's National Science Festival (Scifest Africa), whose primary aim is to promote public awareness, understanding and appreciation of science, technology, and innovation. Although the festival engages Makhanda learners in science education outside of the traditional classroom setting, once the week-long experience is over, learners return to their classrooms but are not empowered to continue the active, participatory, out-of-the-classroom engagements that sustain their own interests and needs in science.

Under-resourced schools in South Africa (Sewry et al 2014), particularly those in the Eastern Cape, have a variety of challenges and hurdles to overcome to improve enough to meet national and international standards (Howie 2001; Reddy 2006). These challenges include parental support (Mbajirogu et al 2012), socio-economic factors (Spaull & Kotze 2015), under-qualified teachers and poor teaching strategies (Ramnarin, 2016) and pedagogical practices (Mji & Makgato 2006) in the classroom among other factors. By attempting to improve the learners' Opportunities to Learn (OTL) through the provision of resources and training for teachers and focusing on language and classroom discourse (Probyn 2012), various stakeholders with an interest in education can begin to support such learners in and outside of the classroom.

In Makhanda there are a variety of stakeholders who are working tirelessly to collect, secure and provide resources to help these learners and their teachers overcome some of the aforementioned challenges (Sewry et al 2014). These stakeholders include GADRA Education, Rhodes University, Scifest Africa and the Albany Museum. Even though there are a variety of resources available, there are learners who either do not know that the resources exist or have no ideas about how to use them to support learning already taking place in the classroom. In such scenarios the learners, who are approached by the stakeholders looking to help them, are slotted into already-existing programs aimed at development with very little autonomy with regard to how their individual needs are met. In such cases, where initiatives are developed to support the learners in appropriating the resources, the initiatives are either top-driven or inaccessible to the learners on the ground who rarely get to start off by expressing their individual or collective needs.

Educational interventions in this town have been well recorded in literature (Gush 2017; Thodhlana 2016; Sewry et al 2014; Sunassee et al 2012; Mayer & Boness 2011) and by news publications including *Grocott's Mail* and *The Daily Maverick*. These educational interventions and reports focus on parents' (Gush 2017) and teachers' (Mokgobanama 2011) experiences, but with the exception of a few (Jearey-Graham & Macleod 2017) these reports still lack the voices of the learners who are being aided in the processes. These learners benefit from the interventions and programmes but the extent of the benefit, from the learners' perspective, is hardly ever the focus of the reports. There is, therefore, a need to begin to listen to the potential benefactors of such interventions, as these benefactors are already finding independent ways to overcome some of the challenges they face with regard to their education. By making visible their experiences and their agency and then providing interventions that build on these attempts one can try to support an intervention that has the potential to be sustained by the learners rather than on the will and resources of outside stakeholders alone.

This thesis reflects on an ethnographic action research (Tacchi et al 2003) cycle which proposed to co-develop a 'grass-roots' Communication for Development and Social Change (C4D) process (Lennie & Tacchi 2013) with a Grade 10 science club at a no-fee school in Makhanda. The project cycles were designed to explore the club's communicative ecology (Foth & Hearn 2007) and resources, and understand how these had the potential to encourage the expression of voice (Couldry 2010: 580) and participatory action (Carpentier, 2011) in the members of the club. It sought to explore and evaluate how the principles of C4D could be used to help the learner-led science club's communication, action and learning.

The club formed on a Monday afternoon, two weeks before the members' 2017 end-of-year exams. At the time, the learners were frustrated that they were not receiving the attention they needed from their teachers and they did not know how to talk to their teachers about their frustrations. The learners had been coming to school and moving from class to class but not being taught because their teachers were helping with the Grade 11 and 12 exams. Some learners seemed to enjoy the freedom but others, who subsequently formed the science club, were frustrated that they needed support but did not want to undermine the authority of the teachers by telling them what they were doing was wrong. They had decided to meet to vent out their frustrations, to talk and feel listened to and to create a space where they could do what the teachers had suspended for the time being.

They planned to study together and teach each other the content they needed to understand for the upcoming examinations. The first session began with the club members delegating subjects according to who was most confident in the subject. These subjects were not limited to science subjects. They had only five people at the time so with subjects like mathematics and natural sciences, more than one member took up the task of preparing a revision session. In the session, the member in charge of the subject would explain basic concepts and the group would work on tasks together. The club had very few resources but asked me to sit in on some of their meetings to help facilitate a space where they talked equally and freely and learned together.

The members of the club had initially met me during my time at Scifest Africa. They had expressed interest in getting involved in any programmes that would help them with their school work and asked to stay in touch with me because I was their link to Rhodes University. Instead of waiting to become part of a programme, I encouraged them to start as a group so when the opportunities did eventually come they had a good support system and structure. Their experiences before the 2017 exams was what finally encouraged them to meet and work together and that is when they asked me to start attending meetings with them to support them in the process.

# Goals of the research and the research intervention

By taking systems and complexity approaches (Lennie & Tacchi 2013) to the research and its presentation, the researcher attempts to:

> Take on and provide new insights into the enduring issues of human experience, interaction and efforts at development that include the complexities of power, control, actors differing motivations and rapid change (Patton 2011: 122).

The primary goal of this research was to facilitate the development of the club's internal organizational capacity so that the members were able to run an organization in collaboration with each other, identify needs, aims, resources, and networks, etc., to build an organizational identity and share it with outside stakeholders through media production. The hope was to cause a ripple effect that might lead to educational interventions that respond to the voices of the learners and create support mechanisms accordingly.

The secondary goal of this research was to create accessible research with the intention of sharing the process with teachers, principals, policy makers and other CSC researchers working on similar projects in the future. The narrative parts of this thesis are intended to be

read by these stakeholders so that if there is something to learn from it, I do not partake in this learning process alone.

The thesis seeks to understand the ethnographic action research (Tacchi et al 2003) cycle proposed to explore the club's communicative ecology (Foth & Hearn 2007) and resources, and understand how these have the potential to encourage the expression of voice (Couldry 2010: 580) and participation (Carpentier, 2011) in the members of the club. The thesis then presents the researcher's understanding of the kind of communication, action and learning that had taken place in the club as well as the ways in which the framework has been able to support the club (or not).

During the research process my role as a researcher took on various qualities including that of a social cultural animator (Tacchi et al 2003), a development support communicator (Melkote, 2000; 27), and an ethnographic journalist (Cramer & McDevitt, 2004) to provide the varying types of support needed throughout the intervention. A complex approach provided opportunities to view the situations from multiple perspectives, "studying micro and macro issues" in an attempt to "understand their interdependence" (Lacayo 2006: 23).

# Presentation of research and findings

Due to the interdisciplinary nature of this research, ethnographic action research has been used to capture and drive parts of the process. In order to make sense of the process, parts of the thesis will be recounted as a narrative to guide the reader. Combining a story (as in Chapter 4), with theory as well as the methods and findings is the researcher's attempt to actualise the research intention and the agency of the project participants in the mind of the reader.

Chapter 1 gives a broad context of the research, outlining the South African science education crisis, areas in need of deep consideration, stakeholders, opportunities and resources that are available to schools, principals, teachers and learners. The chapter also outlines the communicative context of the science club focusing on their technological, social and discursive ecologies (Foth & Hern 2007: 227) to flesh out the full context of the intervention. This chapter ends in narrative form by sketching the beginning of the research narrative (the researcher's attempt to gain access the research participants and the metaphorical and literal journeys taken before the research cycles began). This is followed by a theoretical framework chapter (Chapter 2), which outlines Communication for

Development (and Social Change) and the specific theoretical approaches and frameworks that have formed the foundations of this particular research. In this chapter the researcher explores participatory development, the public sphere, voice, communicative ecologies and social capital before presenting the methodology chapter (Chapter 3), which gives a detailed outline of the approach taken in the research process.

The findings are presented in two analytical chapters (Chapter 4 and 5), with chapter four outlining the research process using an ethnographic narrative, and chapter five leaning on a complexity theory approach (Lennie & Tacchi 2013) to understand the development of the club's communicative ecology. In Chapter 4, 'the story', is told from the perspective of the researcher and uses field notes, interviews and participant reflections written during the intervention to inform its many parts. Although a chronology is not to be expected from this kind of research process, the researcher attempts to create one using the project cycles and embeds analysis for each section by writing it in present tense and italics. Chapter 5 attempts to summarize a complex communicative ecology of the research process, divided into technological, social and discursive layers. The researcher further expands on these by outlining the social capital formations and their implications for the club's access to resources as well as the themes, ideas and conversations had by club members and their implications for the club's identity and pathways to future action.

The conclusion analyses the overarching themes and issues thrown up by the research and their significance and implications for the future of the process. In the final parts of the thesis the researcher turns the mirror on the reader; asking the reader to consider how they are implicated in the research and what they can do to begin to listen and respond to the voices of young people.

# Chapter 1: Background and context

## Introduction

In the following chapter I will discuss the broad social and educational context of the intervention, which includes science education and the performance of learners in South Africa and, more specifically, in the Eastern Cape. I will explore the limitations of voice in a post-apartheid South African classroom and finally I will outline learner support mechanisms in Makhanda.

In order to provide the specific contextual foundations that guided the intervention, I will paint a picture of the science club, including its formation and its members' communicative practises, including the three tiers of its communicative ecology (technological, social and discursive). This context is based on interviews conducted before the project phase of the research commenced.

## Educational context:

*The Trends in International Mathematics and Science Study* (TIMSS) 2015 shows that South African Grade Nine learners scored the lowest in mathematics and science in the 59 countries that participated in the study (TIMSS & PIRLS 2007). This was not the first-time South Africa underperformed in the international study; South Africa's performance in TIMSS 1995 was below all 40 other countries participating in the study as well as in TIMSS 1999 where South Africa was below all 37 of the other participating countries (Howie 2006). The average score of South African learners in the surveys for 1995, 1999, and 2003 was 263, 243 and 244, respectively compared with the international average of 518, 521 and 474 (TIMSS & PIRLS 2007). Results in the Eastern Cape for 2003 were the lowest of all the provinces, with learners achieving an average of only 190 (Howie 2001; Reddy 2006).

There are various extenuating factors for the poor performance of learners, these include but are not limited to:

- The nature of support learners receive from parents who are unemployed or in precarious employment (Mbajirogu et al 2012). These learners usually only receive moral (if any) support because of the socio-economic status and educational histories of their parents.
- Learners' language processing abilities and concept identification in science and

mathematical tasks (Sibaya 1996).

- The learning of science through a second language (Rollnick 2006). Black learners in rural or public schools learning in a second language have the most difficulty because of a lack of access to codeswitching tools (Setati et al 2002) or the conflicts and tensions that arise when codeswitching is used (Probyn 2009).
- The lack of parental involvement and the shortage of instructional materials and qualified teachers (Dandala 2013). This is further consolidated by findings that Grade 3 learners, from poorer families are already three years' worth of learning behind their richer peers and that this gap grows as they progress through school. By Grade 9 they are four years' worth of learning behind (Spaull & Kotze 2015: 16).
- The lack of professional science knowledge, which includes content knowledge, pedagogical content knowledge, educational contexts, curricular knowledge and knowledge of students (Ramnarin 2016), contributes negatively to teaching practices and the way learners are able to learn and understand the knowledge.
- Mji & Makgato (2006) found that learners experience difficulty in science and mathematics subjects because of inadequate teaching strategies, content knowledge and learner motivation. These three and other factors can be attributed to the use of teaching methods that create a complex teacher–learner and learner–teacher dynamic that has been inherited from South Africa's troubled past.

## Performance in the Eastern Cape

While the TIMSS results show figures for Grade Eight and Nine, the trend in performance carries on into the later years of the secondary school learners. Sewry et al (2014: 1161) explain that, in 2013 the matric results of learners in the Eastern Cape were the lowest in the country, stating that of the 72 138 Grade 12 school students (DoBE 2013) who wrote the school leaving examinations in 2013, 25 218 wrote Physical Sciences and only 14 078 achieved a mark of 30% (DoBE 2014) or more.

Probyn (2012: 49) argues that to understand the poor performance of learners in the Eastern Cape, one must investigate their Opportunity to Learn (OTL). Understanding a learner's OTL, which refers to the notion that learners can only be held accountable for their academic performance to the extent that they have actually been presented with the opportunity to learn the content expected of them (Mcdonnell; 1995), means asking questions about content,

content coverage and pacing, content coherence, cognitive challenge of lessons and supporting resources.

Probyn (2012) highlights the factors that impact positively or negatively on opportunities to learn science in an Eastern Cape classroom as follows:

- *Resources:* Researchers suggest that when a learner's socio-economic background is held constant, the levels of resources do not guarantee better results unless those resources are translated into effective education for the learners to achieve academic improvement (Fleisch 2007: 96). The learners however, do still need access to certain minimum resources, given that scientific knowledge is empirically based. These resources include water, electricity, secure storage for resources, textbooks and time (Probyn 2012: 52). In lower performing schools, access to such resources is limited leaving them with gaps in their learning.
- *Teachers' knowledge and training:* According to the 2003 TIMSS study, about 28% of learners in South Africa are taught by science teachers with a university degree, as compared to the 80% internationally (Reddy, 2006). This affects the teacher's ability to: develop science knowledge; present factually correct lessons; understand inter-lesson knowledge coherence to make conceptual links and development clear; and understand how to pace lessons by determining how much content to teach in a lesson (Probyn 2012: 58).
- *Language and learning in science classrooms:* Language is a fundamental resource that learners use to construct and negotiate meanings in classrooms (Christi 2002: 10). The majority of learners, particularly secondary school learners, learn in the medium of English as an additional language (Probyn 2012). Research into rural education, particularly in the Eastern Cape, found that 42% of learners reported that they had trouble understanding their teachers and more than 25% reported they had trouble understanding English textbooks (Nelson Mandela Foundation 2005).
- *Classroom discourse:* Probyn (2012: 60) argues that debates around language have polarised and distracted from debates about the nature of the classroom discourse through which knowledge is constructed. The emphasis of group work and practical activities in science teaching means there is less emphasis on classroom talk and the role of this in developing conceptual frameworks (Mortimer & Scott 2003). Probyn (2012; 61) further explains that the dominant discourse style identified by researchers, is commonly known as IRI or IRF in which there is an initiation of (question by teacher) and response (by

learner) and evaluation or feedback (by teacher). This form of discourse has been criticised because it limits the learner's participation and thinking.

## Limitations of voice: an authoritarian classroom

In 1994 South Africa inherited a racially discriminatory education system in which the average white pupil, attending a private or former Model-C school, benefited from expenditure that was nearly four times as great as that for the average African pupil, attending a township or rural school (Lemon 2004: 270). During this time the black population was excluded from genuine and equal participation inside and outside of the classroom. The state would use education to socialise young people into the existing status quo of inequalities through conformity to authoritarian structures (Harber & Trafford 1999). The teacher would embody the authority that the learner would have to listen to without resistance or question. Luckay & Laugksch (2014) argue that this system, which emphasised rote learning within an authoritarian educational structure, was top driven, very prescriptive, inflexible and extremely inefficient.

There are an array of changes that have taken place in post-apartheid South Africa with the education system, in particular, an area rich in reform. Some notable areas of reform in the education system include the desegregation of schools and the adoption of new language policies for education (Vandeyar & Killen 2007). Lemon (2004: 269) argues however, that since 1994, national policies have been rich in symbolic expressions of equity and redress but in practice are "characterised by the acceptance of commodification and choice and very limited implementation of change on the ground". So even though these policy changes were guided by the Department of Education's drive to "redress past injustices in educational provision" (DOE 1996: 1), they have not necessarily resulted major changes at classroom level due to the use of teaching strategies similar to those used during the apartheid era (Vandeyar and Killen 2007).

For some theorists, it is the persisting authoritarian structure of education that is particularly detrimental to learners. Keane (1999) and Rutherford et al (1999: 253) have conducted studies that show that in classrooms where the teacher speaks and learners listen, learners are not given the chance to "talk science" or "appropriate scientific discourse". Freire (1970) describes this situation as involving a "narrating subject" (the teacher) and "patient, listening objects" (the students) (Freire 1970: 49). In this process education becomes an act of depositing information, in which the students are the depositories and the teacher is the

depositor; the teacher "makes deposits" which students "patiently receive, memorise and repeat" (Freire, 1970: 50).

In these spaces listening is equated to respect and "the respect with which learners listen to their elders therefore represents a key area of congruence between traditional culture and the classroom" (Ninnes 1995: 19). Ninnes further argues that students perceive the adoption of a humble attitude as an appropriate way of maintaining the relationships (1995: 19).

Kanu writes:

> Learning and cognitive styles are a component of cultural behavioural styles i.e. the habits, values, predispositions and preferences that develop during the child's cultural socialisation process (Hilliard 1992)… Cognitive development is therefore, inseparable from the context in which it occurs and children develop communication, learning and motivational styles consistent with the culture in which they are socialised (Winzer and Mazurek 1998). Cultural socialisation, therefore, influences how learners mediate and negotiate phenomena such as curriculum, communication patterns, instructional approaches and other situational factors in the classroom. (2005: 496)

Some theorists argue that introducing a democratic participatory pedagogical structure to schools and classrooms can, in essence, defuse the authoritarian structure that limits the participation of students in the classroom. Giroux (2002: 432) argues that struggling for democracy is both a political and educational task. In an attempt to give rise to a "vibrant democratic culture" education must be treated as "a public good" and an important space were learners "gain a public voice and come to grips with their own power as individuals and social agents". Mcube (2005) suggests that schools which celebrate open spaces for deliberation and dialogue for learners are more democratic than their authoritarian counterparts.

On the development of a democratic system of education Starkely (1991) writes:

> The school must be organised along democratic lines, taking into account that democracy is best learned in a democratic setting in which participation is encouraged, freedom of expression and a sense of justice and fairness prevails and democratic approaches function which allow the nurturing of qualities such as participation, innovation, co-operation, autonomy and initiative in learners and staff. (1991; 57)

# Out-of-the-classroom resources in Makhanda

In Makhanda there are an array of assets "to address the well documented lack of qualified Science Educators, and the need for encouraging young people to study in Science, Technology, Engineering and Mathematics (STEM)" (Sewry et al 2014: 1611). Alongside the

out-of-the-classroom assets, including annual science festivals, science quizzes and a science expo, there are various organisations working to support school goers in the town.

## Rhodes commitment to local schools

When Dr Sizwe Mabizela, was inaugurated as Rhodes University Vice Chancellor in 2015, he made a commitment on behalf of the University to address the challenges of public education and revitalize the public schooling in the town.

In his inauguration speech he said:

> The Eastern Cape Province is the worst performing province when it comes to public education. Since 2007, except for two years in 2009 and 2010, the Eastern Cape has come last of all the provinces in matric pass rates. Every single year its matric pass rate has been way below the national pass rate. In Grahamstown we have a collection of some of the best schools in the country interspersed with some of the most dysfunctional schools imaginable serving our young people… As an institution of higher learning we cannot sit and watch when young people amongst us are condemned to a life without hope; a life of despair because of the failure to provide them with the education they need and deserve. We must brighten our corner where we are.

In partnership with the town's oldest, most established and most effective education NGO, GADRA Education, Rhodes University has committed to a long-term programme with schools, principals, teachers, parents and learners in ways that deliver measurable progress in a short time. Some of these projects include:

- *Homework Clubs*, which support academic development in such a way that each individual learner is developed in areas of particular weakness to a point which enables full and meaningful engagement with text and thus to curriculum in all subject areas.
- *Barriers to Learning programme*, which provides a full screening for all Grade R learners, including screenings for hearing, sight and occupational barriers as well as support to assist learners to overcome mild to moderate barriers, as identified.
- *The Nine-Tenth's programme*, which provides the top 60 grade 12 learners at selected schools with student mentors from Rhodes University for the year. The mentoring focuses on personal planning, studying skills, written work and tertiary applications.
- *The Mobile Science Lab*, which provides a science laboratory to under resourced schools in an attempt to increase grade 8 and 9 learners' development of scientific curiosity as well as to help them obtain good results in compulsory practical assessment tasks.

- *Supporting Rhodes support staff to support their children,* which is an outcomes-driven intervention intended to empower and equip parents to manage their homes for particular educational outcomes. There are five distinct stages, as follows; 0 to 5-year olds (ECD), 6 to 10-year olds (foundation phase), 7 to 13-year olds (intermediate phase), 14 and 15-year olds (GET Band), and 16 to 18-year olds (FET Bands). Particular interventions have been designed for each of these stages offering parent support, learner support and monitoring and evaluation.

The Rhodes University Department of Chemistry has also undertaken Community engagement activities to support and "interact with resource-limited schools in pre-urban and surrounding rural areas" (Sewry et al 2014: 1611). A few of the activities include:

- *Khanya Maths and Science Club,* which, was founded in 2000. This club is coordinated and run by staff, and graduate and undergraduate students of the department to "engender a love of mathematics and science among its members" (ibid: 1612). The club, which was aimed at drawing 30 grade 7 students from all of the schools in Makhanda, mainly consists of members from resource-limited ("township") schools with virtually no science equipment, and few laboratories.
- *Chemistry Outreach Programme,* formed through a collaboration of the Rhodes Department of Chemistry and the Bristol Chemical Laboratory Sciences at the University of Bristol, United Kingdom. The programme consists of a lecture demonstration called "A Pollutants Tale" (APT) which gives a climate change message by using demonstrations of gases in the atmosphere. The lecture can be adapted for grades Five to 12 and includes presentations suitable for adults as well (2014; 1612). A survey among South African school students, after experiencing APT, showed that 73% wanted to become scientists and 80% thought that they might enjoy watching science shows on television. In terms of the social implications of science, 72% felt that science makes life more pleasant and 80% agreed that people should study science (Sunassee et al 2012: 36).
- *School Laboratory Sessions,* which were formed in response to laboratory work being accepted as having the ability to make science more appealing for students, but only a few teachers actually doing laboratory work in the classroom. The Rhodes Department of Chemistry offers schools the opportunity of doing laboratory work in their teaching laboratories, and runs the sessions as and when schools request them (2004: 1613). In the evaluations of the activities, school students mention the excitement and

enjoyment of practical work and their realization that this is a practical application of the theory they have covered in class.

- *The Science Teacher Training Programme,* which was started when a need arose among science teachers for a programme of professional development workshops to support the teachers with the introduction of a new school Physical Sciences curriculum. The Rhodes Department of Chemistry in collaboration with the Rhodes Department of Education, ran weekly workshops decided upon by the teachers. The workshops covered the grade 10 – 12 physical sciences curriculum and pedagogical content knowledge (2014: 1613).

Alongside these resources are the Joza Youth Hub, the Albany Museum and the various libraries in Makhanda open to be used by learners from various parts of the community. There are also many digital learning resources that can be found on zero-data-rated websites all aimed at providing extra tools to nourish and support young and curious minds. The Rhodes University Community Engagement office also runs various initiatives including science clubs and mentoring for learners in resource-limited schools in Makahanda.

Although no-fee school goers in Makhanda face various challenges with regard to their education, the continued involvement of the town's stakeholders has shifted the context from one that was dire and negative to one that inspires a lot of hope. In a *Grocotts Mail* article (11 January 2019) written by Gadra Education's Ashley Westaway, the analysis of the Class of 2018's record breaking matric results tells the story of a major improvement in no-fee paying schools due to stakeholder involvement and participation from students.

> The public school Class of 2018 has produced the best set of matric results in the history of Makhanda. The pass rate, the number of successful candidates, the bachelor rate and the number of Bachelor passes have all hit record highs…Furthermore in 2018 Grahamstwon (Makhanda) produced a better pass rate than any other provincial city. Whilst there are still major challenges, what makes 2018 significant is that it re-established Grahamstown as the most successful educational city in the Eastern Cape. (Grocotts Mail 2019)

# The context of the club

Although members of the science club fall into the broader context of education, to understand how an intervention such as this could be of use to these learners, a more targeted social research context needed to be explored. To do this the communication practices and communicative ecologies of the club members were explored in a group interview done in May 2018, before the project cycles began. Communication was a major focus because of the information that emerged in the interview. They reflected on the reason they had come together to form an official club months earlier and the themes have been presented below**.**

The group of (then) Grade10 learners, all share a deep interest in science, and have formed an after-school science club after seeing that although they have difficulty communicating with the teacher within the classroom space, unless given permission. Their peers and age-mates provide an alternative, egalitarian communicative learning environment. They are able to communicate fully in this alternative environment; asking questions, learning, teaching and deliberating with one another.

## Classroom communication

The club members explained that raising your hand in the classroom is the only way to communicate or attempt to gain access to communication with teachers. The act, of raising-your-hand, however is one that is mediated by teacher.

> "Hayi, it's hard (to raise your hand in the classroom). Maybe the period is going to be one hour. That teacher is going to have to discuss the topic and we are going to have to write it, sometimes you can ask but its hard (sighs). Like this year when the teacher explains and explains, you will put up your hand and he will tell you hayi (no) I'm still busy, then he explains and explains, when you want to put up your hand he tells you he's busy and when the bell goes there are other teachers who want your time now." (Thabo)

Here Thabo explained that there are instances where he has no ability to communicate with this teacher because his teacher is more concerned with getting all of the content out rather than answering the questions that might arise as a result of the teaching process.

Aviwe acknowledged that he fears speaking out of turn but when given a chance he would raise his hand.

> "I am scared of all my teachers, but when they say we can ask questions I will be the first to raise my hands. I want to know everything but I know my place in the classroom. I won't just put my hand up and say things when the teacher has not

> allowed us to speak. I would not want him to think that I am being naughty like some of the noisy learners. (Aviwe)

Noluthando, who describes herself as 'especially wanting knowledge', laughs off the idea of raising your hand but is aware that she has to keep working very hard to ensure that the teacher consistently picks her even though she does not raise her hand up.

> "I don't raise my hand, I am not that kind of person who will like, when they ask a question in the class they will put up their hand. I'm the kind of… well the teacher will just pick me and I will say the answer. I think that sometimes he picks me and picks the other one and the other one but mostly he picks me. I think he picks me because I behave well in the class, I am not noisy and I don't like to ignore him so he knows that I might know the answer." (Noluthando)

The members' communication with their teacher is limited to the mediated interactions within the classroom based on a culture of respect for the teacher and the norms of the classroom.

## Out-of-classroom communication

The members of the club frequently pointed out that speaking to someone their own age outside of the classroom was easier because they are able to relate to them as well as actually feel listened to in the interaction.

> "I have entered Science expo, I think last year was my first time participating at it. And I learnt how to do my own project or investigate on a topic like that. The thing is you meet lots of people there and you learn more things from other people and what they have learnt from maybe other people or the internet or Google. You teach each other because sometimes you are afraid to ask your teacher about something but here you guys are the same age and know what it's like to be scared. You are afraid to ask (laughs) your teacher the question and maybe someone is doing a project about your problem and then you go there at expo, you present your thing, people judge it and then you go around looking at people's projects. Sometimes you see you are comfortable speaking to someone your age because maybe they will listen to you. And then when you ask him or her maybe he will tell you." (Aviwe)

After seeing that fear stood in the way of him asking his teacher about content he did not understand, Aviwe welcomed the idea of talking to age mates and peers at the annual science expo to get some clarity on some scientific concepts.

One member explained how relying on peers and age mates ended up taking place in spaces outside of the classroom.

> "[My friends and I] always would meet during break and discuss the things that we learn but are afraid to ask our teacher about. If one person didn't know something we help them out, if the other didn't know we help them out. We had these big discussions that sometimes had to carry on after school. We usually talked about the

> periodic table so we help each other learn what it's about. It was helpful because we learned a lot and we didn't have to worry that the questions were stupid. With my friends I know, they will listen to me and be patient when I don't understand because even when you say something is hard, it's like the teacher gets angry because he thinks you are just lazy. You can't even express yourself even if you are willing to work." (Nthando)

Realising that there are certain communications that were easier to have with friends, the learners found a space outside the classroom to engage in a more learner centred environment. They explained that after they started meeting each other regularly they would talk to each other about the way they wanted to learn things and even laugh when they knew they could not ask for it in the classroom.

> "I want a person who teachers me science to add a little bit of fun stuff and I can ask questions and not be in the same section all the time because we would get there in class and the teacher would write us notes all the time. Notes, notes, notes all the time. And I wanted to be [taught] those notes because some notes I didn't understand. And the teacher didn't teach some of the notes he would just jump those notes and go to the other notes. That is how he taught us and it did not help me." (Noluthando)

Nthando explained that learning in more than one language could be a possible improvement to the teaching style that is currently taking place in the class.

> "A teacher must explain in isiXhosa and in English because sometimes I don't understand things in English and sometimes I don't understand even in isiXhosa. I'm also thinking for other people, some people in my class don't understand English and some don't understand isiXhosa so I need them both to understand both sides, English and isiXhosa. I don't think we would ever get this though because our teacher is definitely sure that English is the first language that we need to learn. There is only the possibility that maths can only be taught in English. English only, nothing else. I don't think I would get that. I don't think I would get a teacher that would teach English and isXhosa at the same time." (Nthando)

Sipho explained that the teacher needed to be motivational and patient because not all learners understand things at the same time.

> "The teacher must be very dedicated and very motivational, a person who can easily explain to us and make us understand things, a person who is not very aggressive, not as in physically, because there are some learners who take time to understand." (Sipho)

## Communication at home and community

Only one member of the club has parents that finished matric and went on to study at a college. The rest of the member's parents either did not finish school or finished up until matric and did not study further. The members of the club explained that this was a major factor that

determined whether they spoke to their families about their school work, particularly what they do in the science class. They would tell their parents if they are doing well but felt they could not ask for help because their parents also did not understand the work. Those who did communicate about school work outside of the classroom, would do so with older siblings and cousins who were either still in school or in university. They all explained that they would not talk to peers in their community regarding school work. One member of the club, who lives with her grandmother, explained that they would listen to radio and sometimes when science related content came on, they would discuss it. One expressed having watched a few science related shows on DSTV, where he became interested in science.

One member had attended the Eskom Expo for young scientists and another member had been a member of the Khanya Maths and Science Club. All of the members had attended Rhodes University once or twice to do one or another science related activity. None of the members used their phones to do research or look up school-related work. None of the members followed any school-related groups on Facebook.

# Negotiating access to the research subjects

## The ethics committee

After a very nerve-wracking wait for the approval of my proposal, I was very surprised to see one of my supervisors, looking very bleak when we spoke about the idea being approved. It was only after I read the ethical clearance form that I realized why he was not as excited as I thought we should be. On the first day I tried to fill in the form I was enthusiastic and filled with the energy one receives after finding out they are free to go out and explore. The energy was quickly drained as I read, kept scrolling, and seeing that the questions were not finishing. I had thought that it would be a few multiple choice answers and we would be quickly moving on to the next phase of my research. That dream faded with my energy and I went home and decided I should come fresh and energetic if I wanted to get the clearance. After a few days of tossing and turning in bed waiting for my mind, body and soul to be ready for the task, I headed to my computer and filled in the forms. One hour soon turned into three and then into four. I had not anticipated the stress that would come with answering the questions that came with my proposal. One by one, I typed and typed, ensuring to make no mistakes. I was sure I would behave in an ethical manner, I trusted myself but when the questions came, I realized how much thought one would need to put into ensuring that these vulnerable participants were not harmed in the process.

Once I received feedback from the committee, I was sure things would only get smoother. I was more naïve back then. Now as I reflect on the process I realise the tedious, time-consuming and meticulous process of filling out the ethics forms was a classic case of foreshadowing.

## The Department of Education

After waiting for weeks for the Department of Education to get back to me, I looked up their location and walked there to speak to someone in person about why I had been left in this state of academic limbo for so long. As I got to the door of the enormous building I was greeted by two women. The friendlier looking one, in red high heels and a smile on her face greeted me and asked if she could help me. I respectfully greeted and introduced myself. With my head down, I explained that I was a Rhodes Student who had been emailing for a few months asking for permission to work with a few learners from a local public school. The women looked at each other and the one in red shoes asked me to follow her. We walked up the two flights of stairs silently. The sound of her shoes echoed as we climbed. Finally, we got to an office. She introduced me to a woman sitting by a reception desk and left. I introduced myself and explained why I was in the office. As I explained, I took out a brown envelope that contained my proposal, consent forms and a letter to the department. The woman at the desk quickly stopped me and handed me a sticky note with an email address on it. “No, you don’t need to leave that here, just email Mr Ndabeni and he will respond to you when he gets back after lunch,” she said politely.

I smiled and took the note before slipping the envelope back into my bag. As I was walking out, I asked for a number to call and confirm that the email was received. The woman paused for a second before taking the note back and writing her number on it. At that moment she looked as if she was not comfortable sharing the information with me. I smiled shyly and left the office quickly. It was uncomfortable to do but I was glad I had gone straight to the office to ensure that the work was done. I got back to my computer, emailed the address and called to confirm that I had sent the email. The woman said okay and informed me that I could expect a response after lunch. I sat back, feeling really pleased with myself for scoring a number that could not even be found on the website. For the duration of lunch, I did not look at my phone. I was proud of myself for not being too eager. I waited and waited long after lunch, making sure to refresh my phone and check that I was still connected to the Wifi in the Journalism Department. Nothing came for hours.

As I made dinner, with the hope of getting a response long gone, my phone vibrated in my pocket. I looked and there it was, the response to the email I had sent hours before. I quickly opened and read.

> Thanks for your communication. Please kindly contact Mrs. N. Y. Nkanjana at Head Office and ask to grant you permission to do you study in our schools. Her contacts are as follows: nynkanjana@live.com she is the only one that grants such permission.
>
> Thank you for your interest into our schools.
>
> Best regards
> Ndabeni M. R

Tired from the day I had gone through, I sat down and laughed to myself that I had walked all that way to get an email address for this person only for him to give me the email for another person. So much for the digital age, I thought as I looked at these exclusive emails that one could not find on the official website. It was disappointing, but I would not be deterred. I quickly emailed the address and went back to cooking. After my meal I checked for a response. I knew it was unrealistic to expect a response after 6pm but then again, I had received the previous email at 5:55pm. There was an email! An error message explained to me that the address I had used was non-existent. I emailed Mr Ndabeni back explaining politely that he might have made a mistake.

Three long weeks passed. I emailed and called every day. I had not received clearance, the right email or a response. One afternoon, I called the woman from the reception desk and asked to make an appointment with Mr Ndabeni. “He will only be in on Thursday afternoon,” she explained. We agreed that I should call on Thursday and set up an appointment but after a few hours I received the email address I had spent almost two months asking and waiting for. I finally had the right email address to ask for permission. The story of how my email correspondence with Mrs N. Y. Nkanjana went, is short and simple; I emailed and emailed and called and emailed. I called the number on the website as well as the number I was given by Mr Ndabeni. Two numbers, both with a shrilling echo and no response, turned my hope to sheer fear that this research would end before it was granted a chance to begin. I spoke to my supervisor about the luck I was having, the time constraints and the pain of being rejected even before showing the world what I had to offer. He advised me to keep at it, keep going and persist until they gave a response. By the end of November 2018, I had finally heard back from Mrs Nkanjana and she was kind enough to direct me to the next person in line Ms

Babalwa Pamla, who would be “prompt on her response, even when the application is delayed”. At the time of editing this paragraph (8 January 2019), I had still not heard back after multiple emails to both women.

In the meantime, I pursued the permission of the school and the teachers I would be involved with. A pursuit a lot more fruitful then the one with the DOE and the first glimpse of hope for a very beautiful story.

## The school

I drove quickly to the school to make sure that I would get there before any afterschool meetings. Two weeks prior, I had dropped off a brown envelope with my proposal, consent forms and a letter to the school. The principal had asked me to place the envelope on her desk and she would get to it after the meeting. A meeting I was hoping I would get ahead of this week.

When I got to her office, she was on her way out. She stopped and smiled at me with an embarrassed look on her face. I looked down and respectfully introduced myself again. She stopped me and said, “Of course I know who you are, I’m just trying to figure out what we agreed on.” I explained about the envelope I had left weeks earlier. It was not the first time I had left my proposal or spoken to her. We had made an agreement a few months earlier that if I send her the email she would respond with a letter giving permission. After seeing that the emails were not working, I went there, in person to drop my proposal off.

We moved into her office where she moved papers around until she found the brown envelope, buried in among timetables, worksheets and schedules. Again, she looked embarrassed as she opened the envelope for the first time since I had sealed it. She looked frantically at the letter to figure out what I had asked for. I noticed she was searching and said, “It’s okay, I can remind you what the project is”.

She smiled and said, “No, no I remember, I just need to jog my memory.” After seeing the title of the project, she smiled and explained that there was a designated extra mural day for the project. She confirmed the name of the science club and the day we would be meeting. She then explained that she could give me a letter stating that she is more than happy for the project to be done, but I would have to email her. She then quickly ushered me out of the office and gave the brown envelope to a learner and told him to take me to Mr Thomas.

## The authoritarian teacher

The tall man looked down at me. With his arms crossed and face not giving anything away, I was not sure if I was welcome in his classroom. With my head down, I quietly explained my project and that the Principal had directed me to him. I looked up and gave him the envelope. He took it without looking at it. Just then, a few learners started making noise at the door. He excused himself and walked towards the door. He was very slow and deliberate with every movement as if to make a statement in the world. As he moved closer to the door, the learners who were not in his after-school class scattered all at once. One, who had her back to him and did not see him coming, got a fright when he arrived behind her and said in a chilling voice, "Why are you making a noise outside the classroom?"

He did not shout the words. They were said in a low voice with a very serious tone. The learner moved quickly. He stood in the doorway, strong and bold. His big body took up a lot of space in the only passage into the classroom. Learners manoeuvred past him without making eye contact. He stood there, arms crossed watching them walk in.

I waited for him to walk his slow, deliberate and painfully powerful walk back to the table. He then slowly took out the contents of the envelope. He read, looked at me questioningly and then read again. This continued for a few minutes. In the time he read, I watched the learners move into the classroom and interact with one another. I looked around the room and saw papers and sheets, and graphs and textbooks.

After reading the letter, he looked at me. I was scared. Scared of his disapproval but also terrified of his powerful persona.

"So, what am I supposed to do?" he asked. I was taken aback by the question. I was not sure how to respond, as I was not sure of the Principal's intention when she sent me to him. I had been in conversation with Mrs Klaas since the previous year. We had talked through my proposal and in the time only Mrs Jack, another science teacher, had showed interest in having me around. I found myself unsure of what to say to the science Head of Department with his towering stature and powerful demeanour looming over me.

"A relationship," I said as I cleared my throat. "We, the group, the club would like a relationship with you, so you know what we are constantly up to."

He looked at me, paused and said okay. He then handed the envelope back to me. It was the third time now this brown envelope with the plans for the club and my research was handed

back to me without its contents being fully read and understood. So, I asked him to keep it. As one of the people with the power, I needed him to read the envelope's contents, so I told him I thought it be fitting that he keeps the copy as his own. He agreed and placed it on piles of worksheets, memos and textbooks. I left the classroom and went to equip myself for the most important negotiation yet, negotiating access to the club.

## Negotiating access to the club

It had been eight years since I was in grade 10, thought like a grade 10 learner and truly understood the experiences of being in grade 10 and doing science. It was for this reason that being young and interested in helping the science learners and having received permission from their principal and the University to go ahead and do the research was not enough for me to say with confidence that I had negotiated access to the learners. My role as a researcher and the research itself depended heavily on whether the group believed that I was on their side and that they could trust me. We started the process by introducing ourselves and the roles we would like to play in the process.

This is the story I shared with them;

In the beginning of 2017, I sat in my course co-ordinator's office sobbing. I was unable to talk about what it was that had brought me back to the Makhanda to do my masters. I knew there were responsibilities that I could have taken up elsewhere. I was aware that, as an educated person there are communities: personal and public, which are waiting for me to come home and tell them that I can help them; that I can take on some of the distressing financial burdens. Instead, I sat there, sobbing because I was afraid that what I had to do for my family and what I wanted to do for myself lay on opposite ends of an invisible-solid line.

"What is it that you want to do with your masters?" the co-ordinator asked. As tears filled my eyes I admitted that I wanted to give a voice to the voiceless.

"A voice to the voiceless? Who are you talking about specifically," she pried.

It was difficult to talk to her. I was scared that what I wanted was unrealistic and uncalled for. Although the tears came from an anxiety that I did not have what it took to join the academic community, there was something I feared more than any rejection I could face in academia. I was afraid that my attempt to attend to my responsibilities, personal and public, would be rejected and I would have spent another two years not making a difference at home. I cleared my throat. "I would like to give a voice to school children," I said.

A moment passed as the course co-ordinator tried to figure if I had come up with the idea myself or if it was inspired by the place I had received my funding.

“And how do you suppose you would give them a voice?” she asked.

Tears filled my eyes. I was unable to answer her question. She gave me a moment to calm myself before she asked if I had any other funding opportunities. “The problem is the Media Studies component; you are in a Media Studies department,” she explained. “This sounds like something you would have to do in the education department.”

After a few minutes of discussing possible funding opportunities to my blank, overwhelmed face, the course co-ordinator smiled and told me not to worry. “I’ll just speak to your supervisor and we will see,” she said as we ended the meeting.

I left her office feeling like the thing I wanted the most was about to be taken away from me because of my lack of preparation. It was a hot day and hot days have a way of weighing down on you so that everything you do feels even tougher. As I walked, I thought about the fact that I had the answers but I did not know how to dress them up and make them ‘academic’ or even ‘media studies related’. I dragged myself back to the Scifest Africa offices where I was working at the time.

At work, I sat in my chair, swaying back and forth while thinking about the little ironies in life. I wanted to give a voice to the voiceless but I couldn’t articulate myself about it. I laughed a little. It was not a laughing matter but there had been enough tears that day. How could I have told the course coordinator that I grew up in two households? That my parents were married but lived in two separate houses. That I was fortunate enough to live with my father, who worked for the private school responsible for my education. That my brother on the other side of the line, went to a township public school in Katlehong and is now coming home and hiding his report card because he is afraid to show us that he is failing. How could I articulate that I want to find a way to give voiceless school children a voice so that it will somehow cause a ripple effect that will empower them? How on earth could I have told her that! I stopped swaying to look out of the window. It could have been the guilt of having gotten a better opportunity or the embarrassment that I was not able to use it to help my own brother, but until meeting these learners, I had not been able to articulate what it is I want to do with my masters.

*I want to build a bridge between the invisible-solid lines…*

*There is a line that exists in my household. An invisible-solid line. Although we never talk about it, the line separates parts of my family. Standing on either end of the invisible-solid line, we are defined as one thing as opposed to the other. The sides we have fallen on determine the way we have constructed our self-esteem and the way we understand our worth to the world around us. The line has a way of propelling and limiting the way we dream about and envision the future. This line exists in my home. I wake up daily to its complications often wondering about a lifeline, a method, a formula to get between sides. The elders have accepted that they will always be on the one side of the line. The side with little benefits; where you have to work harder for less; where your potential decreases with every year you sit in place. Many elders in my community have accepted their positions; that's understandable. Lines of that nature, invisible-solid lines, have been around since they were the young ones with potential and dreams and ideas about their societal worth. The line in my household however, is distressing. It is not the 70-year-old security guard father or the 56-year-old subsistence farmer mother that make the line distressing. It is the 15-year-old brother, who sits on the same side of the line as them; who is expected to do more for less and supposed make arrangements to make do with the cards he has been dealt. It is him who has inspired this process of introspection. And with every moment I spend trying to find the lifeline to get him across the invisible-solid line, he becomes more and more convinced that he belongs there, and he stops fighting. I have come to learn that this line not only stands between parts of my family but also separates large parts of the country and is determined by the relationship one has with education.*

I told the learners that my brother and the situation he finds himself in, is what inspired the journey with my masters. I explained that I had taken an interest in the learners' interest to start their own science club because it was an attempt to be an active participant in an aspect of their education. I explained to them that as a young girl I would have given anything to be with a group of likeminded adolescents setting their own goals and trying to achieve them. I explained that I am from the journalism department and have an interest in communication and with my research I was hoping to use different communication strategies to support, enhance and stimulate communication within the group and hopefully unlock some great science resources in the process. I explained that I was willing to work above and beyond anyone's expectation because they reminded me of someone very dear to me. My brother, who grew up and experienced education very far away from them but found himself on the

same side of the line as them. I explained that I wanted to know if there was a way to inspire people like him with our story and our journey.

For this kind of process to take place however, there would be one vital thing I absolutely needed in return. This was interest in the club and its activities. This meant that we would have to attend the club's Monday meetings and other meeting days that the club decided on. I would help them think about the kind of decisions they would have to make but the decisions themselves would be up to them. I would show them how to use communication tools and help them build a contact list of interested and interesting people who could help them along the way but the ultimate communication with these people would be up to the club.

*Working with a science club, particularly in a school creates blurred lines in terms of the field of the intervention. As someone who is not an educationist, attempting to reach learners in their learning environment at times I wondered if I might not be more equipped if I had a degree in education or belonged to the science faculty. But, as time went on I learnt that attempting to listen to the learners was just as important, as being a professional listener who, through educational experience, knows what to do with the information. As someone who is professionally trained in journalism, I have always believed that stories are sought after and told so that what is said can be told to an audience; so that if there are professionals in the audience they can come forward and say "We have heard their voices, we are going to take further measures to facilitate the listening processes so these voices are constantly heard, and we the professionals will do something to help in the situation."*

*Because of my training as a journalist, I thought of myself as better equipped at listening, and therefore could easily work between fields as long as the process was based on attempting to understand the voices of the learners, their understandings of themselves within their educational context and the relationships they could form to enhance their experiences in school. I used a framework on grassroots development and something very interesting happened. A beautiful story emerged. Relationships were built and insecurities were overcome. Something happened, and although it might not look like what an educationist might observe; or take the approaches of someone in the science faculty, it is something worth considering.*

# Chapter 2: Theoretical framework

## Introduction

Top-down development initiatives are 'fundamentally flawed' because they prioritise the output needs of the development organisation over the needs of the community the development initiative is attempting to empower. White (2004:8) argues that this "fundamental flaw in development theory and practise" can be addressed by situating development discourse and practise within the context of power (Wilkins 2000: 1) and linking empowerment to participation in the collective decisions at all levels of society for people to have control over these decisions (Servaes 1999: 194).

Empowerment, which White (2004: 21) then describes as "the affirming of the dignity and re-evaluation of the local culture" as well as "re-signifying the cultural institutions so that one's own cultural capital is given greater recognition and it seen as valuable", is only possible if the development initiative is able to;

- begin with grassroots communities and organisations (Servaes 1999: 158);
- promote a participatory structure of communication Servaes 1999: 88), and:
- encourage local communities to seek self-reliance and independence (Servaes 1999: 79).

Communication for Development (and Social Change) can lend to the process of empowerment. It provides the opportunity for the researcher and the participants of the research to meet, understand one another and attempt to get a larger community of people to gain access to those understandings.

In the following chapter, I will outline the history of development communication, and the basic principles of 'Another Development'. With these foundations, I will explore the theoretical underpinnings of Communication for Development (and Social Change) and outline the specific theories that have supported the C4D process in the context of this research. These theories include; participatory development, the public sphere, voice theory, communicative ecologies, social capital, and the framework for evaluating complex communication for development processes. Servaes writes that most development researchers understand that there is "no universal path to development", and that development must be understood as "an integral, multidimensional and dialectic process" which can vary from one

context to another (1995:42). Therefore, the theories presented in this research are derived specifically for the context outlined in Chapter 1 with the guidance from the essential principles and priorities of 'Another Development'.

# Origins of development communication

From the 1950s through to the 1980s, communication served as a key element in the West's project of developing the Third World (Sarvaes & Malikhao 2007). The dominant paradigm, Modernization, supported the transfer of technology and the socio-political culture of developed societies to more traditional societies (Servaes 1995: 40). Media were assumed to be multipliers, with powerful effects on developing world audiences, able both to accelerate and magnify the benefits of development (Fair, 1989: 138). Fair argues that during this time communication researchers believed that the introduction of media and certain types of educational, political, and economic information into a social system could transform individuals and societies from traditional to modern (1989:139). In this paradigm, development was closely identified with economic growth, which was central to the idea of 'evolution'. This implied that development was directional, accumulative, predetermined, irreversible, progressive and immanent with reference to the nation state (Servaes 1995: 40).

Servaes writes;

> Hence the central problem of development was thought to revolve around the question of 'bridging the gap' and 'catching up' by means of imitation processes between traditional and modern sectors, between retarded and advanced or between 'barbarian' and civilised sectors and groups to the advantage of the latter. These two sectors, the traditional and the modern, were conceived of as two stages of development, co-existing in time, and in due course the differences between them were to disappear because of a natural urge towards equilibrium. (1995: 40)

Criticisms of the paradigm arose from as early as 1960, particularly in Latin America, but the best known critique was in 1969 by Andre Gunder Frank (Servaes 1995). In a threefold critique, Frank argues that the progress paradigm is empirically untenable, has an inadequate theoretical foundation, and is, in practice, incapable of generating a development process in the Third World (Frank 1971). Servaes (1995: 41), furthers the critique and argues that the "complexity of the processes of change is too often ignored", and that there is very little attention paid to "the consequences of economic, political, and cultural macro-processes on the local level", meaning that any push-back or resistance to Modernisation cannot be explained on the basis of traditional value orientations and norms, as the paradigm seems to imply.

# Multiplicity and 'Another Development'

In the 1980s and 1990s, the Modernisation model was put under sustained theoretical attack, opening the way for a theoretical framework that is almost the polar opposite, Participatory Development (Servaes & Malikhao 2007). In the altering of the development framework, many researchers went from viewing mass communication as playing a top-down role in social change to developing indigenous models of communication and development through participatory systems (Servaes 1995). Here participatory communication was associated with a new 'multiplicity' and 'another development' paradigm and built on the widely formulated critiques of the linear, top-down, diffusionist perspectives on the one hand and the thinking of Latin American Scholars such as Augusto Boal, Jesus Martin-Babero and Paolo Freire on the other hand (Servaes & Lie 2015: 246).

'Another Development' arose from a need "for a new concept of development which emphasized identity and multidimensionality" (Servaes 1995: 42). There are six general principles and priorities cited by several authors as essential for Another Development' (Servaes 1995: 42), these include:

- Basic needs, which refers to meeting human, material and non-material needs;
- Endogeny, which means the work stems from the heart of the society;
- Self- reliance, which implies that each society relies on its own strength and resources in terms of its members' energies and its natural environment;
- Ecology, which refers to using rationally the resources of the biosphere in full awareness of the potential of local ecosystems, as well as the global and outer limits imposed on present and future generations;
- Participative democracy, which refers to a true form of democracy, not "merely for but by the people" at all levels of society;
- Structural changes, which refers to social relations and power structure so as to realise the conditions of self-management and participation in decision-making by all those affected by it (Servaes 1995: 43).

The practice and adoption of all or even some of the six principles brings about new forms of communication including, decentralised media systems and democratic communication institutions that place emphasis on self-management by local communities (Servaes 1995).

# Communication for Development

As a tool for social and political transformation, C4D will always involve challenging power relationships and structures. This is because it depends on 'actively engaging' a range of people, 'encouraging voice' but also encouraging 'active listening' across difference (O' Donnell, Lloyd and Dreher 2009: 87). This promotion of participation and social change, is done using methods and instruments of interpersonal communication, community media and modern information technologies (SDC 2016: 10).

Servaes (1999: 189) argues that the main actors in a development process are "social actors" that have broken out of "submission to hierarchal structures" to establish their own "independent system of communication and organisation".

C4D then, with the "use of communication processes, techniques and media" guides the social actors toward a full "awareness of their situation" and their options for change, to "resolve conflicts, to work towards consensus" and help the social actors plan for actions that lead to sustainable development (Fraser and Restrepo-Estrada 1998: 63).

The process of C4D is a social one. Based on dialogue, the C4D process is about "seeking change at different levels, including listening, building trust, sharing knowledge and skills, building policies, debating and learning for sustained and meaningful change" (Gumicio Dagron 2009: 6). It is a process that has shown to provide mechanisms for achieving the levels of participation, voice and choice that development more broadly struggles to achieve (Tacchi: 2009).

Servaes & Malikhao write:

> In essence development communication is the sharing of knowledge aimed at reaching a consensus for action that takes into account the interests, needs and capabilities of all concerned. It is thus a social process. Communication media are important tools in achieving this process, but their use is not an aim in itself – interpersonal communication too must play a fundamental role." (2007: 1)

# Participatory Development

The nature of C4D, essentially links communication with participatory development, among other ideals, by "asserting communication links to dialogue rather than message delivery" (Lennie & Tacchie 2013: 9). Participation, however, is a contested concept (Cornwall 2011)

that has become a development buzzword (Cornwall & Brock 2005) assumed to be essential for development, and therefore an unquestionable good (Lennie & Tacchie 2013).

Lennie and Tacchie (2013: 10), explain that participation is not intrinsically good because it holds both the potential for tyranny (Cooke & Kothari 2001) and transformation (Kickey & Mohan 2004), because of its implications in the political and the fact that it exists in relations of power.

Carpentier (2011: 24-26) puts forward six characteristics of maximalist participation in an effort to increase the theoretical foundation of the concept of participation:

1. The key defining element of participation is power.
2. Participation is situated in particular processes, localities and actors.
3. Participation is contingent and dependent on the ideological framework within which it is used or how we think of it.
4. Participation is not based on the replacement or overthrowing of hierarchy, but on diversity and power sharing, and equal power relations in decision making.
5. Participation is invitational and not imposed.
6. Participation is structurally different to access and interaction.

Participation and the contextual understanding of it, requires a distinct level of reflection on the part of the researcher. Because the project is ongoing, the way in which social actors participate should develop with time.

Ultimately, participation is about power and control and therefore inherently a political process (Cornwell 2008). A key understanding brought into this research was that, before *participation* can take place the researcher needs to understand the social actors' relationship with power to be able to reflect on whether the relationship changes and in what ways the changes take place.

Carpentier (2011) argues that the concept of participation is grounded in democratic theory to highlight the importance of power. He insists that it transcends institutionalized politics and permeates all realms of society. By using a broader definition of political, he is then able to ensure that all social spheres are contestable and politicized, and open to claims of increased participation. The approach of using a broader definition of political is a useful tool in politicizing the context of the members of the science club in order to find theories of power that can guide the intervention.

If participation is implicated in power, then ‘to empower’ (Servaes 1999) in C4D can be defined as a process through which social actors gain control and mastery over “social economic conditions”, over “democratic participation in their communities” and over “their own stories” (Melkote & Steeves 2001: 36-37).

This process of participatory development in the context of the science club, is aimed at supporting the sphere that developed as a result of the power relations the social actors were subjected to before forming an after-school science club. As social actors they broke out of a ‘hierarchal structure’ in order to establish their own ‘participatory communication and organisation’ (Servaes 1999: 189) similar, at least in part, to the social actors that form what Nancy Fraser conceptualizes as *subaltern counterpublics* (Fraser 1990).

# The public sphere

Although the research is not in itself a public sphere project, this theory helps one understand the context of the high school learners. The public sphere in this instance plays a vital role within the C4D framework to understand the power relations the members of the science club find themselves in.

As an institutionalised arena of deliberative interaction, the public sphere is a space where citizens discuss their common affairs in a manner that is critical to the state and conceptually distinct from the official economy (Fraser 1990). What determines the extent to which a space qualifies as a deliberative sphere depends on the citizens’ ability to come to a public opinion guided by reason and rationality. Kellner (1997: 78), highlights the requirements of a rational citizen in a participatory democracy such as a public sphere, stating that the citizen must be informed, must be capable of argumentation and participation and they must be active and organised in order to become a transformative political force.

The bourgeois public sphere according to Jurgen Habermas, which began appearing around the 1700s (Kellner 1997), connoted the idea of rational discussion of public matters. The discussion was accessible and inequalities of class and status were bracketed to ensure that discussants deliberated as peers (Fraser 1990). This conception of public sphere was subject to contestation from scholars studying the public sphere because “despite its rhetoric of publicity and accessibility” (Kellner 1997), it rested on and was constituted by the major exclusions of women and lower social classes (Papacharissi 2012).

Fraser (1990) contends that it is unreasonable to assume that there can be a single, comprehensive public sphere. In reality, multiple publics exist but participation is limited in stratified societies because these multiple publics have unequal access to the dissemination of ideas (Kelly 2003).

## Spheres in stratified societies

In stratified societies, "whose basic institutional framework generates unequal social groups in structural relations of dominance and subordination", processes of deliberation and participation in the spheres will most likely function "to the advantage of the dominant groups and disadvantage of the subordinates" (Fraser 1990: 66). Rarely have secondary school learners, for example, been in the position of "agents involved in interpreting their needs and shaping their life conditions"; rather their needs have been defined for them by others, such as bureaucratic experts (Fraser 1997: 70).

Fraser (1990: 66-67) explains that social actors that are *subordinates* in stratified societies are disempowered in the following ways:

- They have no arenas for deliberation about their needs, objectives and strategies.
- They have no venues in which to undertake communicative processes that are not under the supervision of dominant groups.
- They are less likely to "find a voice or words to express their thoughts" and more likely than otherwise, "keep their wants inchoate".
- They are left less than able to defend their interests in a comprehensive public sphere.

In such societies, social actors have repeatedly found it advantageous to constitute alternative publics. These publics, which Fraser (1990: 67) calls *subaltern counterpublics,* are seen as development-enabling in a greater participative democracy. Fraser further argues that although the counterpublics themselves are not always necessarily democratic and egalitarian, as long as they emerge in response to exclusions within dominant publics, they help expand the discursive space.

Subaltern counterpublics help expand the discursive space through their dual character. As "spaces for withdrawal and regroupment" and "training grounds for agitational activities directed towards larger publics", social actors use the platform to "invent and circulate counterdiscourses, which in turn permit them to formulate oppositional interpretations of their identities, interests and needs" (Fraser 1990: 67-68).

Fraser (1990: 67) argues that it is in the dialectic between the two functions that emancipatory potential resides. This is because counterpublics that have formed with a link to schools and beyond schools can serve "both to nurture individuals as they shape their identities in dialogue" and "to educate and encourage individuals to engage with a wider public" (Kelly 2003: 127).

In C4D, the researcher negotiates access to the counterpublic in order to work with and support it from the ground up. The process embraces a variety of communication channels and methods including; small group deliberations, social media and digital story-telling (Fraser & Restrepo-Estrada 2002: 63), to both guide and experience change, in intra and inter group communication, as well as to intensify the exchange of ideas (Fraser & Villet 1994) with a special emphasis on 'voice' (Tacchi 2012) and on listening (Bickford 1996).

# Voice

Voice is directly linked to a social actor's agency and rights. When they possess voice they have the agency to represent themselves and the right to express an opinion. The promise of voice however, is central to the institutional legitimacy of contemporary democracies (Tacchi 2012: 225). Therefore, when a social actor is not given "the opportunity to speak, be heard and have some influence over decisions that affect their life" (Couldry 2010: 123), they are subjected to 'voice poverty'.

Lister describes (2004) voice poverty as the inability for people to influence the decisions that affect their lives and the denial of the right to participate in that decision-making.

Tacchi (2007: 226), explains that C4D can further subject social actors participating in interventions to voice poverty by;

- Denying them modes of expression;
- Denying them opportunity and agency to promote self-expression and advocacy;
- Denying them access to technologies and platforms for distribution of a range of different voices, and;
- Fenying them the opportunities to participate in the design of the C4D interventions.

In an attempt to steer away from an intervention that facilitates voice poverty, the C4D intervention should understand voice as both a 'process' and as a 'value' (Couldry 2010: 123). Understanding voice as a process, means that one understands that voice and voicing is

the process of giving one's life and its conditions (Couldry 2010). Understanding voice as a value, on the other hand, "is valuing, and choosing to value, those frameworks for organizing human life and resources that themselves value voice (as a process)" (Tacchi 2012: 229).

This dual understanding of voice, as a process and a value, is important because it facilitates a listening process that is vital if any attempt at voice is to be taken seriously. The theorising of voice as both a right and a process is grounded in the local, a way in which memory, experiences and local knowledge were mobilized to effect processes that has clearly resulted in transformative change (Thomas 2015: 77). Tacchi (2012: 229) argues that voice has been linked to participatory development, especially with reference predominantly to voice as a process, which has subsequently left the value of voice and process of listening with far less attention. Listening however is equally as important.

Couldry (2009: 580) explains that:

> The reason we need to listen and the reason… we have an obligation to listen is that all human beings have the capacity for voice, to give an account of their lives. This is an irreducible part of their human agency. If to acknowledge this is humanism, so be it: it should be obvious it need not rest on any simple notion of agency or on any complacent notion of superiority of human life over other forms of life, let alone on the privileged attempt to 'speak for' humanity from one site or another
>
> So a mere claim by particular individuals or groups to 'voice', without any practice of listening, is contradictory or at best incomplete.

Couldry (2009: 580) further argues that the politics of voice does not have to be contradictory, if 'voice' is understood as being "implicitly linked to practices of speaking and listening based on a practice of mutual recognition".

Therefore, a key understanding for any intervention is that, the point is not to "value listening at the expense of speaking but to understand better the relationship between the two practices, their interdependency [and the] dynamic relation between them" (Bickford 1996: 145).

The communicative nature of C4D means that voice is defined in the terms of "self-expression" and "inclusion and participation in the social" but it also should encompass "access and skills to use technologies and platforms" because the social actors' voices should be heard at multiple levels on a variety of platforms (Tacchi 2012: 229).

The social actor's use of voice and intragroup communication within the 'spaces for withdrawal and regroupment' (Fraser 1990: 67-68) should empower them to begin to participate in the space that is the 'training grounds for agitational activities directed towards

larger publics'. One of the first ways in which a social actor participates in this space is by mapping their communicative ecologies.

# Communicative ecologies

An integral part of C4D is understanding how information flows and how communication takes places between the social actors and their community (Lennie & Tacchi 2013). The mapping of the social actors' 'communicative ecologies' allows the social actor and the researcher an opportunity to understand all of the communication networks, and connections that the social actor or actors are part of (Tacchi 2004).

Hearn et al. (2009: 31) explain that all instances of communication take place as a part of "existing communicative ecologies" and each place has a unique ecology worth investigating and understanding. The communicative ecology of a social actor maps out all of the forms and ways in which communication takes place as well as with whom. These ecologies focus the research "on the communication – related aspects of the context in which the [social actors] operate".

In the process of understanding a social actor by understanding their communicative ecology, the researcher and social actor prioritise "understanding local specifics" of the ways in which information and communication flow between people (Foth & Hearn 2007: 222).

Here communication channels are not just electronic media channels, but through institutions. These are the everyday, complex networks of information and communication in individual and community lives. Communication networks are complex and based on individual decisions and choices about how to use various media platforms as well as broader issues of availability and access and social and cultural barriers and opportunities. (Tacchi et al 2003: 17)

Through this understanding, of the social actor's ecology, the C4D process can be enriched by further understanding the ecologies as having three layers; technological, social and discursive (Foth & Hern 2007).

Foth and Hearn (2007: 227) conceptualise the three layers as;

1. The *technological layer*, which consists of devices and connecting media where communication and interaction takes place.

2. The *social layer*, which consists of people and the social modes of organising them. This includes the informal social networks, the more formal community associations as well as the commercial or legal entities such as body corporates.
3. The *discursive layer*, which consists of the thematic content. This includes the ideas, themes, conversations or narratives of the ecology.

Using the three layers, the researcher and social actor can then discover the "kind of communication and information activities" that are carried out by the social actor as well as the kind of communication and information activities the social actor would like to carry out. The process opens a platform for the research to explore "communication resources available to [social actors] including media content, technologies, and skills". This helps the social actors understand "how the resources can be used" as well as who they can connect with in the future to understand and enhance their social capital (Tacchi et al 2003: 17).

# Social Capital

According to Coleman (1988; 199), social capital is the "co-operative relationships" that take place within families and communities. Social capital is thus the "direct and indirect resources that are formed as a by-product of social networks and social support systems" (Hawkins & Maurer 2010: 1778) within families, friends and the broader communities that social actors form a part of during an intervention such as the one in this research.

This theory places a strong emphasis on resources and understanding the "resources embedded in one's own network or associations… accessible through direct or indirect ties" (Lin 2001: 56). Hawkins & Maurer (2012: 357) argue that access can be gained in network connections that are not possessed by the social actor or for which the social actor exchanges their own resources because social capital can offer "temporary access" to resources owned by other individuals or embedded in networks (Lin 2001: 18).

Social capital, which then serves as a useful concept to understand the varying values of the network relationships of a social actor, can be broken down into three distinct categories including *bonding social capital* (Putnam 2000), *bridging social capital* (Szreter & Woolcock 2004) and *linking social capital* (Woolcock 2001; Szreter & Woolcock 2004).

Hawkins and Maurer (2010: 1779) summarise the categories as:

1. *Bonding social capital*, refers to the relationships that form between the members of a network who are similar in some form. (Examples include the core membership of the science club, their peers and any age mates with similar interests in science.)
2. *Bridging social capital*, refers to the relationships that form between the people who are not similar and do not fall under the same categories such as age, socio-economic status, race, ethnicity and education. (Examples include; the researcher, the teachers of the members of the science club, the parents of the members of the club, and other science clubs in other parts of the community.)
3. *Linking Social Capital*, refers to the extent to which people build relationships with institutions and other people who have relative power over them, for instance to provide access to services or resources. (An example could be the extent to which the club member's relationship with organisations such as Albany museum and Scifest Africa develop during the intervention.)

Lin (2001) further delineates interactions as heterophilous (amongst actors who are dissimilar) or homophilous (amongst actors who are similar). Typically, homophilous bonding represents the strongest connection with the least valuable by-product.

Heterophilous bridging social capital is generated from a weaker connection but produces a more valuable by-product than bonding interactions (Lin 2001; McPherson et al 2001). Linking social capital is the result of the weakest relationship but the most valuable outcome, as linking provides access and connection to power structures and institutions. Unlike bonding, it is bridging and linking that are characterised by exposure to and development of new ideas, values and perspectives (Woolcock 2001; Szreter and Woolcock 2004). (Hawkins & Maurer 2010: 1780)

# Evaluating Communication for Development

The theories outlined in this chapter should ultimately attempt to answer the question of whether the principles of C4D can be used to help a learner-led science club's communication, action and learning. However, evaluation and impact assessments in C4D interventions are a significant challenge for researchers. The social change approaches adopted by donors create very complex expectations of the research process and its evaluation. This is due to the difficulty faced when attempting "to assess direct cause and effect impacts" and that fact that "the outcomes and ripple effects of C4D can be difficult to capture using standard approaches" (Lennie & Tacchi 2013: 7).

## Complexity Theory

Researchers have adopted systems and complexity approaches to tackle questions such as the one posed by Lacayo (2006: 40), when she asks, "how do we reconcile the messy, unpredictable and complex notion of social change with a short-term, cause effect based schemata that can frame results as quantifiable and measurable?"

This question highlights a global interest "in a range of alternative, holistic, critical, feminist and postmodern perspectives, and participative and creative ways of fostering development and social change" (Stevenson & Lennie 1995: 58). Lacayo (2006: 45) calls for a supportive social, political and economic environment that encourages alternative thinking, includes the construction of complexity-based indicators, and uses evaluation methodologies that "explain rather than justify", and "understand rather than measure" processes of social change.

This thinking could effectively counter dominant linear, step by step approaches to behavior change and evaluation which, Lenni & Tacchi (2013: 45) argue, fails to capture the potentially positive impacts of having local social actors and collaborating stakeholders working together in their C4D interventions and the processes of evaluation the interventions undergo.

Leach writes about the advantages of considering this alternative, stating that complexity approaches seek to:

> … reflect the full range and diversity of a social system and its environment. It helps recognise that there are multiple ways of understanding and representing a system; and that all analyses of a system involve framing…. The fundamental implication of complexity and dynamics is that there are limits to what is known and what can be controlled and planned. This means dealing with incomplete knowledge in situations where uncertainty and surprise are inevitable, and tailoring actions and strategies where dynamics of change and their drivers are not always tractable to control. (2011: 8)

## Complexity and evaluation

An advantage of complexity is that it provides researchers with the opportunity to look at problems from "multiple perspectives, studying the micro and macro issues, and understanding how they are interdependent". Rather than describing how systems are expected to behave, "complexity science focuses the analysis on the interdependencies and inter-relationships among its elements to describe how systems actually behave" (Lacayo 2006: 23).

This highlights the value of complexity theory to the evaluation of complex social change initiatives. It is not a single theory but the study of complex social systems, patterns of relationships, and how they change or remain the same. It debunks substantialist approaches to evaluation and, instead, privileges self-evolving and adaptive approaches (Lennie & Tacchi 2013: 46).

A recent conceptual advance in the area of systems and complexity-based evaluation that is highly relevant and useful in planning, designing and evaluating C4D is the typology "simple, complicated, and complex" as conceptualized by Michael Patton (Lennie & Tacchi 2013: 46).

1. In *simple situations*; which are situations where the knowledge and experience tell you what to do, it is both possible and appropriate to intervene from the top down. In these situations, a high degree of predictability and agreement permits detailed planning, controlled execution, and precise measurements of the degree to which predetermined targets are achieved. A best practice model can be generated and subjected to a summative test. (Patton 2011: 86)
2. *Complicated situations* are less predictable, with less certainty of producing desired outcomes. They occur when the degree of uncertainty and agreement are such that 'what needs to be done is challenging and difficult, but knowable (Patton 2011: 87). In the context of C4D, there is a need to distinguish technical complicated situations, which could be sending a rocket to the moon, from socially complicated situations, with stakeholder interaction. Socially complicated situations "involve situations with many different stakeholders offering different opinions and perspectives, articulating competing values, and posing conflicting solutions" (Patton 2011: 87-88).
3. *Complex situations* are characterized by high uncertainty and high social conflict and refer to interventions in which the outcomes are unpredictable and unknowable in advance (Patton 2011: 90). This concept also refers to the "dynamic and emergent aspects of interventions, which are adaptive and responsive to emerging needs and opportunities" (Rogers 2009: 25). This means patterns, are therefore, only evident in retrospect (Lennie and Tacchi 2013). In complex situations, cause and effect is unknown and unknowable until after the effect has emerged, at which point some retrospective tracing and patterning may be possible" (Patton 2011: 92). Roggers (2011) also suggests that in complex interventions, expertise can help but it is not sufficient, and that relationships are the key to successful interventions.

## Framework for evaluating C4D

Lennie & Tacchi's (2013) have developed a framework for evaluating complex C4D interventions as an attempt to encourage the understanding of the important contributions of C4D and evaluation to the process of development and social change.

This framework helps reinforce the case for effective two-way communication and dialogue as central and vital components of participatory forms of development and evaluation that seek positive social change. It asserts that participatory approaches, complexity theories and whole systems approaches understand social change as unpredictable, unknowable in advance, emergent and something to learn from and adapt to. In addition, they prioritise relationships, openness, innovation and flexibility (Lennie & Tacchi's 2013: 4)

The seven inter-related components in the framework are:

1. *Participatory:* a process undertaken in partnership with the social actors involved with the research. It aims to actively engage the social actors in all aspects and at all stages of the research through two-way communication, dialogue and feedback. This becomes a process that respects, legitimises and draws on the knowledge and experience of the learners both in and outside the classroom.
2. *Holistic:* a process that understands the wider social, cultural, technological, organisational and institutional systems within which the communication operates, of which the school is an important, albeit not the only, component. This becomes a process of analysing and understanding the inter-relationships, interconnections and networks between various organisations.
3. *Critical:* a process that seeks to actively address issues of gender, class, age and other relevant markers of unequal power and voice among participants. The evaluation focuses on local social norms and the challenges and contradictions that have characterised the process of social change and is open to negative findings and learning from failure.
4. *Realistic:* a process that is grounded in local realities and is based on methodological pluralism requiring openness, flexibility and realism. This approach aims to increase the usefulness of evaluation results, which should focus on intended, unintended, expected, unexpected, negative and positive change.
5. *Learning-based:* a process that facilitates continuous learning, mutual understanding, empowerment, creative ideas, and responsiveness to different attitudes, values and

knowledge. Evaluation is fully integrated into organisations and the whole programme cycle involves a diversity of people taking responsibility for research and evaluation activities.

6. *Emergent:* a process that takes an evaluation approach that is non-linear and dynamic. Because C4D process are unpredictable, evaluation processes need to be flexible, adaptive and based on simple principles and processes such as self-organisation, powerful listening and continuous feedback loops.
7. *Complex:* a process that often takes place in a social, and cultural context with high levels of social conflict involving people and organisations with multiple agendas and perspectives. Evaluation approaches therefore, need to be creative, participatory and flexible (Lennie & Tacchi's 2013: 22).

Communication and the application of the seven interrelated steps is critical for sustainable development. Lennie and Tacchi (2013: 21) maintain that the importance is based on the key role of evaluation in ensuring that researchers do not ignore the lessons of the past in favour of "mechanistic approaches to monitoring and evaluation", that "technocratic approaches" do not overwhelm participatory approaches and the involvement of those on the ground, and that innovative and creative approaches designed for learning rather than accounting are promoted.

## Implications for the C4D framework

The theoretical framework of this research attempts to sew together specific theories to support C4D in addressing the internal development and empowerment of the club. The framework does this by attempting to understand the group's communication using participatory development theory (Lennie & Tacchi 2013: 9), attempting to understand the group's relations with power using public sphere theory (Fraser 1990) and attempting to understand the group's ideas and identity using voice theory (Couldry 2010). Although, this creates a platform for the group's empowerment, White argues that this is not enough:

> The concept of empowerment, is, at best incomplete and possibly dangerous if not orientated more clearly towards the service of society. Empowerment needs to be explicitly located within a broader framework of commonly agreed upon parameters of human and social equity.
>
> Too often, when movements do achieve the empowerment they are seeking, they feel that they have arrived at their goal. They have redefined their own identity and they are widely accepted. The logic of empowerment causes no sense of urgency to use their power to serve others in a similar situation. (2004: 21)

The theoretical framework of this research not only uses the underpinnings of C4D to address White's concern, but also sews together various theories to understand how the group can engage with the wider society they exist in. The framework does this by attempting to understand the group's communicative ecologies (Foth & Hearn 2007: 227), and attempting to understand the group's varying levels of social capital (Hawkins and Maurere 2010: 1779).

All in all, this is a complex process. This research creates the need for a theory to tie the theoretical framework together with the methods and methodology, to guide both the researcher and the reader on how to make sense of the intervention and thesis. The framework addresses this need by understanding complexity theory (Leach 2011: 8) and ways to evaluate complex C4D interventions (Lennie & Tacchi: 2013: 4).

# Chapter 3: Research methodology and methods

## Introduction

Tacchi et al (2003: 32) argue that for participants of research to fully engage they need to feel that the research activities seek to provide the amount of time and human resources they require if they are to understand its purpose and recognise its benefits. This requires the researcher to fully understand what the research is for: what the researcher seeks to uncover and how the results will be used once the research is completed.

In the following chapter, I will outline the aims of the research and the research methodology I used to achieve these aims. I will introduce Ethnographic Action Research and break it down into its component parts Ethnography and Action Research. I will outline the ethical considerations and the roles of the researcher undertaken during the research process. I will then outline the project cycles of the intervention and conclude with the data collection methods used to capture the rich and complex process of the research.

## Aims of the Research

This research sought to design, execute and reflect on a process where the principles and techniques of C4D and Social Change are applied to enhance, support and develop qualitative changes within a learner-led Grade 10 science club at a public school in Makhanda.

The research sought to explore the club's communicative ecology (Foth & Hearn 2007) and resources and understand how these have the potential to encourage the expression of voice (Couldry 2010: 123) and participation (Carpentier, 2011) in the members of the club. It sought to understand whether the principles of C4D could be used in a project cycle to help the learner-led science club's communication, action and learning. The research then attempted to understand the kind of communication, action and learning that took place as well as the ways in which the framework was able to support the club (or not).

The research attempted to facilitate a process in which the members of the club, named and framed their own issues, deliberated alternate frameworks for addressing those issues, identified available resources, organised actions (including communication with peers, teachers and other actors), and reflected on the possible learnings and changes that accrued from the process using Lennie & Tacchi's (2013) framework for evaluating C4D.

Ultimately the research aimed to facilitate:

- The development of internal organizational capacity; a process where the club learned how to run an organization in collaboration with each other, identifying needs, aims, resources, and networks, in the process.
- The development of internal communication capacity including a WhatsApp group, and an organizational identity sharable through media production (Facebook page, radio shows, etc.)
- A process where the club began to build their ability to self-organize and self-manage.

Due to the interdisciplinary nature of the C4D intervention, it is important to understand that a successful process was not necessarily one where teachers and learners improved classroom practices. A successful process would have been one where members of the club take control of their communicative practices and actions to take advantage of some of the resources they identified and unlocked, in partnership with other stakeholders, tracing a blueprint to make the same process possible for their peers.

# Ethnographic Action Research

Since participation is such an integral part of the process, the methodologies carried out as part of the research should encompass elements of social actor participation in all its cycles. Ethnographic action research (EAR) can lend to that process. Tacchi et al (2003) describe ethnographic action research as the merging of ethnography as an enquiry method with local participant involvement and ownership that participatory action research engenders. It is a valuable methodology because of its ability to engage and involve social actors on a level that evolves them from mere participants of empowering research to become "co-researchers" in the development process (Dick 2009: 218).

Ethnographic action research, which can also be conceptualized as "applied action research", allows the project participants, (both the social actors and the researcher), to "take the qualities of an ethnographic approach and, combined with action research, help the project work effectively… to understand in what ways they might be able to use ICT's [Information Communication Technologies] within the wider 'communicative ecology' of their location" (Tacchi 2004: 94). This is done through the methodological use of ethnography, to guide the research, and action research, to link findings back into the projects ongoing development (Tacchi 2004).

## Ethnography

Tacchi et al (2003: 9) argue that in using an ethnographic approach to research, rich understandings of the research environment will be produced, allowing for "more effective use of knowledge and information". This is because ethnography's primary concern is always uncovering meanings that are inherent to a particular group and its practices (Cramer & McDevitt 2004).

Tacchi et al, further explain that,

> An ethnographer looks at patterns, describes local relationships, understandings and meanings. Ethnography takes a "holistic approach to the subject of study – that is, the ethnographer looks at the whole social setting and all social relationships. S/he also seeks to contextualise these in wider contexts (e.g., the wider economy, government policies, politics, etc.).
>
> …Through *immersion* in the field (that is, the project and the context in which the project is working), you as an ethnographic action researcher, will be in the position to animate actions based on sound local knowledge. (2003: 9-10)

The ability to perform the role of an ethnographic action researcher "requires flexible and responsive" use of a wide range of methods and every "experience, conversation, and encounter" can later be utilized as "material or data alongside more formal research such as interviews" (Tacchi et al 2003: 10).

## Action research

When the researcher integrates their research into the ongoing development of the project, the process of action research takes place. Huang (2010: 93), explains this as being unlike conventional social science in that "its purpose is not primarily or solely to understand social arrangements but to also effect desired change as a path to generating knowledge and empowering stakeholders". According to Huang action research is therefore;

> [A] transformative orientation to knowledge creation that action researchers seek to take knowledge production beyond the gate keeping of professional knowledge makers. (2010; 93)

Tachhi et al (2013: 13), further this by explaining that action research requires the project to "continuously" reflect on the research, to build up a "research culture" that "everyone contributes to and learns from" because of planning that is guided by "the needs of the project". They explain that in order to do this process successfully, the research process must be tightly connected to the project activities in three ways; *active participation*, *action-based methods*, and *generating action*.

1. *Active participation*, refers to the people who should benefit from the research participating in defining its aims and the direction of the research, interpreting it and drawing conclusions from it.
2. *Action-based methods* refers to ensuring that the activities and experiences of the participants produce knowledge alongside, or in combination with, more formal methods.
3. *Generating action*, refers to research that is directly aimed at generating things like medium- and long-term plans. These could include ideas for new initiatives, finding new resources or partners, and solving problems. (Tacchi et al 2003: 13)

Ethnographic action research, therefore, is involved with the production of knowledge through research that "continually investigates the ongoing impacts of the project" (Tacchi 2004: 95) through "rigorous, well planned, structured and self-aware methods" (Dick 2009: 218). For the research to be consistently self-aware, significant ethical considerations need to take place.

# Ethical considerations

Ethnographic action research is based on real world enquiry. In this case the researcher is working with learners below the age of 18, which means that the researcher's process of self-awareness has to begin way before any interaction, process or intervention takes place. This heightens the importance of seeking permission for the research as seen in Chapter 1. Tacchi et al (2003: 28-29), outline various issues that the researcher must be aware of when considering the ethics of an intervention.

- *Explaining yourself* is important because the research participants need to clearly understand the process you are undertaking (e.g., interview, group discussion or survey), why you are doing it and how you will use the material.
- *Respecting confidences* is important because the research participants need to be assured that what they say will be kept confidential and non-attributable, if they so desire.
- *Treating people sensitively* is important because the research may elicit strong emotions and confidences that could lead to close relationships. These relationships need to be respected and treated sensitively.
- *Exploring sensitive issues* is important because the researcher needs to be prepared to explore sensitive issues, in ways that are respectful to the research participants' views and opinions.
- *Not putting people at risk or endangering their wellbeing* is important because reporting on what people say can have real consequences on them (and for the project). No research is more important than people's lives or their livelihoods. (2003: 28-29)

Alongside, pertinent ethical considerations the researcher is to consider the 'dilemma" faced due the dual roles, of being a researcher and whatever other role/s they must take on during the research intervention.

Morton writes:

> Action Researchers face the dilemmas both of the researcher and of the consultant, but they also face dilemmas which are *sui generis.* These dilemmas often arise out of the dual role which an Action Researcher has to perform. In her role as a consultant, she is ethically bound to provide the client with a service which meets acceptable standards. In her role as a researcher, however, she must ensure that the research has "implications beyond those required for action or generation of knowledge in the domain of the project" (Eden and Huxham, 1996, p. 530). The conflict between these two demands—what Walton and Warwick (1973) call "role contamination"—can take various forms. (1999: 219)

Morton (1999: 221) explains that ethical considerations in action research processes must include the added complexity of dealing with "role contamination" and will more often than not, be made under pressure. A need arises, then, to develop "conceptual models for dealing with ethical dilemmas" that might arise due to role contamination in order for the researcher to internalise them and apply them to the field.

# Roles of the researcher

Outlining the potential roles of an ethnographic research practitioner, doing work guided by communication for development in a particular context, then plays a vital and ethically strategic role within the research. For the purposes of this research, the role of a *social cultural animator* (Tacchi et al 2003: 27) was enacted during the project phase, the role of *development support practitioner* (Melkote 2000: 49) created a good theoretical foundation for the role enacted during the project phase and the role of *ethnographic journalist* (Cramer & McDevitt 2004) proved to be very useful in the initial stages of documenting and analysing the project phase. Although these roles are not significantly different from each other, outlining them enables the researcher a sense of their responsibility in each context.

## Social cultural animator

Tacchi et al (2003: 27) argue that the term "animation" is the "most appropriate" term to describe and articulate the role one has to take on as an ethnographic action researcher in a local context. This is because the "social cultural animator" is responsible for "breathing life into the projects and the underlying dynamic of the communities in which they are located". In this role the researcher is to:

- Work with social actors so that they participate in the project activities.
- Help build enabling environments and relationships for the social actors.
- Facilitate a process of understanding different needs and perspectives.
- Encourage a concern amongst social actors for the local social and cultural environment.
- Encourage social actors to look at themselves as co-researchers and include their ways of making sense of the world and themselves into the evaluation of the projects. (Tacchi et al 2003: 27)

In this way, the ethnographic action researcher will undertake research by taking part in the day-to-day activities of the project as a project worker, facilitating various information gathering and sharing opportunities, training people to recognise and make the most of the knowledge they have and apply it, and encouraging project workers and wider communities to participate in and influence the research process and the projects themselves (Tacchi et al 2003: 28).

## Development Support communicator

Ascroft and Agunga (1994: 310) define the role of a development support communicator as one in which, "the ultimate analysis, must be able to create the situational and psychological conditions" so that the "development benefactors and their intended beneficiaries can participate together in mutual co-equality in making development decisions".

Melkote (2000: 47), expands on this definition by explaining that the development support communicator needs to help in the formation of effective organisations by helping the social actors develop leadership, communication and critical skills to be able to solve problems and carry out negotiations.

Melkote (2000: 48), explains that the role of a development support communicator can be further specified if anchored in the Westly-Maclean (1957) model which was originally designed to explain the role of mass media in society. There are three principal actors in this model:

1. *the receivers,* who need information to help satisfy needs;
2. *the advocates,* who can supply the information and help satisfy the needs of the receivers but are usually self-serving;
3. and *the mass media channel.*

If the model is adapted to define the primary role of the development support communicator, then, the development support communicator acts as the "communication channel" and as an

"advocate" for the "receivers" i.e. the social actors who need access to resources and problem solving (Melkote 2000: 48). In this role, the development support communicator can assist in the identification and articulation of problems, possible solutions, resources and relevant authorities crucial to meeting the needs of the social.

> Thus, the DSC professional can extend the *receiver's* environment by acting as a collaborator, facilitator, and importantly, as an advocate… He/she is uniquely qualified to lead groups and has the communication skills to train people to present issues cogently, to arbitrate, and to resolve conflicts and so on. The DSC professional is more than just a communication specialist, he/she is also a social worker trained in community organisation skills, a social scientist trained in research methods and problem-solving strategies, and a management person trained in organisational development strategic planning methods. (Melkote, 2000: 49)

The term 'Development Support Communicator' has been usually associated with a more modernistic rather than participatory approach to development communication. In this research however, the role has been interpreted consistently with the views of the participatory approach on the role of development facilitators and supporters as conceptualised by Lennie and Tacchi (2013). This means that the research, its facilitation and the support given during the development process is indicative of a reinterpretation of the term based on the theoretical underpinnings of the participatory development (Carpentier 2011: 24-26).

## Ethnographic journalist

According to Lindlof (1995: 20), traditionally, an ethnographer tries to describe all the "relevant aspects of a culture's material existence, social system and collective beliefs and experiences". Therefore, it is within reason to assume that the more depth and detail that the ethnographer gives account to, when describing a particular group, the greater the chances for the reader to understand the group and its members' feeling, thoughts, values, challenges and goals (Cramer & McDevitt 2004: 128).

In thinking about the ethical implications of reporting on and understanding the research project cycle, one might choose to consider the role of an ethnographic journalist operating as a participating observer.

Within this role, the ethnographic journalist "portrays in a responsible manner, the lives and cultures of groups that are typically marginalised through mainstream practices" (Cramer & McDevitt 2004: 133). This can bridge a significant gap in a reader's understanding of social actors, as well as the context surrounding research and project cycles and perform a similar

form of advocacy characteristic of a development support communicator. This is because ethnographic journalism appears to move between practices of journalism and ethnography and operates on the epistemic level "affecting the journalist's position, altering the norm of objectivity in favour of an interpretive approach" (Hermann 2016: 270).

Furthermore, the journalistic commitment, that is, focus, goals, and interests, moves from an event-driven preoccupation with conflict and rupture toward a holistic engagement with continuity and social structures. And, rather than cultural reproduction, taking previous media frames as the starting point and replicating them through linear research, journalism can counter common sense by informing its inquiry theoretically and making it dialectic (Hermann 2016: 272).

In this research, this role was important when writing the narrative accounts for different stakeholders and audiences. The role was used to write an accessible narrative (Chapter 4), in that it can be read by learners, teachers, and parents, but could also be used to produce journalism based on this research for mass media and the wider public sphere (policy makers, educators, etc. may be interested in reading the outcomes of the research in journalistic form).

Cramer & McDevitt (2004: 135-140) outline the ethical considerations that ultimately shape the role of an ethnographic journalist, in this case, participating in an ethnographic action research project cycle with the intention to write about it.

### Objectivity as verification

The authors argue that rather than detachment, which is typically construed as objectivity, objectivity should be practised as faithfulness to the real world under study. Therefore, what is expected is a "retelling of a story as it actually occurs, not as the ethnographer interprets it" (ibid. 135). It is thus, the responsibility of the ethnographic journalist to allow the participants of the research to participate in verification of how the meanings of their lives have been portrayed.

### Avoiding bias

It is important that the ethnographic journalist "strive to avoid applying their own frame of reference to the events and the people observed" (ibid 136). In trying to portray the group accurately, "the imposition of the ethnographer's point of view" (ibid 138) can erode the narrative. This however, places a strain on a researcher navigating "role contamination" because one of the roles of the researcher is to attempt to understand theoretically, what is

taking place with the group. This “point of view” is ever-present in the narrativization of the project and it is the responsibility of the ethnographic journalist to not create biases in favour of the theory.

### Covert or overt observation

There is an important distinction between consent and deception about the purpose of an observation. If the role of the ethnographic journalist is to write a narrative that is “committed to portray people and perspectives usually ignored in mainstream media” (ibid 139) then deception makes it impossible for the observer to create a full and authentic narrative.

### Confidentiality

The role of the ethnographic journalist is to assure a confidentiality that will provide some safeguard against the invasion of privacy (ibid140). Punch (1994: 92), writes that “there is a strong feeling among fieldworkers that settings and respondents should not be identified in the narratives and that they should not suffer harm or embarrassment as a consequence of the research”.

It is particularly important to understand this role with regards to this research because the research deals with minors. Seeking ethical approval (as seen in appendix 2) helped provide further “conceptual models” that helped with ethical conundrums later in the research.

# The project cycles

Tacchi et al (2003: 3), explain that ethnographic action research is often divided into two phases, baseline research, “before the project starts”, and monitoring and evaluation research, “to assess how the project has developed”. For the baseline research in this particular study, preliminary interviews were conducted with members of the science club to understand their communication practices with regards to their science subjects at school, at home and in their communities. The project cycle, which took place over the period of July to October 2018, provided the platform to do the monitoring and evaluation research.

Each cycle attempted rigorously to involve all participants in a process of “planning, doing, observing and reflecting” (Tacchi et al 2003: 4). In attempting to meet the ideals of ethnographic action research, we attempted a project that developed a participatory research culture, ensuring that knowledge and reflection constantly fed back into the project’s development. At the end of each cycle we, as a group, attempted to understand how the process could feed into the next cycle.

## Cycle 1: Scanning the environment

I conducted an ethnographic field study where I attended and observed the meetings of the club to negotiate access to the environment and build relationships with the club members. The club began this phase of the research by establishing a group identity through engaging in intra-group communication using group discussions. A WhatsApp group was also used to support this process as well as allow the group to post and share ideas, memes, and learning resources with each other in a closed media space. The cycle primarily consisted of activities aimed at participating in a Science Expo.

## Cycle 2: Co-designing an intervention strategy

This cycle was aimed at goal setting, identifying resources, mapping stakeholders, and planning and organising courses of action. The internal decision-making process was done primarily by the members in their established discursive space with the guidance of myself as a facilitator.

This involved meeting with the club to highlight the key questions about the changes needed to explore, understand and appropriate the club's communicative ecologies. Here the club decided on the objectives of the project and the tools and channels we had and needed to ensure that the intervention was effective. The club created a Facebook page and email address in order to begin to interact with broader stakeholders.

## Cycle 3: Implementing the strategy

I played a facilitative role in implementing and ensuring that campaigns in the form of videos, social media, and club debates were carried out by the group. In this process we, as a group, started to identify resources (e.g. newspaper articles about science) and target outside stakeholders (e.g. science experts).

During this process the club shot a video based on their community that they shared at a climate change event. This event was their first attempt at targeting outside stakeholders and sharing some of their interests and processes with a wider community of stakeholders. They also got the opportunity to share, on radio, some of their activities and processes. With my help, they were able to update their Facebook page with pictures and ideas they generated during the research process.

## Cycle 4: Researcher withdraws

In this cycle the science club is given access to tablets and study guides and they are to use these without the involvement of the researcher. This process is then reflected in cycle five during the exit interviews.

## Cycle 5: Monitoring and reflection

Monitoring and reflection took place on an ongoing basis using Lennie & Tacchi's (2013) framework for evaluating C4D because in ethnographic action research participants (researcher and social actors) have to constantly plan, do, observe and reflect, in every cycle until the end of the project.

In the final phase, the club members and I reflected on the ethnographic journalism piece I wrote to give the reader a deeper understanding of the process we went through. During this process understandings and meaning I had misunderstood and misinterpreted were corrected and the corrections were used in the final piece (chapter 4). We then did the final step of reflection, through in-depth exit interviews with the members of the club to reveal the complex role C4D played in the club's communication and development.

Disclaimer: my relationship with the club continued after the final project cycle.

# Data collection methods

Tacchi et al, argue that in ethnographic action research "everything is material", and this is due to the "flexible, responsive and diverse" nature of the research (2003; 52 &53). With a variety of options at my disposal the methods; *participant observation*; *field notes*; *in-depth interviews*; and *group interviews,* were used. Tacchi et al (2003: 52), give rich descriptions of these data collection methods, which have been summarised below:

- *Participant observation* is the central research method of ethnography. By actively participating in social situations the researcher, begins to understand what is going on while building strong relationships with the people. Participant observation does not rely on strict objectivity but accepts subjective understandings of research situations. The participant observer needs the attitude of someone entering a new and strange environment and trying to understand how things work, all while taking detailed field notes.

- *Field notes* should be recorded from the very beginning. They are the most important record of all that the researcher observes, talks about and thinks of the research. These can build into a rich and valuable archive for the research. Even the simplest conversations can be used as rich data. Field notes can be sorted into a log of daily activities; who, what, when, where, why and how things happened with interpretations about what the researcher thinks happened (Tacchi et al 2003: 56). For the purposes of this research I sorted my field notes into a detailed narrative, filled with rich descriptions of the project cycle in order to share my interpretations with the participants as well as the reader.
- *In-depth interviews* are the most helpful tool for the researcher to get a deep and meaningful understanding of the participant's story, what ties them to the research and what their experiences of the process has been. It is very important that the "story is told in their own words and in their own way" (Tacchi et al 2003: 61). The exit interviews with the members of the science club were rich in nature, and were characteristic of long conversations rather than actual interviews. Although they were unstructured in nature, some of the questions the conversation aimed to answer were;
    1. What role do you play in this science club?
    2. How did you end up in this role?
    3. Please tell me a bit about the science club, how it began, when you joined and some of the things you do when you meet?
    4. What has been the highlight of being in the science club?
    5. What role did the research process play in the club?
    6. What, in your words, would you say the research is about?
    7. What connections have you made since the research began?
    8. What goals did you hope to achieve when it all began?
    9. Have you achieved these goals?
    10. What are communicative ecologies?
    11. Do you have personal communicative ecologies?
    12. What have you learnt about yourself in this process?
    13. What have you learnt about education in this process?
    14. What are your hopes about the club for the future?
    15. What role are your peers supposed to play in your learning?

- *Group interviews* are also known as focus groups. These are in-depth interviews with more than one person with the aim to get rich and often exploratory material. These are useful because through this method, issues and ideas emerge that could be left out in a discussion with the researcher alone (Tacchi et al 2003: 76). All the group discussions in this research were structured in the form of focus group discussions. The topic up for discussion would be announced (by anyone, not only the researcher) and the rest of the group would contribute to the discussion until the end. The constant and consistent evaluation and planning of the research cycles depended heavily on the method of focus groups and group interviews.

# Chapter 4: The Story

The following chapter is the story of the process. This story was created as an attempt to have a sharable document both in and outside of academia. As the first layer of analysis, the story does a theme by theme chronological outline of the intervention. During the evaluation cycle of the research, this story was shared with and edited by the members of the science cave to ensure that they were comfortable with the representations. All of the names of the parties belonging to the school involved have been changed due to an ethics agreement with the Department of Education.

I have included, in italics, a reflective analysis of the story. These parts were added during the process of writing my thesis and should be read as the researcher's point of view.

In the following chapter I will tell the story of how the club negotiated access to the world of science by working towards and attending their first science fair. I will tell the story of how the club began to plan for and work towards a more functional organisation by connecting to each other and other stakeholders online. I will share some challenges the club faced as well as the interesting events the club was invited to. I will conclude this chapter by telling the story of my withdrawal as a researcher and the very inspirational response the club had to the final cycle of the intervention.

## Going from me and them to we the *Science Cave*

### (May 2018)

I had met the learners many times before I was officially allowed to write about our activities. By May, I had got permission from their principal, their parents and the learners to meet them regularly as part of the science club. By that time, we had established the name *Science Cave.* We knew there was a need for the club, its members continuously expressed that, but the club had not yet found its purpose.

*The set-up of the classroom makes it difficult to sit in a circle. Instead, the learners sit on the desks and look forward at me, almost expecting me to begin to teach. I attempt to avoid this. It is not my intention to be a teacher. I have come here to observe and contribute in the hopes that the cavers will find their unique voice in the process. I sit down in the first row of desks. I fit but it is tight and somewhat uncomfortable. I stay there for the duration of this and other meetings to ensure that they are aware of my position (with them rather than me in front of them).*

Every week I bring two packets of chips and a packet of biscuits for the group to share as we brainstorm. At first, I was worried about whether it was unethical to do this. To bring snacks that could entice the young minds into fully participating. This is an insecurity that has been caused by one of the teacher's observations. One day while in Mrs Richard's classroom she walks in on the club sharing the chips and biscuits. With a cheeky laugh she says, "Ahh so that's how you get them to pitch every week". At the time I laughed shyly, feeling guilty for potentially taking advantage of the hungry learners but my thoughts on the topic soon change. The learners explain that it is difficult to meet after school because by then they are hungry. They explain that we would have to organize that they get some of the afternoon meals that learners doing extra mural activities get at school.

# The club negotiating access to the world

## (July 2018): Cycle 1

*This cycle proves to be very difficult and consumes a lot of resources as well as time. In this cycle my objective is to get to know the environment. This is because the nature of C4D is based on community participation. My community, the science club, understands the world in a certain way and in getting to know their world, I am understanding what kind of changes are needed and what kind of participants I will be working with. They too need to gain access to the larger educational environment, this will help them build ecologies that can later provide sustenance and growth for the club.*

*By now we have spoken about the Eskom Expo but there is no real indication that the Science Cave will attempt to participate in it. The Eskom Expo for Young Scientists is a science fair where students have the chance to show others their projects about their own scientific investigations. Annually, selected student participants from 35 Expo Regions in South Africa compete against the best young scientists around the country and in the world in the Eskom Expo for Young Scientists International Science Fair (ISF). For the club members to get an opportunity to attend ISF they would have to be finalists at the Regional finals.*

## Finding the club's purpose

We walked past the quad and up the stairs to Mrs Richard's classroom. Although there was no official agreement yet, she knew that every Monday afternoon the *Science Cave* would meet in her classroom and plan ways to re-enter the world of science just for the sake of it. We walked in and settled down. It had been two weeks since our last meeting. The group was

no longer busy with other work and activities, so we finally had the time to do some fun things.

“So now that we have time guys, what is next?” I asked as the group settled down.

*To speak first could be dangerous but as the facilitator I wanted to guide the conversation rather than sit completely outside of it.*

“What about Expo?” one learner asked. In agreement heads nodded all around the room.

The group had recently explained that until our meeting Expo seemed to be off the table. They had been asked by Mr Thomas, their science teacher, if they were interested in Expo in the first term but had heard nothing about it since. Noluthando, a member of the Cave, had gotten an offer from a few students at Rhodes University to help her and mentor her into participating. She had since lost contact with the students and up until our meeting was okay to let it go.

“Expo is in three weeks’ time, are you guys going to be able to pull that off.” I asked.

Shy smiles spread across the room. Mumbles and the shaking of heads started to take over.

“Yes, Miss T. We are a bright bunch so three weeks will be just fine,” said Sipho. “All you have to do is guide us and we will be able to do it.”

The excitement in his voice aroused the attention of the others that had been mumbling.

“Please, Miss T, how hard could it be?” said Thabo.

At this point, I too was unaware of the work that would need to be put in, but I agreed to help. This was going to be the perfect opportunity for me to do step one of the research, which was scanning the club’s environment and negotiating access to its resources. Surely, we could build a bond this way. We could enter Expo, meet other schools and start to think more deeply about how we could strengthen the Science Cave.

So, we decided to plan. My role was to print the entry forms, category lists and anything else on the website that might be useful. The role of the Science Cavers was to go into the community and find something they cared about enough to explore scientifically. We were aware that for things to function in accordance with our goals we would have to assume some further responsibility to get our meetings to work well. We soon delegated some tasks to

various members of the Cave. With the excitement of having something to work towards we ended our meeting and agreed to meet the following week.

A lot took place in that week. More and more excitement formed in the members of the club. One member, Asavela was able to write about what he cares about and come up with a scientific innovation that would be his Expo project. Another member had reminded the Principal to put Science Cave down as an official extra mural activity. Another had spoken to Mrs Richard about officially booking the classroom, so we were free to do our science-related activities in her class every Monday afternoon without question or interference. Another member organized that the names of the science cavers were given to the women giving out lunch after school.

When we met the following week, things were more organized. “Miss T, we have gotten Mrs Klaas to put the Science Cave down as an extra mural activity,” said Thabo. “We sometimes forget what we are doing after school and this way we can be reminded at assembly.”

The rest mumbled and gestured in agreement while taking out their silver science diaries each with their name on it.

*The diary is a tool I thought would establish a formal group identity and membership. They were used for writing ideas, feelings and anything related to the process. The cavers were aware that they could use the books to communicate ideas to me or just keep note of what was going on. Part of C4D is that the participants move from being participants to co-researchers and the diaries were my way of getting these participants to generate data. I also kept a Science Cave diary. Each was covered using silver wrapping paper with the name of the owner typed out on the front of the book.*

We started talking about the categories in the science expo, and the real-world problems that the cavers sought to fix with their ideas and inventions. Only Asavela, who had attended expo the previous year was aware of how to set up his research attempt. We googled expo on my phone and found some pictures online that helped us sort the information we were trying to ascertain. By the end of the session, it was almost clear what each duo of cavers, and Asavela working alone, were going to attempt to achieve with the Eskom Expo only three weeks away.

With the Expo only two weeks away the group met on Monday again. In this meeting the different groups were supposed to present their projects ideas, the materials they needed and the procedure they would undertake to make and test the project models.

“So, who wants to go first,” I asked the group. My question was followed by silence and then some nervous laughing. “What’s wrong guys, since when are you shy?” I continued in an attempt to encourage some volunteers.

Nthando put up her hand and said, “It’s just that we don’t know exactly what the scientific process is. How can we present our projects?”

This question caught me by surprise. I had just assumed that these grade 10 learners were aware of experiments and why they take place and what they are aimed at achieving.

Before I could say anything in response, Thabo got up from his seat and walked over to the chalk board.

“I can’t tell you exactly what the scientific process is, but I can tell you about an experiment I saw once that was really awesome,” he said.

The group was now listening intently, hoping that this was the piece of information they needed to make sense of all the information they had gathered.

“So, does water have feelings?” he asked making sure to take a break and give the group a chance to respond. After some laughs and a few cavers shouting no, he continued:

“I watched a show on TV about these scientists who were trying to find out if water has feelings. What they did was they got two glasses of water. Both glasses were in the same kind of glass and they were the same temperature. Then they separated the glasses and spoke kind words to the one glass and mean words to the other. They then froze the two glasses to see if the words had different effects.”

Thabo then paused again to allow the group to react to what he had said. After a moment he continued. “So, the glass that the scientists said kind words to, had formed beautiful crystals and the other one had no crystals. So basically, they proved that water has feelings.”

Although these “experiments” have been criticised by scientists, there was a lot of value in Thabo’s example to the group. He put down the chalk and went back to his seat. I took the opportunity to ask the group if they understood what Thabo had said and together, we worked out what the hypothesis, the big question, the dependent and independent variables and the

method was. Once we had done this, the caver's saw the relation of the experiments to their own expo ideas and were able to present their ideas. As a group, we had discussed language use in the club and the policy was for members to speak in the language that allowed them to express themselves the best. This meant that codeswitching was a regular element to our communication with complex scientific terms staying in English but their explanations and examples being explained using both isiXhosa and English.

We ended the meeting by deciding that we were all tasked to collect the recycled materials needed for the different projects and be on the lookout for video's and news reports etc. that related to the projects. Because of the socio-economic backgrounds of most of the cavers, using recycled materials to make their models was the most financially convenient thing to do but this sparked an interest in environmental sustainability and recycling which was a theme they all expanded on in their Eskom Expo ideas. My responsibilities for that week included typing the written work for the cavers and being on the lookout for people who would be willing to sponsor some of the materials that needed to be bought for the models.

The cavers have computers at school that work very slowly. These computers usually have no connection to the internet and are available only on some afternoon's afterschool. Because the cavers felt that they could not rely on the school computers they would write their work out in their Science Cave notebooks and give the books to me to type and print the work for them using the University's labs. This proved to be a time consuming and difficult task but meant that in the end they would have presentable files and posters for the expo and that their work would be judged based on merit rather than its presentation.

After meeting with the Science Cave and hearing their ideas, I began to liaise with the Scifest Africa Outreach officer about the cavers' plans. The contact was in the form of emails sent between myself and the outreach officer. After establishing contact, I emailed the project ideas to the officer and he and his team edited some of the work and gave recommendations on some of the changes that the learners could make to make their projects better. This was very useful because the Cavers had not built their models yet and could factor in the changes on the model-building day that would take place on the Saturday.

## Finding help from interested stakeholders

The group agreed to meet on Saturday 28 July 2018. This meeting was aimed at giving the cavers a chance to work on their project models. At this point, there were five projects in total that were going to be entered into the science expo. In order for the day to take place, we

needed a venue, we needed transport, and some of the resources to build the projects. Due to the last-minute nature of the process, it was difficult to get sponsors to support the group on the day. I ended up providing the transport (with help from Mishka Wazar), the food and the resources and we used a seminar room in the journalism department to work. During this process, I was fortunate enough to have two of my friends, Laurence Stewart and Tsholofelo Sepotokele, helping the learners with the making of the models for the science expo.

The venue was very useful to use because the cavers had access to a computer with internet access where some groups searched for videos and resources that helped them build their models. There were plugs for some cavers to charge their phones. And, because Laurence and Tsholofelo had connections to the WiFi network, Eduroam, they were able to download videos for each group to put on their phones to take home for offline use. This space also helped a few groups with research on the materials that were used for their project models. Although the cavers had an 'unlimited' supply of internet and information, the availability of devices to connect on the internet meant that they took turns using the phones available and the computer to gather the necessary information for their projects.

Tsholofelo and Laurence went from pair to pair asking them about their projects in order to help the cavers communicate better what they were attempting to do. They made sure to ask important questions that could help the cavers flesh out their ideas. They contributed to the ideas and sometimes used their own equipment to help do the necessary research to understand parts of the cavers' projects. They would go around encouraging the work and showing interest even in the smallest developments. They downloaded videos on their devices and used Share-it and Bluetooth applications to send it to the phones of the cavers. They took pictures of the step-by-step processes. They ate alongside the cavers, taking a much-needed food and juice break where they asked personal questions about the interests and aspirations of the cavers. They made jokes and laughed at those shared with them. Without them actually realising it, they contributed to the trust that they cavers had in me.

At the time of this process Laurence Stewart was a third year Bachelor of Arts Student and Tsholofelo Sepotekele was doing her honours in Media Studies. Our collective lack of scientific experience worked in our favour because we focused more on asking questions rather than explaining scientific concepts. The cavers were encouraged to try to research for understanding because they could not rely on us to tell them what to do. We did guide them

when it was necessary, but the understanding was that they were the ones attempting to get us to understand rather than we attempt to get them to understand their work.

After planning and typing, transporting and printing, encouraging and purchasing; my energies had been depleting. The help from Tsholofelo and Laurence, played a significant role in perception the cavers had of my research as well as the research the cavers were doing.

The day was long and tiring so the agreement after the models were made was that we would use our Monday meeting time to test the models, record the results and the remaining few days for the final write-ups.

On the Monday, before heading over to the school to meet with the cavers, I visited Dr Rosa Klein at the Rhodes University Chemistry Department. With her help, I was able to borrow a thermometer for one of the projects. When we met later that afternoon, the cavers and I tested some of the models.

On this day, we had difficulty with the testing of two models. Both models were built in an attempt to find a way to filter water cheaply as a response to Grahamstown's dire water quality situation. Unfortunately, after asking for help from a variety of stakeholders, Scifest Africa and Rhodes University to name a few, the two groups were unable to acquire water testing kits to establish if, in fact, their water filters were the cheapest and most effective filters made from recycled materials. Both groups did comparative studies and used the comparisons to other filters for their data analysis but ended up having inconclusive results for the quality of the water.

That week proved to be a difficult week. By now, the five projects were made, but the write ups were still undone or unfinished. The work began to take a toll on the cavers. For one member the amount of work it took to do the scientific experimentation was too much on top of her work for school. On the Tuesday, I received the following message from her:

> "Thandi,
>
> I don't think I will be able to finish by Thursday because I have an assignment, two English essays and an oral to prepare. I am very sorry. I feel like I disappointed you because you also worked very hard. I didn't expect this week to be so busy."

My response to this was as follows:

> "No, no, no! Please don't feel bad. Like I said, it's just about being honest with yourself and that is what you are doing. I am proud of you for trying and even more

proud of you for being honest with yourself about your time and priorities. Good luck with your assignments and please make sure you take care of yourself."

*The process had been long and tiring so one would be disappointed if members of the group were to all decide they would not attempt to attend the science expo. If only one member of the cave attends the science expo, then it is okay. Gaining access to that kind of environment can be done by all the members if there is a representative; they can watch in the space to begin to see themselves as belonging to spaces such as these.*

Before the expo, we had one consultation with the Scifest outreach officer for final touch ups. We planned to meet at the caver's school where I would transport the learners from the school to the University, where the Expo was held.

## Attending the Eskom Expo

### (4 August 2018)

After frantically printing the projects with their last-minute touch-ups and heading to the venue, I disappeared into the background and let the cavers do what they came there to do. Of the 10 members of the club, six members entered as young scientists with four projects. The six were split into two group projects and two members working alone. Three other members attended the science Expo as visitors, and they supported their club-mates.

The day had started off too busy for me not to notice that I was no longer needed when the actual expo was underway. I had woken up early and fetched all the participating members of the science cave from their school. Together we made final changes to their posters and printed them before going to the Chemistry Department where they registered and found their boards and started putting their posters up. What started off as a frantic moment filled with mixed up papers, messy ink and paper jams ended up being a proud moment for me. As I walked around, I saw the cavers talking proudly about the work they had done in the previous weeks, I saw their own pride and sense of triumph just for being able to attend the Expo. Every now and then, I saw members of their school and other local schools notice their work and show interest and enthusiasm about their ideas.

Through their participation the cavers gained access to a world of science where the scientists are young people from different parts of the Eastern Cape. They saw learners from similar and different socio-economic backgrounds in the different halls, sharing ideas, laughs and interest in one another. They gained access to different science ideas and presentations based on scientific experimentation. Every now and then, I would walk past them and I would hear

the members announce that they had worked with other members of the Science Cave to make this and that project possible. It filled me with excitement and joy knowing that the members of the cave were starting to talk about the cave and its activities in wider publics outside of our Science Cave meetings.

The Cavers entered the following projects into the science fair:

- The thermodynamic flask: a comparative study aimed at finding the best insulators for flask made from recycled materials found in the household.
- The Aquifer tank: an innovation aimed at collecting, storing and pumping rain water for draught stricken areas.
- The h20 purifier: an innovation aimed at purifying water with a cheap home-made innovation.
- The DIY water filtration system: a comparative study to prove that this water system is the fastest, cheapest and most effective water filter available for lower income homes.

For me this was enough, I told them that they had done and achieved so much by just participating. I explained to them that they had enough to be proud of and should not worry about the prize-giving ceremony. My worry was that they would compare themselves to the other learners who had received more support from their teachers and financial support from their households to gain access to the resources that made their work as in-depth and interesting as it was. This worry is one I tried to always hide from the Cavers, but it made me constantly remind them that they had worked hard and put in their all and had that and so much more to be proud of. Although this worry continued consistently throughout the day, it was quelled by the expressions and pride that the Science Cavers who were not participating had. The day was beautiful, and it was only going to get better.

As I sat in the chemistry minor lecture theatre waiting to take pictures for the prize giving ceremony, a member of the organizing committee came up behind me and asked me to point her to Asavela. My heart skipped a beat. I was aware from my previous experience at the Science Expo that the top five young scientists were always notified before the ceremony began so they could prepare to give short presentations about their work. Shortly after, the woman whispered something into Asavela's ear, we were told to move outside for the group photo.

My heart was still pounding, I wanted to find Asavela, to congratulate him and tell him not to worry about the crowd. This proved to be very difficult. The group photo was taken, and we all moved back towards the lecture theatre.

Just as I was going in I heard Asavela call my name.

“They told me to go fetch my board,” he said nervously. He had a look of disbelief on his face. He was talking to me but glaring into the distance. “I’m scared,” he said while watching the rest of the learners move into the lecture theatre. “I didn’t think I would have to present. There are so many people.”

I tried to reassure him that he had already done the hardest part and that he should think of the presentation as an opportunity to share his work that with the rest of the people at the science fair. This did nothing to calm his nerves. Still glaring into the distance, he walked in and waited for the ceremony to begin.

I sat in the front row ready to take pictures of the science cavers. Just then, I saw their principal armed with her own camera and ready to proudly take photos of her achieving ambassadors. Her arrival stirred excitement, not only in myself but in the rest of the Science Cavers hoping to be seen for exactly what they say they are, “young teens with the potential to change the world”.

The ceremony began. First Asavela received a one-year fully-funded bursary to Rhodes University, for his first year for the Aquifer tank. Then Sipho received an innovation award of R2000 for the H2O purifier. Then the first duo (Thabo and Siviwe), received a bronze medal for the DIY filtration system and the second duo (Nthando and Sinethemba) received a silver medal the thermodynamic flask. Following achievement after achievement the cavers walked to the stage and stood proudly in their uniform reaping the rewards of their hard work.

To top off all the achievements received by the Cavers, all but one of the projects were chosen for the next round of interviews to stand a chance to represent the Eastern Cape at the International Science Fair in Johannesburg later in the year. It was a beautiful moment. I found myself struggling to hold back a few tears. These learners who had confided in me and told me they were shy and sometimes scared to share their ideas were being rewarded for sharing in the best ways possible. They gained access to something magnificent that day, they

gained access to the pride of being celebrated for hard work and enthusiasm and this was bound to make its mark.

When it was time for Asavela to speak, we were reminded of our realities and the lines that separate us. He stood there and stared at the crowd. In the rush to get to the stage he had left his magnificent model at his seat and I now held it waiting for a cue to rush on stage and give it to him to show the rest of the crowd.

“I… my… eish,” Asavela said as he stumbled for the words to talk about his scientific innovation. This went on for another minute before the organisers told him he could speak in his mother tongue, isiXhosa if he would have an easier experience of talking about his work.

At that moment he received his model and was then able to give his presentation while codeswitching whenever he needed to. Although still nervous, he spoke to the crowd and explained to them that the idea had been inspired by Makhanda’s dire water situation and he was hoping that this innovation could be used by households or even taken up by the municipality to capture and store water. The idea was brilliant, but the panel of judges did not have any isiXhosa mother tongue speakers in it. So, Asavela, feeling more confident about speaking, switched back to English and said as much as he could about his work. This simplified his work to the phrases he could recall and use, while nervous, and thinking of all that had happened that day. The others presented. Of the top five he came fifth, one thing we had not prepared for was something that affects many second language English speakers, we had not prepared for language barrier problems and the intimidation that came with being expected to be fluent in English.

## Reflections from negotiating access to our environment

This cycle placed me in a good position with the Science Cavers’ principal and science teacher. This meant they understood that I had the best intentions with my research, and I hoped to use this to build the kind of relationship with them that would allow them to continue to encourage action from the Cave after my research participation was over. My role as a facilitator in this cycle was to encourage action, to ask what the group wanted to achieve and to try my best to help them do it.

While the research was focused mainly on their ability to encourage themselves and find the means to achieve the goals, the first cycle was aimed at showing them it can be done. In

future steps I would step back and facilitate the process in a way that meant they would be the ones solely doing the acting.

Action up to this date

*The cave has participated and acted in the process in various ways. On 22 June 2018, the learners finish their exams and express an interest in continuing with the consultations in the third term. I take this as their first intention to participate. Doing expo through the Science Cave means that they can (and did) use each other as important resources and support building a strong bond through intra-group communication. This is important because this is something, they continuously talk about but are not given the platform to do in the classroom. I am made aware that this is something I should encourage that we pursue.*

*When we talked about why the group wanted to join expo, some of the answers included that they wanted to get to see other projects, they wanted to get to meet other young people interested in science, they were looking forward to the learning process, and that they want to do something outside of their box. They express that all they need is to be trusted and they will work really hard to make sure it is worth the effort. They have always wanted to do the Eskom Expo but do not have enough information about what it actually is.*

*The sources of information include one science cavers' communication with a Rhodes Student mentor from RUCE: one caver's experience from attending the previous year and our interactions together.*

*The Science Cavers explain that their teacher mentioned it once in the first term and asked them again in the second term, if anyone is going to participate this year. They did not respond as they were aware that they did not know enough about the expo.*

*We make a verbal agreement that if they put in 100% to ensure they participate, I will do my best to help them secure the resources we will need. Everyone participates and those that can explain some of the intricate scientific specifics volunteer the information. This is the first point where we see the group working towards something. The meetings become rich and interesting.*

*The members that did not end up participating in the expo (and were not confident that they would complete their projects on time) attend every Science Cave meeting. Even the meetings where the focus is mainly about getting ready for the expo are attended. This is another indication about the desire to participate. These cavers are always very helpful. They offer*

*their phones to those doing research, they offer a hand when the models are being made and they offer motivation when their fellow cavers are tired and feeling like giving up. These cavers play an intricate role in the process leading to the Expo. They all attend the Expo and cheer their fellow cavers on.*

After this cycle, four members of the club are going to Johannesburg to attend the International Science Expo. This presented a challenge now for me as a facilitator during the intervention. The challenge is to continue to work towards the group's goals and find a mediated way to record this to share with a community of peers after so much success in the beginning stages.

After the Expo, the club has received a lot of attention from other learners at Ntsika Secondary School, as well as other schools. These learners express that they were proud of one of the members for winning a Rhodes University bursary for his first academic year. This shows that this cycle created an ideal opportunity for the club to show others what they were up to and how they managed to do their actions, in an attempt to reach out to:

- Likeminded peers and others looking for inspiration;
- Community stakeholders interested in playing a role in the club;
- Organisations that can help the club take care of its basic needs and foster an environment for growth and learning;
- Other interesting clubs doing something in the community.

The Science Cave's participation and success at the Eskom Expo laid a great foundation for cycle two in the research process.

# *Science Cave* as a bridge to endless possibilities

After the Eskom Expo we all had a renewed sense of hope about what could come of the Science Cave. Even though the previous weeks had been difficult and tiring on top of all our other academic responsibilities we saw that commitment meant results and results meant that the teachers, the principal and other stakeholders who now knew about the Science Cave were now watching closely to see what could happen next. We were faced with the challenge of continuing without the purpose of an international science fair dictating the level of commitment we had. It had to come from us now.

As we entered Mrs Richards's classroom, I counted the group and there were nine members eagerly finding seats and taking out their notebooks. Members would miss meetings from time to time, so there was no reason to worry that not all the members were in attendance.

I sat quietly as the group laughed and chatted about the day's activities. After a few minutes, they quieted down and started speaking about the past weekend.

"It was so cool to see projects from so many other schools, it was like so amazing to see what young people can achieve!" said Noluthando. She had attended the expo as a visitor and had spent the most time exploring the halls to see what the young scientists had to offer.

"Yoh, it's so amazing that one of our very own cavers got a bursary," said Sipho enthusiastically. "What is next Miss T? I also want a bursary."

This question caught me off guard. Although I had been a factor in all of their achievements over the weekend, I did not believe I was responsible for the rewards they received for their hard work. All I had to offer was support guided by my research project and that sounded far less appealing than a R2000 cash prize or a one-year bursary at Rhodes University.

Sipho's question had not gone unnoticed. He had stirred up interest from the rest of the group. After laughing and chatting about the possibilities they turned to me and waited for me to tell them what they could gain access to next.

I laughed shyly, hoping to hide the fear of dishing out empty promises. "Mhhhmmmm, what's next! Good question guys." I said while trying to find the right words. "Well, I think I should be asking you what is next – my role is just to facilitate your process using the theories of my research, not make decisions for you."

"We can discuss where we are in terms of the research, but you would have to tell me what you would like to achieve in order for us to figure out what is next."

Thabo raised his hands and looked around before asking his question. "Miss T, what exactly is your research about? We have talked about it but maybe it would be nice for you to explain it again just, so it can help jog our memories."

"Ahhh, thank you for asking," I said. "Basically, the research is titled, *a communication for development project aimed at enhancing communication, action and learning within a learner led Grade 10 science club in a public school in Makhanda.*

“You are the school and the Science Cave is learner-led. All my research is trying to do is to help you guys communicate better in a variety of different ways to a variety of different people and act and learn according to goals you set for yourselves.

“The research is done in four cycles that are related to a theory called *Communication for Development.*

“Cycle 1 was negotiating access to your environment. The expo helped us do that because we got to work with different Stakeholders like, Ta Sbusiso (Scifest Outreach Officer), your principal, my friends that helped with the projects and all the people you met, talked to and will keep in contact with after the Expo.

“Cycle 2 and 3 is what we will do next. In this cycle we co-design two strategies. The first one is a strategy for sustainability and that is basically how will the club continue when I have left. The second one is a media strategy, which is how can we share what we have been up to, with people interested in the Science Cave.

“Cycle 4 is basically when I withdraw and see what you guys can do without me around. We can decide what we want to do for this cycle, and we will use cycle 5, to reflect on the process and talk about what we have learnt. I will help with that by interviewing everyone so there is not too much pressure about saying the right thing.”

It was quite a mouthful, but it was important that they understood. So, I continued. “The important thing is that it is learner-led, so if I step over the line and start leading you guys, which I will try very hard not to, you have to tell me that this is your science club and you want things to work the way you have planned for them. So, it is really up to you.”

The cavers laughed and mumbled to each other.

“Why is it important that this club is learner-led?” I asked.

“This helps with the expression of ideas, Miss T,” said Sipho. “When you have a scary teacher leading the group, you will just want to keep to yourself. Like for example Asavela, he likes to play a lot and we, as learners know him and understand that he likes to play. We will still listen to him because we know he can have good ideas even though he plays a lot, an older person wouldn’t understand that.”

“Just to add on to what Sipho said, we teenagers can relate to each other and what we prefer, and adults don’t usually look at preferences. They usually look at ‘is it going to work?’ said Thabo.

“It will help us to communicate with each other, because I am not that person who likes to speak that much but here, I have that belief that this is my group and they will understand me and I can speak without any fear,” said Nthando.

“Here we get to work together and support each other and make sure that everybody succeeds, we help each other to gain the confidence to speak in front of a big crowd. Like my friend Asavela did not want to speak at Expo but when he is here, he is able to speak and we can encourage him so that the fear in front of big crowds goes away,” said Sinethemba.

This was a very important discussion to have. To begin to discuss what a sustainable learner-led science club was about, we needed to establish why it was so important. The cavers expressed that it was the communicative freedom of the club that made it different to any other club that had adult involvement.

Before the meeting came to an end, we briefly discussed some goals the Science Cave would have liked to achieve by the end of the year. They expressed interest in the environment and wanted to do some tree planting to restore the environment. They explained that having access to the internet was an important factor and would like to investigate why the school did not have access to the internet or Wi-Fi to help the learners. They also discussed organising themselves as a study group to help each other prepare for the end of the year exams *(this later was turned into our cycle 4)*. They wanted to go on one field trip, and even joked that a scientifically-guided trip to the botanical gardens would do.

We ended the meeting by agreeing to meet at the Joza Youth Hub that week Saturday to have a meeting about using the Hub as an official Science cave venue as well as do part one of Cycle 2 which was to plan for the club’s sustainability.

## Sustaining the cave

Cycle one had done its part in integrating me into the Science Cave. When speaking about the club I was starting to refer to everyone in the club as ‘we’ and talk about ‘our’ actions and ‘our’ achievements. We were on track and the more I realised this, the more I got attached to being the one and only honorary member of this club. This was bound to change in cycle two, so I enjoyed it while it lasted. In preparation for the cycle, I met with Rhodes University

Community Engagement's (RUCE) Kim Weaver and Joana Bezerra about the sustainability of the science club after my intervention.

Having worked with many community engagement projects, these women were an important starting point to turn to for the sustainability of the Science Cave. I had come to hear about their work at a conference I attended earlier in the year. At the conference, the topic of science clubs was raised and the facilitators of the various science clubs in and around Grahamstown spoke of the nature of commitment learners in the clubs had. They said that the learners had difficulty committing to clubs and attending weekly meetings because the clubs were being run by teachers and adults rather than the learners themselves. They expressed that a learner-led science club would be the ideal because the learners would have incentive to stay committed. I remember sitting in one end of the lecture hall with my supervisor in the other end. At that moment, we exchanged looks and shared the moment of validation the speakers were giving to the research attempt.

I emailed the women and they both expressed interest in having a meeting. When we met, I was very nervous. As a student in the Journalism Department, I had felt time and time again, that I had no place attempting research linked to science or education. But, here I was, talking to the professionals about having tried to guide the science club.

Kim Weaver had attended the Science Expo and she was aware of the Science Caver's achievements. I felt more validated in my research attempt by the Caver's achievements thus far because I could always argue that even though I am a journalism student, our interactions were still fruitful. This was a personal insecurity and I never received any real challenges because of my educational background, but seeking help outside of my supervisor was a lot easier to do when I started to believe I was the right person to help the Science Cave.

The meeting began with me explaining our cycle one. I explained that we would be having an important strategizing meeting and we would need some help in terms of planning for a sustainable science club.

"So, which teacher helps you with your activities," Kim asked.

There was no real answer to her question. I tried to explain that the cavers have tried to do it on their own and while we have teachers who are aware of their activities, there was no formal interaction between any teacher and the Cave.

Kim and Joana seemed to understand where the learners were coming from but insisted that for a sustainable club, I would have to help them plan for what would come after I leave. They explained that the learners could nominate a teacher to help keep their calendar and club documents and that both Kim and Joana could organise an outside facilitator who could do a job similar to mine in the year to come.

Although I had grown attached to the Science Cave and was concerned about anyone else's involvement as a facilitator, I could see how it would be beneficial to have someone in that role to keep the club connected to various stakeholders outside of the school environment.

My role had been more than just a researcher, as a facilitator, I helped the cave build their calendar. I was contacted by various people interested in hosting the Science Cave and would help the Caver's organise themselves to attend and contribute to these meetings. I understood why it would be beneficial to have a link to someone with a few connections to various events in and around town to keep the club active and learning.

As the meeting ended with Kim and Joana, I thought it would be a great idea to ask the Cavers which teacher they preferred and what the role of the facilitator would be in their own words. That way they would understand that they had the right to decide what was best for the future of their club.

## The big meeting (Co-designing a sustainability strategy)

### (25 August 2018)

The morning was a big rush. I had to ensure that I organised a meal for the day, some juice and some baked goods to eat during intervals. After sorting out the snacks, I printed the programme for the big meeting. This was a meeting we had all been waiting for. We had already started talking about some of the goals of the Science Cave, but this was the official meeting where decisions would be made and we would make our first contact with outside stakeholders.

The first stakeholder, Mr Rod Amner, was to meet us at the Joza Youth Hub and talk to us about us possibly using the Hub as a venue for club activities.

Although the Joza Youth Hub provides township communities - mostly schools - with access to an integrated array of education, communication and IT training services, clubs like the Science Cave are encouraged to book and use the space for youth development and educational needs.

To the learners of the Science Cave this would be the first time they introduce the cave to an outsider. Meeting Rod was the perfect opportunity for them to do this because as my supervisor, he knew enough about the Cave, how to appeal to their interests as well as offer them the chance to engage with outsiders.

We had agreed to meet at the Joza Youth Hub at 10h00. Rod and I arrived early to set up the environment. I organised some chairs in a circle so we could all talk to each other with no real hierarchy of voice, especially now that the cave was meeting someone new. On each chair, I placed a program and Rod placed a copy of the week's Grocotts Mail newspaper. I organised the camera and set up a refreshment station before sitting down and waiting for the group to arrive.

As we waited, I began to feel very nervous that they would not arrive. Part of my fear was that, because I had told Rod of every step of my research, he expected to see young, vibrant Cavers eager to do things in the world but whether he saw that depended heavily on if they arrived or not. We waited patiently without saying much for the first half-an-hour that no one arrived. Every now and then he would take a call and I would refresh my Whatsapp and Facebook to see if there were any new messages from the group. Shortly after 10H30 three members of the cave came.

I was relieved, three out of 10 is not great but it is better than nothing. The five of us waited for another half an hour for the rest of the members to arrive and after only two came in we decided to begin the meeting.

In the meeting, we went around in the circle, telling each other our names and interests. After the introductions, the group split up and came up with short presentations to tell each other and our visitor, who the science cave is and what the Science cave is about.

"We are the Science Cave, a group of 10 innovative learners with the potential of making the world a better place," said Thabo who chose to present alongside Nthando. Once he was done, he got a disgruntled look from Nthando who then shouted that he had said all of the cool things about the Cave.

Next to present was Siviwe and Zuko they explained that the group had started the Science Cave to have a community of school learners who motivate each other to be more courageous and communicative about science. "We also tend to push each other to try and learn and

achieve more," added Nthando, after seeing there was something the other speakers had not added.

The group had gotten used to talking in front of me but it took some time before they were fully expressive with Rod in the room. Rod, who was aware of the possible power relationship that was directly related to his age and race, took the opportunity to share his interests in the voices of young people. He talked about his position on the board of the youth hub and the potential relationship that could exist between the Science cave and the Joza Youth Hub.

Earlier that morning, I had asked Rod if he could explain what a communicative ecology is to the cave. In order to achieve anything in cycle two, the cave would have to map out their communicative ecologies and see who they were connected to in what ways, in order to use that connection to the benefit of the cave.

"Do you guys know what an ecology is?" Rod asked.

The group looked at him with no response.

"Have you ever heard the word before?" he continued after seeing that no one had any clue what he was talking about.

"No sir," Thabo said.

"Do you know it in relation to science or the environment?" Rod asked the blank audience.

He soon changed his line of communication and told a very interesting story.

"Do you know of Addo Elephant Park?" he asked.

The eyes of the cavers lit up, but no one had heard of the park, so Rod continued.

"Before there was an elephant park, there were many, many elephants that used to roam the Eastern Cape. That all changed when the white settlers came and started killing the elephants one by one. It got so bad that the population of the elephants went from thousands to only a few. This began to effect the ecology of the land because the elephants were an important part of the natural cycle. So, some environmental scientists decided to build the Addo elephant Park, where the elephants would be protected from poachers and killers. This was their attempt to gain back the population of elephants so they do not go extinct."

The group seemed to have enjoyed the story. This example also brought them closer to understanding what an ecology was.

“So the Addo elephant park is now the elephants’ ecology. The way they interact with each other and their environment is their ecology.”

The cavers nodded with interest and anticipation for what was to come next.

“Your communicative ecology would then be the environment you are in and the flows of communication that take place within those environments. Every kind of communication you have access to is part of your ecology and the people you communicate with are too. The devices you use are also part of your ecology. The kinds of things you talk about, including themes and topics are all part of this interesting ecology.”

Rod paused to let this concept sink in.

“So does understanding our communicative ecologies mean that we will know how to use them to benefit the club?” Thabo asked enthusiastically.

“Yes, for instance this Youth Hub, it is for young people like you. People with an interest in the world, people who have come together and formed a science club. The facilities have a variety of resources, there is a lab with an internet connection and lots of learner support materials but the hub is not open simply because we cannot afford to pay someone to run it on weekends.

“This place is a part of your ecology and understanding that means you can make the necessary communications to be able to have access to a space like this. The board just needs to see what you are up to, what you are interested in and that you can actually use the space. It’s for you and clubs like yours, where young people are taking initiative and making decisions about their learning and their interests.”

## Planning for the Hub

The cavers were quite moved by the confidence and passion Rod had expressed with regards the cave. When he asked what plans they had for the Youth Hub, they had to take a moment to think and plan things to ensure that their voices would be heard.

We took a break while the group brainstormed ways they could use the youth hub. After a very enthusing talk from Rod, the cavers got very intensely interested in the idea of being the ones that make all of the decisions. Rod excused himself and I was asked to leave while the

group used their planning diary to write down everyone's contributions. Only having five members attending the meeting made it difficult for the group as they wanted to only make decisions that everyone would agree with. The group decided they would put down some options and use the beginning parts of the Monday meeting to make final decisions.

It was the first time I was asked to leave while the group discussed and planned for the future. While this made me curious to know what went on in my absence, I was thrilled about the Cavers' planning without me present. Their sustainability had nothing to do with me, I was only just a resource in a long line of resources that would eventually help them attain the goals they would set for themselves.

When we finally reconvened after their session of planning the group expressed that they would be interested in using the Youth Hub on Saturday mornings and afternoons. During this time, they would make use of the labs to do research for schoolwork. They also hoped to use the labs to download resources that would help them with their exams and sometimes just to connect to social media like Facebook and twitter. They even considered using the hall one Saturday a month to screen a science movie for the cave and everyone interested in science to enjoy.

The group expressed that they want to have an online presence. They wanted to share their achievements and ideas with the world and they also wanted a way to communicate with possible funders, and stakeholders like Rod. They also expressed interest in doing more media related things that appeal to their communities.

## Getting connected

Once all of the planning was done, we moved into the labs where three members grabbed a computer to fulfil different functions that had been discussed in the goal setting meeting. Nthando began by creating an email address for the Science Cave. Sive made a Facebook page for the Science Cave. Thabo collected all of our numbers and created a Whatsapp group for the Science Cave. Lutho, went on Facebook and updated his status while waiting for a link to the official page that he planned to share with all of his friends.

Although the Facebook page was created, the cavers did not upload all of their pictures because they did not have them at the time of making the page.

That day we managed to email two potential stakeholders; Rod Amner, about using the youth hub as a work space, and Julian Jacobs about possibly sponsoring our transport needs.

The day ended very positively with part of the group's vision and mission articulated on the planning diary.

On our way out of the youth hub, Nthando approached me and asked if we could focus on some journalism-related activities in the next meeting. Although I was very excited, I calmly told her to write her ideas down in her diary and we would discuss them with the group on the Monday.

Ahead of our Monday meeting, I typed the plans that had been written in the plan book into an official document for the cavers. There were a few things that were still left blank that the group had chosen to discuss with the rest of the members present. For these I created big blocks where the cavers would write their suggestions and ideas. I also created a block where they could write a teacher they preferred and what the role of that teacher would be and did the same for the position of the person who would be in my place in the following year. I printed five of these documents with the aim of having the caver's fill them in, in groups of two then share their ideas with the group.

As we walked into Mrs Richard's, classroom I counted seven Science Cavers. This was more than on Saturday but only three members who had been there on Saturday were at the Monday meeting. We continued with club activities, with the groups working together to finish the clubs official document.

Once done with the document, I told the cavers that they had been invited to a Rise for Climate Change event that would take place in two weeks. I explained that the organizers had taken interest in the group and they were wondering if the group would like to do a presentation or debate at the event.

After the science expo, the club mentioned that they would be interested in things to do with the environment and possibly planting a tree at their school. When a friend of mine, Thandiwe Matyobeni, told me she was hosting an event for the Rise for Climate Change campaign and needed possible help with the event planning, I thought it would be a great opportunity for the cavers to get access to an event about climate change and possibly share some of their own thoughts on the matter. Thandiwe is a member of a student group organised to support and aid the Wastepickers of Grahamstown. She had planned climate change conversations in the past but they had only been attended by the Waste pickers and University lecturers and students.. She asked other members in the group (of which I am a part) if we could help reach more people to ensure the event is affective. She then planned the

event, and I offered ideas about some of the activities we could do on the day. I asked her if we could get the Science Cave actively involved and she thought it would be a great idea if they got to share their ideas in the form of a debate.

The Cavers seemed to be excited that the world was noticing their work and passion. Nthando took the opportunity to discuss her interest in journalism.

“Would they be okay if we maybe did some kind of journalism and presented it at the Climate change event?” she asked enthusiastically.

“Yes,” I said. “You can do anything you would like, just as long as you can link it back to the theme of the event which is climate change.”

The group was immediately taken by the idea of working towards another event. They asked for some time and started brainstorming ideas of the aspects of journalism they were interested in the most.

Nthando was the first to speak. “I would like to do a video, there is a place in our community where there is a lot of pollution. When the rubbish people don’t fetch the rubbish, members of the community just throw it in that place and when there is wind it blows all over the place.”

“Yes,” Noluthando agreed. “Sometimes the people burn their rubbish but it has a bad effect on the environment.”

The idea kept developing with everyone at the meeting contributing. Two cavers who were interested in writing rather than making videos decided they would do some background research about pollution and the effects of pollution.

With the different roles assigned, I collected the sustainability documents to combine ideas and type the official document and we ended the meeting.

During the week, Nthando recorded different members of her community using her phone and she sent me the clips that I was to arrange together while waiting for voice notes from the other members who had decided to do the voiceovers in the video.

## Overcoming group challenges

This was one of the hardest days during the research process. What had started off as an exciting day soon turned into a day of doubt. It was difficult to reflect on and so I chose to

write in my diary instead. These thoughts, would have not left the diary but as I reflected on the process I realised how important it was for the reader to know of the turmoil just underneath the surface.

I have ignored the dropping numbers for weeks without really getting down to the bottom of the reason for the drop. After the Expo, we did not have even one meeting with all 10 members in attendance. This is worrying but I never fear the worst, not until after this day with only three people in attendance. I feel that all I can do is mourn quietly as the flame starts to go off.

I had spent a few hours trying to get access to the *Science Cave* email account to check their emails before our meeting. This was a temporary solution to the problem of the cavers not having access to the internet. We had sent a few emails on the previous Saturday in an attempt to get resources that would serve as a permanent solution to our internet and other resource needs.

The cave had received an email from Julian Jacobs. It read;

> Dear learners & Thandi,
>
> I will make some contacts available to you. I do however, need you to perhaps provide the possible donor/funder with the following information:
> - Name of your Project/Club
> - Number of members/learners
> - Projects you are involved with – perhaps some pictures would be helpful here
> - A breakdown of your needs – transport costs, venues or school labs, scientific resources, etc.
> - Your goals, vision and why you started your club
> - Branding needs, (t-shirts, caps, stickers,)
> - And any other needs you might have
>
> It is important to create a profile of who you are, what you do and what you intend to do and why it is important for funders to support you.
> Once you have done this, I can have a look at it and send it to my contacts.
> Regards
> Julian A. Jacobs

My excitement was difficult to hide. We had spent the past few weeks co-designing the sustainability strategy and it meant we had figured out most of the details Mr Jacobs needed in order to support the club. The line was on its way to being bridged and our hard work was finally paying off. That day I got extra snacks because I wanted everyone to know it was a day of celebration.

When I arrived at the school I saw five of the 10 cavers hanging around after assembly. Like usual we met downstairs and walked up to the classroom where we waited for the rest of the club to arrive. As I walked up the stairs, I was speaking to two members and did not realise that the others were not following. When we entered the classroom, three cavers sat down and looked at me while I waited for the rest to arrive. No one else came.

I know my feelings were not the reason why I was doing the project but at that moment I felt a lot of hurt. Just as things were beginning to look up for the club and its future, the interest of the caver's was disappearing and I felt hurt because I was starting to believe that no amount of energy and work was going to be enough. Even if participating in the club meant gaining access to interesting prospects and people, it seemed to not be enough rewards for the energy it took to self-organise.

As the three members and I started mapping our ecologies, I could not keep my head up because I didn't want to look at the three in the eyes. I did not want them to see how disappointed I was that the turnout was so bad. I did not want them to see the panic in my eyes while I was fearing that the research was all done in vain. I was afraid that if I showed them my true feelings they too would lose interest in the process and their club would be another interesting but failed attempt at dealing in education.

I was really sad that we could not all celebrate the small victories. That the cave could potentially get sponsors, and that different organisations were taking an interest in the cave and its activities. Another announcement I was going to make that day, was that the cave was invited to a photo walk and biology bash. The editor of *Grocott's Mail* had heard of the group and their interest in science and had invited them to the event to take photos to later enter into the WESSA photo competition.

This was particularly important and significant because the cavers had expressed that they want to go on some kind of field trip. They had even joked about a scientifically led trip to the botanical gardens. This was exactly that and it felt like the perfect opportunity.

The irony of it all was that the club was getting noticed by people in the community and the people wanted to offer the club things, skills, experiences and an opportunity to talk and be listened to but there was no more club participation. The members were probably tired from all the other work they are expected to do. They seemed tired of something, I just did not know what it was. There was also a lack of communication between them and me about why they did not attend meetings anymore.

*As a facilitator, I am put in a very peculiar situation because my role is not to tell them what to do. They make it very clear that they don't want to be told what to do and I understand that. So, therefore, I can't tell them they have to attend meetings. Within the role of the researcher, I know that all I need to do is offer guidance and record the process whether the offer is or is not accepted so I can later analyse it. But, my role as a facilitator makes it really difficult to accept that this is the kind of participation that is taking place.*

*My worry is that after I leave, there won't be a group of enthusiastic people. At this point, I am worried that all the adults that are listening to these learners will think that I am the reason why all of this stuff happened. I don't want that and don't think it's true.*

*I just am really sad and I don't know how to tell them without making them feel guilty or making them feel like I am attacking them. I have put a lot of time and effort into this even when it has hurt me deeply. I have put in so much of myself and the last thing I want to do is make it about me, but I don't know how else to respond to this situation.*

Although the majority of the cavers had opted out of attending the meeting, the three in attendance worked really hard to ensure that the cave stayed on track for the plans of the week. The caver's had been working on a video that would bring awareness to the dumping issues in Extension 6.

When we finished mapping our ecologies, we used the chalk board to work on a story board that would tell the story of the videos that the members had collected. With the *Climate Conversation* only a week away, we needed to find a way for the members to give the rest of the videos to me to put together in the sequence, for the event. We agreed on using WhatsApp as our mode of communication. There, one member would send me a video of another source, and another member would send me the voice over clips that would go with the video. Although the attendance was not that great, the meeting itself turned out to be very good. During the week, I received the different videos and pictures and put them together into a very interesting video for the cavers.

## Project damage control

My subsequent meeting with my supervisor sounded a lot like a cynical take on my diary entry. He had watched me fight really hard to get a swing at making a difference with my research only for me to accept defeat at the first sign of struggle. He never said this to me but his advice led me to the assumption that I had the right to at least let the cavers know how I

was feeling. He told me to be radically proactive and it sparked a fresh enthusiasm for the process.

After the meeting, I began to reflect on why their absence was so hard for me to accept. I had noticed a difference in the interactions between those who would be going on to attend the International Science Fair and those who would stay behind. There was a line created between the cavers and I had been too caught up in fulfilling the research requirements and cycles to actually fundamentally address it.

In the beginning of the research process, all of the members of the science cave believed they were equal. They shared interests and looked to each other for inspiration and motivation. The group that went on to participate in the Science Expo had benefitted from the help and motivation they got from the entire club. After moving to the next stage of their process, they still needed guidance and the space to have motivation and support. This meant that those who would come to meetings for the Science Cave were subject to half a meeting of the Science Cave and half a meeting of the International Science Fair (ISF) preparation. I believe this started taking a toll on the members and they started to lose interest in participating.

Another possibility is that with the added pressure of improving their projects the ISF cavers had a lot more on their plate than that which they had initially bargained for. This with the expectations of their day-to-day activities could have been taking a toll on them.

In later interviews with the members of the cave, I find out that the reason for the drop in attendance is because of the members having a lot of school work and extra mural activities to worry about. One member expresses that there were some learners who felt like the club was mainly focussing on those going to ISF. But, all maintained that they were interested in being a part of the club.

Although my speculations could not fully capture the reason for dwindling interest in club activities, I used the hunch to contact them individually and tell them that I believe they are a valuable contribution to the Science Cave.

That evening I sent this following message to the Science Cave WhatApp group (recording).

“Hey guys, I just wanted to talk to as many of you as possible. I came to the school yesterday and only three people arrived and honestly that made me upset because we are trying to work on something altogether. It’s very important that you guys at least let me know when you are not available so that I also don’t come all the way because it takes time, effort and resources.

If you are not interested anymore it's fine, I am not here to force you to do anything that you don't want to do. But, I have also put in a lot of my time and energy into making sure that if you guys want something, you can get it. I did this because I believe in you guys. I can believe all I want to believe but if you guys don't want to do something then it won't happen.

On Saturday there is a Climate change event at the Youth hub, if you want to come, you are always welcome but you have to let me know so I can help organise transport. And, if you say you are going to do something, you have to either do it or let the other person know that you are unable to. I have believed in you ever since I met you guys, but that can change when you say that you will do something and then you don't do it. I just wanted to let you know that I am proud of you guys for doing this much but you have to let me know if you guys want me to stop pushing because I do not want to force you guys to do something you don't want to do."

After the voice note I asked everyone individually if they would be going to the rise for climate change event and we all agreed to meet on the Thursday to have a discussion about the event and the photo walk.

During the discussion (that nine members attended) the cavers explained that they are still very interested and the club activities. They told me that they were just under a lot of pressure and had recently found out that their exams would be starting the following Wednesday. We agreed that the meetings would pause after the *Climate Conversation* and we would do our final cycle in their fourth Term.

## The rise for climate change meeting

On the day of the Climate Conversation, I went to the RUCE office where transport waited to fetch all those attending the event. It was raining and cold. The event, which was originally being held at the Joza Youth Hub, was moved to the Rhodes Journalism Department at the last minute. The Youth Hub had lost electricity due to a burst fuse box. The transport was then arranged to fetch any attendees who might still go to the Youth Hub because of not seeing the notice of the venue change that had been sent out on the event's Facebook page. This was advantageous for the science cave who ended up being fetched at their school. Nine members climbed into the bus enthusiastically calling their friends who they had invited, to come into the transport. There were 14 people from their school attending the event.

We arrived at the Journalism department just in time to hear a talk about South Africa's climate for the next 50 years. In attendance were some of the waste pickers of Grahamstown, and a few students and lecturers from the University.

During the lecture, I had to go and finalise the catering for the event so I was not able to see how the members were in the space. Upon my return, I found out that two members of the cave, Thabo and Sipho, had won the first and third prize in the debate about climate change. The group was enthusiastic and excited throughout the day. When they were called up to present the video that some members had worked on they introduced the science club to the audience and talked about some of the things they had done as a club. The video was then presented and the cavers got very good feedback from the audience.

Rhodes University lecturer, Mr Shepi Mati, then spoke to me about asking some of the members of the cave if they would like to do an interview on Radio Grahamstown. Five members walked down the stairs wearing smiles that could only translate to a nervous enthusiasm. Once in the studio they sat in a row and listened carefully to instructions they were given by the radio show presenter.

The presenter spoke into the microphone, warmly telling his listeners that he was seated with the Science Cave. "Please introduce yourselves," he said.

"In the Science Cave we are a group of 10 learners who basically make their own decisions in trying to make our environment better," said Thabo confidently. "We are also trying to push each other forward. So basically, we create our very own projects of which Ms Thandi helps us with." Thabo went on to explain that the Science Cave projects are based on helping the community at all times because of trying to achieve their ultimate goal, which is making the world a better place.

Although the others were told to make as little noise as possible, hearing their fellow member talk about the club changed the expressions on their faces from nervous to proud about what they had been getting up to.

The presenter asked a few more questions that each of the members took turns answering. He then asked if the Cavers wanted to add anything to the information they had given.

Lutho cleared his throat ready to answer the question even before the presenter had finished asking it. He seemed sure of what he was going to say. "I would like to encourage people who are doing science subjects or thinking of choosing them; if you have a skill or passion

for science go for it," he said passionately. "There is no time for waiting; there is so much you can do to improve our country."

Zuko added that if there is anyone who wants to join the Science Cave, they were looking for new members so that the club would not have to stop once they got to Grade 12.

*This is the Science Cave's first time communicating to a wider public. They did so through the climate conversation event, during the debate as well as through showing the video they made. The radio interview is an even bigger public and they communicate something we have not discussed in the group up until this point. They tell the listeners that they are looking for members to join the cave. This means they believe young people from their school who might be interested in the Science Cave, are potential listeners and they are speaking directly to them.*

The busy weekend ended on Sunday afternoon, after the Photo Walk and Biology-bash. Most of the members had been exhausted from the Climate Conversation and could not attend the photo walk. Sinethemba and Nthando arrived early and eager for the walk. They took pictures, asked questions and showed interest when being told about some of the interesting trees, insects and plants in the botanical gardens. Once they had taken their photos, they received a short lesson on how to crop and edit their photos and then ushered outside for a scary but interesting snake talk. Sinethemba was nominated as a finalist for one of the photos he took of a beautiful flower in the gardens. He was then invited to the Wessa Photo Competition award evening.

After the busy period we stopped meeting so regularly so that the members of the cave could focus on writing their third term exams. The four heading to the International Science Fair used the time to work on their projects and would contact me to talk, ask for help and ask for support. I met them one afternoon thinking I was to help with their process. The meeting ended up with us sitting in a circle and just talking about how difficult things were and motivating each other to keep going. They knew I was in the process of writing my thesis so they were also trying to motivate me in the process as well. I remember feeling so guilty for having dreaded the meeting a few hours before it took place. I was so worried that I would not be able to help the members with whatever they needed, I didn't consider that they might have been contacting me to check in, talk, vent, and ask for some motivation to get them through their difficult time. I reminded them how valuable they are in our society. I told them that they had worked so hard to get where they were and even if it seems like their hard work

was creating even harder work for them, they should take a break, take care of themselves and try get on top of the work so they could be ready for the international science fair. At the fair Sinethemba and Nthando received a bronze medal and Thabo's project was highly commended.

# Researcher withdraws

In order to understand the significance of the fourth cycle of the intervention the reader needs to go back to cycle two after the science expo when the club was meeting and discussing some plans for the future. Everyone was excited and enthusiastic about what could happen next. When I asked the members what we wanted to achieve by the end of the year, Sipho explained that the club was trying to also develop into a study group.

"When I was at the Expo, I met this other guy who goes to Kingswood, and we talked about collaborating so that we could help each other study," Sipho said enthusiastically. "He said we could have a group with people from different schools coming together and helping each other and they could help us since they have internet and can use it."

It was at that point that Thabo mentioned how he would like to launch an investigation about getting Wifi into the school for the learners to use for educational purposes. The group, excited about "project interconnectivity", quickly moved on to the latest topic and the study group was not explored in more detail. At the end of the meeting when I asked Sipho about the plans he had with the boy from Kingswood, he explained that he would be meeting him on the Wednesday and that is when they would plan the whole initiative. Unfortunately, the meeting never happened and the members of the club got too busy to make concrete plans for their study group.

During the break we had taken, to allow the members a chance to study for their third term exams and prepare for the international science fair, I got to thinking about whether the C4D intervention was complete or not. We had bonded as group, established a group identity, found creative ways to express our interests, connected to like-minded and resourceful stakeholders, as well as connected through ICTs and used digital media to share our process with peers and interested stakeholders. Yet, the process seemed incomplete.

A few days later, in a meeting with my supervisor, I got confirmation that the process, was indeed incomplete. There was never a period of withdrawal by the researcher, to see how the club works without my input. We decided to explore Thabo's initial desire to form a study

group. He had wanted to work with the Kingswood boy because he believed that the boy had access to the internet and therefore access so some study resources. We spoke about offering the club members some resources for their studying and seeing how they would use these resources. We were fortunate enough to get access to four tablets and a variety of study guides that the cavers would share.

What emerged from the interviews done after the cavers had finished their examinations was incredible. Not only had they found creative ways to use the limited resources, they also prioritized sharing and group learning so that even their peers in the classroom would get access to the tablets.

“When I was watching the video, more and more people started to come to me to sit next to me so that they can watch,” said Sipho as he explained his experience. “At that time the teachers were very busy because the grade 12s were starting exams so we had a lot of free periods. I know we cannot just sit in in class and play when we are about to face exams, so I carried the tablet to school, with the History study guide and I shared it with my friends.”

Sipho explained that having access to these videos helped him find new ways to study with his classmates. “You watch and see a question then ask a friend and see where their knowledge is,” he explained. “If they fail we watch again so that they can know and get more knowledge. We watched maybe for 10 minutes then someone takes the tablet then we sit and ask each other questions to see if we have learnt.”

Zuko agrees, and explains that having the videos helped because she was able to learn at her own pace. “Sometimes you don’t get something in class and then when I watch it in the video I’m like, ‘Ahhh okay this is how you do that thing that I didn’t get in class,’” she explained. “Sometimes it is very difficult to ask the teacher to repeat what he was saying so you just watch the video and it helps because you just pause and look at what they were writing, write it down and listen to it again and learn it properly to understand.”

Although I had encouraged all the members to attend the meeting where I was handing out the tablets and study guides, only five people had arrived. The remaining five, found alternative ways to gain access to the resources their peers now had.

“When I found out that the others had gotten tablets and stuff that was downloaded from the internet, I knew that if they could download, I could also get those things that they copied from the youth hub and so I searched the internet for past exam papers and study guides for geography and there would be certain websites that would pop up and I would click and

download," she explained enthusiastically. "I shared the stuff with my friends because they didn't even know you could get that so I sent them those exam papers using Share-it."

I describe this cycle as incredible because my only contribution was helping them gain access to the resources. How they used them, shared them and understood them was based on their own agency. Reflecting on Thabo's initial idea for the study group meant trusting that if he was helped to get the necessary resources to fulfil his goals, he would find creative ways to fulfil them.

This speaks to the entire intervention. I did not meet blank canvases waiting to be painted with fancy development discourse. No, I met 10 interesting individuals with ideas, aspirations and paint brushes of their own. I guided a process to help them find ways to realize their goals and they guided a process to help me realize my own goals. In many ways we were not equal, but in the ways that it mattered the most we were. I trusted the cavers and they trusted me. I used my power when I had to and they used theirs when they had to. Together we learned about ourselves and the community around us. The most significant development that took place was the relationship that formed between myself and the cavers because through that, everything else was made possible.

# Chapter 5: Findings

## Introduction

The concept of communicative ecology has been used in various C4D interventions to emphasize the importance of locating any communication activity within the wider understanding of the diversity of people's lives, their access and use of communicative technologies, and the availability of communication channels to them (Lennie & Tacchi 2013: 48). By exploring the communicative ecologies, one can understand deeply the implications of the research attempt because you are understanding the "wider systems, networks, inter-relationships, boundaries, and other aspects of the context of the intervention" and how these influence the outcomes (Lennie & Tacchi 2013: 27).

## Communicative ecologies

Even though the learners had a communicative ecology before the intervention, including their peers in the science club, their teachers and principal, their peers in their classes, their peers at school and their parents, as outlined in chapter 1, their participation in a C4D intervention with a particular focus on understanding and appropriating communicative ecologies has enriched the communication practices in these ecologies as well as added various new stakeholders and discursive elements to the members' ecologies. In this section, the *technology*, *social* and *discursive* layers will be explored and discussed in an attempt to understand particularly how these layers have been enriched by the C4D intervention. This exploration will be done to understand aspects of the process, themes that arose during the exit interviews, field notes taken during the intervention, and accompanying media produced as part of the process.

### The technological layer

The technological layer consists of communicative interactions, where members of the club are using the technology to get in touch with and communicate with one another and media production and dissemination, where media is being produced and shared with a wider public.

| **Example** | **Medium/Media technology** | **Cycle** |
|---|---|---|
| Intragroup communication | Closed WhatsApp group (cellphones) | Cycle 2-5 |

| | | |
|---|---|---|
| Communication with wider-publics | Facebook group (Using cellphones, Youth Hub computers) | Cycle 2-5 |
| School related research (For expo) | (Internet, youth hub computers, Rhodes university computers, cell phone) | Cycle 1 |
| Expo related research | Grocotts Mail online (using Rhodes Computers and phones) | Cycle 1 |
| New interest in newspaper | Grocotts Mail newspaper (being delivered at school) | Cycle 2-5 |
| Created new email address | Google (on Joza Youth Hub computers) | |
| Phone camera (recording device) | Taken for story telling by cell phone and shared using WhatsApp | Cycle 3 |
| Radio interview | Clip shared on WhatsApp and Facebook | Cycle 3 |
| Accessing tablets | Downloaded educational material and shared it with peers | Cycle 4 |
| Accessing sharable learning videos | Offline download at Youth Hub, download off of google, sharing on Share-it app, access on phone using data | Cycle 4 |

### Stakeholder communication

The members of the club participated in "intragroup communication" and used a closed WhatsApp group to communicate with one another. The WhatsApp group (refer to appendix 3) was not only used to share important messages and notices, but also used by members to share inspirational quotes, information about school-related activities and specific information regarding the plans of the club. The members of the club used both English and isiXhosa as a medium of exchange on the group but English was the dominant language used. Not all members had access to the group because they did not have phones or data to be constantly active on WhatsApp and this proved to be a challenge for the research cycles as well as the functionality of the science club.

> A challenge is communication between us because some of us have phones and some of us don't. We struggle to let each other know if there is a meeting. Some of us will come and some will not. Like now, some will know what is happening in the group and some won't. This could cause friction as time goes. There will be some misunderstandings because some will think there are favourites because some talk about what is going to happen and some will not know because they don't have the resources to know and get hold of us. (Khaya)

These extra members were informed of group conversations either by myself (on Facebook) or at the weekly meetings by the rest of their group depending on the urgency of the message.

During the preparation for the Eskom expo, members of the club used *Grocott's Mail* online to do research about local contextual issues the town is facing, like drought, water quality and socio-economic factors affecting the Makhanda environment. *Grocott's Mail* hard copies started being delivered to the school during the project phase and members of the club were encouraged to read these, with a few reading the paper from time to time. When fellow members were chosen as finalists to go to Johannesburg for the international science fair, the group readership of *Grocott's Mail* increased because there were more and more articles about people they knew and could relate to (refer to Appendix 7).

The club had internet access at the Joza Youth Hub, Rhodes University and the Scifest Africa offices. This internet access was used for research for projects, downloading videos to help with the expo projects as well as connecting to their email and Facebook account. In the final cycle of the research, members borrowed four community engagement tablets and used computers at the Joza Youth Hub to download videos and other educational material on the tablets to help them with exams. Those who did not get the chance to use the tablets used cellphones for downloads and shared the information, exam papers and videos using an App called Share-it.

The club was invited onto a radio show to talk about their group and the club activities. Those who did not hear the show air, were sent the interview (Appendix 5) via the WhatsApp group.

## Media production

A Facebook page (Appendix 4) was created and used by the group to send media messages about the club. The page was created in cycle 2 but was only active during cycle 3. The researcher played a big role in sharing the pictures of the members but the messages shared were based on comments members had made during an interview during cycle 3. With the help of the researcher, the group broke up the interview up into themes and made it into videos to use for their Facebook page. To date the page has 92 likes and shares from various

people and organisations including Scifest Africa. Members were encouraged to share all the pictures they had or had taken on the WhatsApp group for the two admins (Khaya and myself) to upload on the Facebook page. A culture of photographing all of the activities began in order to use the photos to reflect on the research process and share the process with the world.

Two club members with an interest in Journalism made an environmental awareness video (Appendix 5) about their community in Extension Six. This video was made using cellphone cameras and recorders. One member shot the various clips that were later put together and the other recorded some voice-overs to explain the video and link the clips. I helped place the clips to form a video based on our previously agreed upon sequence (Appendix 6). The video was then shared on the WhatsApp group and at the Climate Conversation event.

## The social layer

The social layer of the clubs ecology is rich and dynamic and therefore best understood using the theories of social capital. The theory's *bonding* (Putnam 2000), *bridging (*Szreter & Woolcock 2004), and *linking* (Woolcock 2001; Szreter & Woolcock 2004) capital carefully organises and explains the social interactions that formed as well as the flow of communication and resources between the types of capital.

| **Type of social Capital** | **Stakeholder and relation** | **Accompanying resources** | **Cycle** |
|---|---|---|---|
| Bonding | Members of the club | Support, learner support materials, help, motivation | 1-5 |
| | Eastern Cape expo finalists | Support at expo (connected through WhatsApp group) | 3 |
| | Classmates just before exams | Study partners, passed papers, tablets videos and methods | 5 |
| Bridging | The researcher (Me) | | 1-5 |
| | The principal | Organised transport, preparation interview, and support for members. | 1 |
| | The science teacher | Organised water testing kit and support for cavers. | 1 |

| | | | |
|---|---|---|---|
| | Laurence Stewart (volunteer on model day) | Internet resources, support, resources for expo projects. | 1 |
| | Tsholofelo Sepotokele (volunteer on model day) | Internet resources, support, resources for expo projects. | 1 |
| | Sibusiso Spellman (Scifest outreach officer) | Internet resources, support, resources for expo projects, guidance and access to Scifest Africa stakeholders. | 1-3 |
| | Rod Amner (researcher supervisor) | Guidance, knowledge about resources available and access to Youth Hub stakeholders including Awarenet. | 1-5 |
| Linking | Rhodes and Awarenet | Tablets and Study guides | 5 |
| | Thandi Bombi (as a researcher) | Advocacy through the articles I have written for Grocotts Mail, the research itself and the story chapter | 1-5 |
| | Shepi Mati | Radio participation in 2018 and potentially 2019 (Radio Grahamstown) | |
| | Kjeti Torp | Access to Awarenet, access to Joza Youth Hub, access to afterschool ICT training | |

## Bonding social capital

There were three instances where members of the cave demonstrated bonding social capital. The first instance took place within their subaltern counter public and worked as an agitational training ground, to build the confidence of the members to bond with stakeholders outside of the core group. The second bond formed as a result of others beginning to take interest in the members of the club at the science expo and the third bond was formed when members became their peers' bridging social capital to exam prep resources.

## Bonding in the subaltern counterpublic

In this instance, members of the club were bonding with one another and this took place in the initial stages of the research. They had a literal space outside of the classroom (as an afterschool extra mural) and took active measures to secure that space for the deliberation of their "needs, objectives and strategies" (Fraser; 1990; 66). They are also very clear about why

the space exists and have created “oppositional interpretations of their identities” (Fraser; 1990; 67).

> We teenagers can relate to each other and what we prefer, and adults don’t usually look at preferences. They usually look at ‘is it going to work?’ We basically want to do what is better for us and our community. We make our own decisions and we are not controlled by adults. It’s like this huge experiment see what happens when 10 teenagers decide what to do. That is what the science cave is (Thabo).

The interpretations of their identities is directly related to ‘age’ and ‘power’ (Lennie & Tacchi, 2013; 23) and in having a space that is run by teenagers that they use to decide on matters that are of actual importance to them rather than those prescribed by adults, they actively contested ideas about teenagers not being able to think for themselves.

They formed a group identity and began to take on roles within the parameters of the group. Support, safety, and teamwork played a big role in the formation of cultural practices that defined the group. This led to the cave being described as a “family” that exists in an open, communicative and safe space for the members to be creative and make mistakes.

> Like, some of us were shy to speak in front of each other. Like, public speaking was the biggest problem we had to overcome. I was scared to speak in front of people, many people. But, when we were not laughing at each other and saying “wow that’s bad or it’s not great”, we opened up to each other and we worked together as a team and became friends together and enjoyed each other’s company. We worked together and we united as a bond in that way we were able to work together and overcome our troubles and challenges (Khaya).

The power of the researcher/facilitator/mentor who was older and more educated was dismantled through the characterisation of the ‘powerful’ stakeholder as a part of the family taking on the role of a ‘big sister’ who has interests that are similar and supportive of the younger members of the family. The members clearly outline the role of the bigger sister to ensure that they defuse the potential power that the older member might use in their disfavour. As long as the ‘big sister’ adheres to the prescribed role, they are welcome as an equal member of the bond.

> As time went on, I felt loved and welcome because to me we were like family. We were starting to be one big family and you were our big sister. You helped us with information and equipment and materials. When you leave we also need someone we can talk to. Someone who is easy to talk to, easy to communicate to because to us you were like our big sister. We told you our things and you also shared with us. That is the kind of bond that we need from someone who can help us next year (2019). Someone who is easy to talk to, calm, loving and caring. Someone who will be like our big sister or brother. Someone who we can share with and someone who can help

> us in our educational journey but not only that, but social life. Someone we can talk to and have fun and do a lot of things together (Sipho).

### Bonds based on similar interests

The first bond outside of the subaltern counterpublic was made during the science expo the club attended. At the expo, they met a lot of young and interesting people with a passion for science and innovation. They formed a bond with age mates, school mates and people who showed that they admired them for their hard work and ingenuity. During this time peers from their school started to take notice of the science club and started to ask about how they could get involved in the club. This interest from school peers sparked an interest in the members of the science club to begin to share what happens within the science cave with some classmates and school peers.

Four of the members got to bond with other finalists when they went to Johannesburg to attend the international science fair. A WhatsApp group was formed in order for all of them to be in contact, to ask for help or just to let the others know what was going on. In Johannesburg they met older finalists from the Eastern Cape that they formed bonds with. One member describes the one bond as “brotherly”, with the ‘brother’ motivating them and telling them they don’t have to be afraid.

### Bonds with bridging potential

The third bond was made during exam time when members of the club worked creatively and closely with their classmates to use the resources that were made available to them and shared these resources so that people outside of the club could benefit from the process. In the exit interviews, a major theme that arose with regard to this cycle, was the importance of sharing the resources so more people could benefit from the process.

They became their peers’ ‘bridging social capital’, helping to provide access to videos and study guides that helped some of their classmates through the examinations.

### Bridging Social Capital

I (the researcher, development support communicator and ethnographic journalist) have been their primary bridging stakeholder. Various other people have also played the role of bridging capital as seen on the diagram. I played a bridging role to those stakeholders. The roles taken on by the stakeholders varied from providing simple resources to providing guidance and links to others with resources to aid the members with the goals they had set. These bridging stakeholders did not fall under the same categories for example in age, race, ethnicity,

education and culture. This meant that in order for the stakeholders to have a relationship with the club and its members, the stakeholders had to partake in particular practices to engender trust and participation with the members of the club. Creating spaces where everyone was able to talk equally and listen to each other helped bridge the power gaps and allowed the spaces to be productive as seen in chapter 4 in how Tsholofelo, Laurence and Rod interacted with the cave in their individual meetings.

In the meeting the club had to plan for the future, they came up with requirements for the bridging stakeholder they would need in the future after the C4D intervention. The primary responsibility of this person was in line with being a 'development support communicator' giving them advocacy, support and a pathway to a wider public. They wrote that the person:

> … will take over from Thandi Bombi. They have to be a not controlling, nice person. They have to speak both English and isiXhosa or at least understand isiXhosa. They will help us with connecting to the rest of the world. They will help us in our different roles and they will also help us build our calendar. They will guide us and assist the media representative of the club (Appendix 6).

In later interviews, it became evident that the members were looking for a supportive person with the qualities of a mentor. Someone who is kind, patient, and communicative and:

> He or she must not be like someone like who forces you to do something. He or she must be free to work with us, to share any ideas and be nice with us and we work together and help us with other problems. They must encourage us to do more so that we cannot be sleeping while we need to work. They must encourage us to do more and work hard so that we can improve ourselves and improve our self-esteems (Luthando).

It becomes more and more evident that although the club makes it clear that they want to be in charge of the discussions and actions of the club, they seek and welcome allies who will not attempt to control the club and it members, but rather act as a guide and mentor the club to ensure the individual members grow in the process. It was of great importance to find the right person to help with the sustainability of the club. The members even requested that should someone new fill the role of a development support communicator, their preference would be Laurence Stewart or Tsholofelo Sepotokele because they had interacted with them and they knew that these stakeholders possess the nurturing qualities they need. An alternative suggestion was that the new development support communicator attend meetings for a trial period during the intervention and choosing the person is made part of the intervention to ensure that the progress made by the club is not lost because of bad relations with the bridging stakeholder. This thought and focus on finding the right person is an

attempt by the club members to avoid entering a social contract based on unequal power relations with someone who might not have their interests at heart.

### Linking social capital

Through myself as a bridging stakeholder and a few others, temporary links have been made to various institutions that have provided resources to the science club. An example of this is their relationship with *Grocott's Mail* and how they got into the Photo walk and Bio-bash. *Grocott's Mail* Editor Sue Maclennen heard about them through Rod Amner (research supervisor) and then gained access to them through me by emailing me and asking me to help get a few of them to the Photo Walk. Through this, the two members of the club gained access to cameras, photography skills, editing skills, a snake talk and entrance into the Wessa wildlife Photo competition. One member was a finalist for the photo competition.

The club was linked to various institutions during the C4D intervention. These institutions include: Rhodes University, Scifest Africa, Eskom expo for young scientists, *Grocott's Mail*, Awarenet and Wessa. The clubs activities also sparked interest in various stakeholders who want to work with the club in the future. Radio lecturer, Mr Shepi Mati expressed interest in working with the club in 2019 to produce radio journalism from the club's perspective for Radio Grahamstown. Kjetil Torp also expressed interest in involving the science club in after school programs run by Awarenet at the Joza Youth Hub.

The club and its members had access to a temporary link to wider publics and media through the advocacy of an ethnographic journalist (me) working closely with them. The research itself serves as a potential link to institutions of power including the Department of Education, their school, Rhodes University and educational journalism publications. These institutions have the power to support learners such as these after hearing about the learners and what they say works for them. This research has the potential to act as advocacy for the members of the club linking their needs and interests to these institutions that may be able to support them long after the intervention.

The provision of the tablets and study guides also served as a major temporary link. The community engagement tablets were from the Rhodes University school of Journalism and Media studies. The study guides were from Awarenet. The videos were *Mindset Learn* videos made available by Awarenet through the Joza Youth Hub facilities. In this example, the only role played by the research was the link to these institutions and resources but the appropriation was done without the researcher participating. This link outlines an ideal role

for the linking stakeholder, where the participants gain temporary access to specific resources embedded in the more powerful stakeholder's network (Lin, 2001).

# The discursive layer

This layer consists of the themes, ideas and conversations the members of the club had during the process of the research. The themes building confidence, identity through voice, and community focus and engagement stood out the most in the discursive layer.

## Building confidence through the club

As seen in the section for bonding social capital, the members of the club value the idea of listening and hearing one another in a space that is equal and not intimidating. Here Sipho expresses that having a safe space where everyone helps each other was the main reason he continued to participate in the science club.

> I joined it at the beginning of the year. I heard that everyone helps each other in this club and nobody will do bad things to each other and that we will feel comfortable. When I first joined the science cave I felt comfortable with nobody bullying me. What made it comfortable was that we were all united as our group, we are a group of 10 learners, and all of the 10 learners helped each other. With things that I did not understand I asked others (Sipho).

Being frequently able to talk within the club also played a positive role in the members and their ability to talk and express themselves outside of the classroom.

> Science cave has done a lot of things for me. It has given me a lot of confidence because before I could not even ask a question in class but just communicating with others, because at science cave there are a lot of students, gave me that courage that I could communicate even in class when I don't know something Noluthando).

Zuko has a similar experience;

> I think it helped boost my confidence a bit. I stopped being shy and was able to express myself and tell others what I know. I felt clever doing this with people during exams (Zuko).

## Establishing an identity through voice

In the first cycle members of science of the club came up with science expo ideas that were linked to their experiential realities. They expressed deep considerations of their own community and the environmental and socio-economic factors affecting the community. These considerations were made in the following ways;

> Grahamstown winters can be very cold. Not every learner can afford a thermal flask to take a warm drink to enjoy during break time. This research seeks to explore the

> alternatives to store bought flasks to see if learners can make cheap durable flasks from recycled materials to use on cold winter school days. It has to do with the time from when the student leaves home to the time when they have lunch at first break. (Sinethemba and Nthando)

Sinethemba and Nthando placed special consideration on recycled materials for their project because not only did they understand that people in their community may not be able to afford expensive materials to make the flasks, they themselves had very little resources to use towards the expo project. Grace ended up making a small bag out of cotton for the thermal flask so that even those who might choose a cheaper homemade flask could have something beautiful "so it is not embarrassing that the learner can't afford the real one form the store".

> The aim of this project is to create an underground water collection system to help places like towns, cities and rural areas where water is scarce even after big rains. At some places even after raining, water becomes polluted while flowing next to roads and in potholes. Most of the water that is not collected into dams then goes underground and cannot be reached to be used. By using these aquifer tanks, this can be no more. These tanks with various filtering materials can collect and store water that can be later used to water gardens, or used in the households. (Aviwe)

Aviwe took notice of the drought in Grahamstown and used that as the context behind his investigation. Although, Aviwe needed a water pump for his model, he used recycled materials to build the project. He expressed that the use of recycled materials was based on the fact that "there are lots of materials that are thrown away every day that we could use to build things to help the community, but we are sleeping. We don't think we can do anything with stuff that is thrown away."

> In Grahamstown, our tap water is brown and contains ecoli and other things that have been recently reported. This shows that people need to take things into their own hands to build things that will help us purify our water because the municipality is unable to do it right now. This is where the $H_20$ purification comes in. The model is not that good looking but it serves as an easily available model that takes a maximum of R25 to make. (Thabo)

This particular project was aimed at a low cost way for community members to "take matters into their own hands" and find ways to purify the water we drink. Thabo did not have access to a lot of resources so he decided instead of doing a comparative study to determine if his innovation was better than ones that already exist, he would just make an alternative for those who really could not afford to buy already purified water or a purifier.

Since every one of the members had socio-economic reasons to use recycled materials. The group decided to include aspects of environmental sustainability in relation to recycling in their research projects. They argued that there are innovations even poorer members of the

community can get access to and one of the members, Sipho, expressed that this helped him get his voice heard.

> My voice was heard by the people all over South Africa like when we were at Joburg for the science expo. They didn't know that people can use recycling materials to make a flask. They now know that everybody can do anything with their hands like even using a chips packet as an insulator. They said that they will use the idea to do the flask on cold days. I feel happy because my project can be accessed by the people who need it. Not everyone will feel poor. They will have the flasks to drink warm tea on cold days (Sipho).

Another member, Thabo said that the platform of the science fair itself, got his voice heard because he had a "vision" and was provided the "facilities" for the vision to be heard and that has the potential to get him noticed by people who could provide resources.

> Our work in the science expo got our voices out there. A lot of us have vision but we are too scared or we don't have facilities that will make us make our visions to be heard or seen. With the science expo we told the people about our projects and how we want to make them work. So now that they have heard our projects they will maybe give us sponsors like scholarships, like Aviwe, and make us make our projects where they can be used to help other lives. Also our principal has been trying to connect us with people so that they can hear about our projects and the science expo, there is this manager from the EOH management thing. They took a photo of me and asked for my details because they see the potential that my project has (Thabo).

## Community focus and engagement

The positive feedback the members received from their expo projects led them to think of themselves as helpers of the community and community engagement then became a large part of the values and practices of the science club. They engaged with the community in the following ways;

1. Making an agreement with the Wastepickers of Grahamstwon to make compost to contribute to the waste picker's community garden.

   "We are also trying our best to help the community. We just launched recently and one of our projects is to help the waste pickers of Grahamstown who recently created a community garden. So we want to try and do something where we make compost for their plants to get more nutrition. So you don't have to be like a scientist to change the world all it takes is hard work". (Thabo)

2. They made a short clip about their community's waste problem.

   "I thought that it was a great idea to do something related to our community. What led us to doing that video was seeing that there is pollution and we need to do something about it. So I think that rise for climate change conversation was our platform to tell the story of our community." (Zuko)

3. They shared the tablets and study guides they had access to with their peers in the classroom

   "These tablets that we got and the study guides, we shared with other learners in our classes and other people. They were very grateful because these things helped them through their exams. There are things that they learned through the tablets that they had not learnt with our teachers and during this time they got access to other information." (Sipho)

4. One member of the group says after the work that the club did this year, she wants to start her own initiative to teach people in her community how to speak English.

   "I would like to start a group, but, where I would teach primary school learners how to speak English or how to write it because I have a cousin who is a slow learner. She doesn't know English that well. I want to do this because English is very important and even in high school you have to know English very well. (Noluthando)

She goes on to explain that the nature of the intervention has inspired her to want to do something of her own.

> "Being in the science cave has inspired me to want to do this because when you decided to help the science cave you were aiming for us to know more about science and learn more about science while having fun, and that has happened. You achieved that. So I also want to do something that makes me feel better about myself and will be able to benefit others and benefit myself at the end." (Noluthando)

Here Noluthando expresses that there is something self-beneficial in helping the community. She hopes to benefit others while doing something that makes her happy.

# Chapter 6: Summary, conclusion and recommendations

*As I reflect on the journey of this research, I think back to my initial reasoning for wanting, so desperately, to create a platform that gives voices to young people. I remember thinking about an invisible-solid line – one I noticed while talking to my younger brother. He was sitting across me, looking down towards his hands. On his lap, one palm sat intertwined with the other. His right thumb went from finger to finger pushing them forward and back in order to have something to focus on so we wouldn't make eye contact. That is when I first noticed the line. I had not asked him anything yet but he knew I was going to ask how things were going at school. So, we sat there, in silence, and his body language told me we were in for a very short conversation. Over the years, I had learnt that the only way to get anything out of my brother was to ask him to look at me, tell him he shouldn't be scared to tell me things and I that I would always try and understand it from his perspective. We were able to do this with many situations but when it came to talking about school, I always hit a solid line and he would giggle his way out of the conversation. This time was different. This time I was determined to find out what was making him do everything in his power to avoid going to school. After sitting in silence for a few minutes, I asked, "How can we help you?*

*He looked up at me. He was suspicious of the question and returned to playing with his fingers. So, I repeated the question. "How can I support you, what can I do to help?" I said hoping to get through to him.*

*"What do you mean?" he asked, after a while. Before I could say anything he continued. "I'm fine, and school is fine."*

*"How can we help you, so you want to go to school more?" I asked while looking down at his busy hands. More silence and nervous hand gestures took over the communication in the room. We had been at it for almost 15 minutes so I was starting to lose hope that he would ever give me a straight answer. He could see that I was getting impatient and held out longer to test the limits.*

*Noticing this I smiled at him and said that we could talk another time if he wanted.*

*"How am I going to even do well if I am constantly being told I am stupid and I can't do anything," he said. Now he was looking directly at me, his eyes were visibly glossy. His*

*hands were still occupied and his stare returned the pressure I had being putting on him for the past 15 minutes.*

*"Who tells you those things?" I asked after giving him a moment to continue.*

*"Everyone, ever since I failed they laugh and call me stupid, so why should I listen to them or even try."*

*Standing on either end of the invisible-solid line, we are defined as one thing as opposed to the other. The sides we have fallen on determine the way we have constructed our self-esteem and the way we understand our worth to the world around us. The line has a way of propelling and limiting the way we dream about and envision the future. I have come to learn that this line not only stands between my brother and me but also separates large parts of the country and is determined by the relationship one has with education. When I began this research process, it was this line that I thought of. I wanted to create a life-line, a line of communication, so that we adults could stop letting down young people like my brother; who have something to say but are afraid that no one is actually listening.*

This research sought to design, execute and reflect on a process where the principles and techniques of C4D and Social Change were applied to enhance, support and develop qualitative changes within a learner-led Grade 10 science club at a public school in Makhanda. After a five-cycle C4D intervention with the science club, the understanding and building of communicative ecologies has created the best chances for ripple effects that could lead to the club's development. Through these, various forms of social capital arose, providing the cavers access to voice, participation and learning resources.

The club began by bonding within their group and building voice and confidence through intragroup communication. The club then bonded with wider publics and began to identify stakeholders with bridging qualities and linking capabilities. The members of the club realised the importance of bridging stakeholders and identified the bridging qualities necessary to enable the science cavers' voices. In this process, power imbalances were ameliorated and a more egalitarian, supportive and active community was formed. The learners made it clear that they identified themselves as teenagers that are in charge capable of taking charge of their education. Their interests developed from engaging in the environment awareness to engaging with the community and finding ways to contribute positively to it. The learners contributed to their communities by supporting members of their group to finding creative ways to support members of the community. Confidence was built

and insecurities were overcome, to allow for more communication both outside and inside the classroom. Although there is no quantifiable means to measure the extent, the caver's feel listened to and more open to communicating their needs. They are also better equipped to do this kind of communication and practice agency whenever the opportunity arises.

In the short span of the intervention, the club has created and sustained a digital footprint. Their WhatsApp group and Facebook page continue long after the intervention, to facilitate spaces of withdrawal and regroupment as well as spaces for agitational activities directed towards wider publics. Their interactions with wider publics have created opportunities for collaborations with bridging stakeholders in the future.

This C4D intervention was my contribution to listening to young people. After being asked by my course co-ordinator, how I supposed I was going to give young people a voice, I went through a long and process of introspection. I morphed from one role to another to attempt to use my educational training to impact a field I traditionally have no place interfering in. I was reminded time and time again that I was diving into murky waters. But I got help from all those who began to believe in the process and the Science Cavers also showed that they were believing in me. That is all that happened; first I believed and then the cavers believed and then wider publics with resources believed and did anything they could to support the intervention. I have only one recommendation for anyone who reads this to consider;

We are all responsible for the education, encouragement and support of young people in this country. To ignore the dire situation we find ourselves in, for the mere fact that it is not within your faculty, is to refuse to think creatively about how each and every faculty can contribute to the education and the development of young people. The same goes to development support practitioners and researchers. Within the roles one has to take on to support the research participants, there are an endless amount of ways to be what the community needs you to be, in order to facilitate real social change. The only task is to be able to listen, reflect on the context, and understand your interest and capabilities to unleash the full potential of your contribution. Also, be brave and allow yourself to be vulnerable enough to attempt to listen from a different perspective. There is no lifeline; just you and the community.

On Friday 1 February 2019, I received my approval from the Department of Education. My research had come full circle and the department had taken notice of me. Included in the terms and conditions of the approval, was the request that I send a research report with

recommendations to the department. Through this, the department was committing to attempt to act as a bridging stakeholder. They were committing to listen to a story about the voices of young people in their education system. Weeks later, the principal of the science cavers made the same commitment.

I end with this information to iterate White's (2004: 220) concern. The act of empowerment without an attempt to involve the stakeholders with the power to sustain the process of empowerment, is incomplete. This research is not attempting to convince the reader that the Science Cavers are empowered completely with no need for the process to continue, instead it seeks to start a process and hand it over anyone who might have the means to contribute to the development of the Science Cave and other learners alike.

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# Appendices

**Appendix 1**

**Interviews and organising codes**

**Interview with Sipho**

F: Science has not really been my strong point but ever since I met up with my friends the ones that are in the science cave this year. We have been helping each other, we would go to the library and ask each other questions. We continued and that is how our friendship was built and also when we joined the science cave group. I saw a lot of opportunities for me that would come my way if I joined this group. I joined it at first, but at first I was not 100% free because I had a lot of other commitments. I had debating and all the things that I had to do. So as time went on I felt loved and welcome because to me we were like family. We were starting to be one big family and you were our big sister who introduced us to other things like the science expo and some things that I did not even know existed. When we made our projects, I really didn't believe in ourselves that we would achieve what we achieved. All those things that I have accomplished is all because of this science cave and also other teachers that are helping me like Mr Johnson and Mr Makaula. They are all helping me to reach the goals that I have, the goals that I want to achieve. They are playing a big role in my life. Also my parents, they have helped me through the past year, last year and this year, they are helping me a lot. That's basically what has happened this year.

T: How did you get into the science cave?

F: It was Manyathi, it was through him. Me and Manyathi and Luthando Singatha were always like this. Where ever this one goes we follow. We had joined debating. Then I saw him one day in Mrs Barnards class and that's when I went in and sat down and you asked me if I would like to join the group. Because I am an opportunity taker, I always take opportunities,

**Commented [WU1]:** Collaboration: helping each other (process)

**Commented [WU2]:** Resources: trying to access resources (Process)

**Commented [WU3]:** Collaboration: building friendships (process)

**Commented [WU4]:** Challenge: time to attend (versus)

**Commented [WU5]:** Affirmation: love (emotion)

**Commented [WU6]:** Collaboration: "We were like family" (In VIVO)

**Commented [WU7]:** Collaboration: "You were like our big sister" (In VIVO)

**Commented [WU8]:** Collaboration: teachers helping (process)

I said yes and as time went on I enjoyed being in the science cave.

T: what role do you think you played in the cave?

F: from my point of view, nothing specific because I did not do anything alone. We were working as a team. We did everything together. So in terms of the role I played, I would say we all played a big role in improving a lot of lives and helping each other to succeed. Which is why I would like us to continue even more helping to get more people in the science cave so that they can experience the things that we have experienced through the science cave.

T: can you give me some examples of things you think you did as a team?

F: As a team, for example these tablets that we got and the study guides, we shared with other learners in our classes and other people. They were very grateful because these things helped them through their exams. There are things that they learnt through these tablets that they had not learnt with our teachers and during this time they got other information. And the subjects that we were doing, they also wanted to join because they are seeing that it is more fun and educational and that these subjects have a lot of opportunities for them. And also other people want to get into the science cave because of the way that they see us working together and improving each other. The science expo projects that we did, people were interested because, for example the judges that judged us in joburg they said I must improve on my project because they see potential and they said that it can help a lot of people in the future. So with the science cave we have created things and bettered other people's lives. As for Adam and Sinovuyo, when they did that video of environmental management it really helped because their voice got heard by other people

**Commented [WU9]:** Collaboration: working as a team (process)

**Commented [WU10]:** Collaboration: team work example (process)

**Commented [WU11]:** Affirmation: being grateful (emotion)

**Commented [WU12]:** Voice: voice through video (process)

somewhere. That way their video helped. Even now I see the municipality even trying to fix here and there but they are struggling because of money but I am sure that in about two years everything will be better. So the science cave have really helped people in a lot of ways.

T: So you say that they got their voices heard with that video, do you think that they are other things that helped you get your voice heard or other members in the club?

F: Yes, Our work in the science expo got our voices out there and when we had the meeting for climate change and we had a debate on environmental management. Like there is this group from the dumpsite, I think they… [Interruption].

Like I didn't know the kind of life that they live, the things that they do and the visions that they have about improving their future. Because in life we don't like really know the way that everyone lives, we assume that everyone is living the good life. That day we got to know the situation that they are in and the situation that the country is in. The lack of education and the way that people need education and to be taught how to live in this world.

And also with the science expo thing, a lot of us have vision but we are too scared or we don't have facilities that will make us make our visions to be heard or seen. With the science expo we told the people about our projects and how we want to make them work. In future these projects can be used because in growing when you take a step forward, it's like a baby. First you crawl, then you walk then you can run. So now that they have heard our projects they will maybe give us sponsors like scholarships and make us make our projects where they can be used to help other lives. Also our principal has been trying to connect us with people so that they can hear about our projects and the science expo, there is this manager from the EOH

**Commented [WU13]:** Voice: voice through expo (process)

**Commented [WU14]:** Voice: voice through expo (In VIVO)

**Commented [WU15]:** Connection principal connections (process)

management thing. They took a photo of me and asked for my details because they see the potential that my project has. And not only can mine but the others, the potential that we have play a big role in other people's lives. So our voice got heard in those ways.

T: Did that give you confidence?

F: Yes, a lot because for me especially. When I was doing my project. I did not think it would go anywhere. I was working with my partner, name and Surname. We did not think that it would go places or this project could take us places. But when we went to present at Rhodes and got through to go to joburg, it built up our confidence and showed us that we have what it takes to stand up and fight for what we believe in and make our visions and prove that we are capable doing other things. Things that other people can do. To be scientists, and to create projects that can help lives. Going to Joburg really lifted my confidence personally because now I believe if I work hard, I can go places, I can meet new people and I can improve the lives of our people. My project for example, cleans water. If I work more on it could be maybe in 10 years, people will want to use this project because it gets, it limits everything like wood, coal and water. It uses all kinds of cleaning methods, the fire, the sun and the stoves, these things will be saved so that the future generation can also use coal. We generate out electricity from coal and it's going to be finished at some point so of we use these three kind of projects there will limits the wasting of coal. I was confident because they showed me that I have something. I have an input in this world that we live in.

T: Do you know what the research I'm doing is about?

F: You are doing journalism and there is a book you are trying to finish. But I know you have not been concentrating on that from my point of view. You want to help learners like me to

**Commented [WU16]:** Challenge: low confidence: (conflict)

**Commented [WU17]:** Affirmation: going to joburg (process)

accomplish and to have something in life. So you research to me it's like helping people than finishing your work.

T: Yes you are right, I am doing my big book. It's my thesis and my thesis is just about what we did and our process and what happened. The methods that we used are communication for development and that's why we got to do different things and we tried to contact different people and every time we did something we would come back and talk about what to do next.

Do you think the research helped the science cave?

F: yes it did because we got to experience a lot of things. Not only us, the members of the science cave but a lot of people. Ntsika, Merry waters, a lot of people. The information that we got from the science cave, the knowledge that you gave us we also used it to improve other people's lives.

**Commented [WU18]:** Connection research and community

T: What was the most fun thing that you did this year?

F: fun thing, was to work with my crew in projects that we did. When we went to Rhodes to present and got to challenge each other. It was nice because we were not stressed about winning or losing we were just concentrating on having a good time as one big family. It was fun. The day that we went to the expo and the day we had the debate. It was fun because we were divided into groups and we were seeing each other's limits because that is what we are all about because we want to see your limits so that we can try we can try to drive it more up so that we can make you unstoppable so that we can lift each other up. The most fun things were the debate and the science expo and the time that we spent together, the meetings and fun times as a science cave. And for Adam and Nombewu, the photo walk they went to, they are always speaking about it. They had a lot of fun, they witnessed other plants and animals like snakes. They had a lot of fun. So the science cave is not only about education for us, it is about having fun, improving each other's

limits and trying to be better people, to improve lives in our country and community.

T: What was the thing that made you tired and frustrated the most?

F: The workload. When we were doing the science expo to go to joburg. It was a lot of work. I'm not complaining because it was educational because I know in the future if I want that when I go again to the joburg I know what to do. We know how to prepare for it so that the workload will be less. Work at the monument was a lot, you had to improve your project and you had to write introductions and edit, it was a lot of work. But thanks to our teachers and the facilities even you, the things you did for us we were able to finish and we got a lot of experience from joburg which we will use to make more dreams come true.

T: You got to connect with more people this year, can you name some?

F: We met a group of people from KZN some from Mpumalanga, Durban, and Kimberly. There were a lot of people and it was a lot of fun. We met a lot of people, some from Victoria girls, and boys from Nyaluza, Kamva. We were not that close because we were in different categories. We connected and made connections we were not that close with the VG girls but we knew that if we needed help we can ask them and they knew they could ask us. We created a whatsapp group to communicate on if anyone needs help. We are all still on that group and we are connected to other people from other schools in the Eastern Cape. We also met a boy from Queenstown. We were working together he is in grade 12. We called him bhut Enzo, he helped us a lot. He was friendly and easy to talk to. He was a calm person. And he always told us not to stress, he was like our big brother. We did make some great connections.

**Commented [WU19]:** connection + communication: Eskom peers, whatsapp (process)

T: If you had to continue science cave next year and someone else had to try and understand what it is that you need support with what would you say?

F: We really don't need that much things. We just need, maybe if we are doing research, we would need a place where we can do research. Like facilities like that. Also the tablets that we had, maybe if we could be able to get for next time we have exams. They will be able to help us because they really helped us this exam. Also we need someone who we can talk to if we have a problem at school, someone who can help us.

T: What kind of problem

F: With projects, you helped us with information and equipment and materials. We also need someone we can talk to. Someone who is easy to talk to easy to communicate to because to us you were like out big sister. We told you our things and you also shared with us. That is the kind of bond that we need from someone who can help us next year. Someone who is easy to talk to, calm, loving and caring. Someone who will be like our big sister or brother. Someone who we can share with and someone who can help us in our educational journey but not only that, but social live. Someone we can talk to and have fun and so a lot of things together.

T: If you can achieve one thing next year, with or without the science cave what will it be?

F: I want to achieve it with the Science cave and all my members of the science cave. I want us to make dreams come true in Grahamstown, at the Science Expo. Go to Joburg and from joburg go overseas.

T: How did you use the tablets?

After we took them that day. I went home with it and looked through the videos and told my friends about it and my classmates. I even told the principal. The next day I went to the

**Commented [WU20]:** Resources needed in future

**Commented [WU21]:** Communication + resources: needed in the future

principal and told her that our science cave have borrowed us the tablets to use and she said that I must go show Mr Johnson and I did that and after that I went to my show my friends so they can understand that these are the kind of things that the science cave gets up to. They were also interested in joining the science cave but we told them that we are still developing and we will see where we can put them once we have developed.

When I was watching the video, more and more people started to come to me to sit next to me so that they can watch. At that time the teachers were very busy and the grade 12s were starting exams so we had a lot of free periods. So it was better for me to use them there so that we can share knowledge and not only use it for ourselves. We cannot just sit in in class and play when we are about to face exams. So I carried it to school. With the study guide, I borrowed some of my History classmates so that they can read and which they are very grateful for because they had essays. They were supposed to write two and it helped them because they said things that they could write about. The Tablet I did not really borrow people but if they needed it I would go to them and we would sit together and watch. Others used it for Maths and physics. It was very helpful and the other science cavers did the same. They shared the study guides so that others can get more knowledge and they were very grateful because these things really helped them through their exams.

I think it helped with the exams a lot because in the tablets there were previous exams papers that were gotten from the youth hub. So we went through them, we practiced we asked each other questions. You watch and see a question then ask a friend and see where their knowledge is. If they fail we watch again so that they can know and get more knowledge. We watched maybe for 10 minutes then someone take the tablets then we sit

and ask each other questions to see if we have learnt. We really helped each other. That's how the tablets were used.

T: what did Mr Johnson say when he saw the stuff?

F: he was really happy because he said that we were struggling so when he saw the guides and the videos he said that we should watch them in our free time because the videos will help for the exam. The other learners, they have trouble because when a teacher is teaching, we don't all get that understanding fast. But with the tablets experiments were done and we could see how it is done and those kind of ways. So Mr Johnson was very happy because sometime he could not do the experiments with the videos we got to see how they were done and those things helped us answer some questions in the exams. We have hope that we will get good marks because we got a lot of help.

On behalf of the science cave, I would like just to say thank you because you have really helped us. You have showed us things that we didn't have, things that we never thought that we could have and you showed us love. You were not only our mentor, but you showed us love and you were with us all the way and for that we are very thankful and we hope to see you again soon.

**Interview with Khaya**

T: can you tell me a bit about your experience in science cave this year?

L: This year we have been busy in the science cave. We joined the science expo, we did a lot of projects but we did not have that much time to do the projects. But at least we managed to do it and help each other and I got to make my own project and got to participate and I did it well. And then even though I withdrew, at least my work was represented successfully. And yeah we did a lot recently. We also attended the Climate change

**Commented [WU22]:** Collaboration: helping each other (process)

debate whereby there we also took part in debating about climate change and burning fossil fuels that affect the climate.

T: How has that been for you this year?

L: It has been fun, I got to participate and I enjoyed it. I kind of got to know what's going on

T: so what role did you play in the club?

L: let me just say, I have got a chance to help others form groups and help each other speed up our idea and learn from each other. We got to combine as a team and work together. We worked together and that's how we succeeded in all our projects.

T: What does it mean to work as a team?

L: What it means to work as a team is like when the others don't know how something works, for example I am doing a project here, now it is like tough on how I do it. I need ideas but I can figure all of them out by myself so others come and help me generate ideas and then we form a solution to fix the problem and then in that way my project succeeds with the team work and us working together.

**Commented [WU23]:** Collaboration: team work definition (In VIVO)

T: How did you become a part of the science cave?

L: A friend of mine told me that they were involved in a group called the science cave and they were doing science projects and entering competitions like the science expo and like they were forming ideas about science and learning more about science and that is how I got interested and entered the science cave. I felt welcome a lot because I also got to participate even though I was new and didn't know exactly what was happening in the beginning.

T: Can you give me an example of how you participated?

L: When I arrived the group was busy with doing their projects for the science expo. Then I joined the science expo, and was

doing my project with my partner Farai and we were doing a project of an H2O purifier. Whereby when we did the project, we worked together as a team. Both of us helped each other we got to combine a boiling method that was easy to filtrate water and then the project succeeded because it went to Johannesburg with my partner.

T: How has your participation in the club affected you?

L: Science has been a bit hard for me. I even wanted to change subjects, but at times I told myself that I am enjoying it as I joined the science cave. We were doing more experiments about science exploring ideas because science is not only about doing experiments, it's about developing new ideas of modern technologies. I enjoyed doing that and it involved simple things and doing simple things that might help in the community so I enjoyed it and I decided to stick with it. The science cave helped me get more knowledge of science. let me say, it was more bearable and I got to learn more things. Mostly it was kind of better. I understand it better. Like in class, we usually given a project to do like something practical and in the science cave we do practical work like making hypothesis and all that stuff, controlled variables, fixed variables, so those kind of helped me even when we did the practical activities in class during the formal assessment tasks.

**Commented [WU24]:** Challenge: difficulty in science (versus)

**Commented [WU25]:** Challenge: example (In Vivo)

T: So you recently went to the youth hub for resources can you tell me about that?

L: Well, we got some helpful things in the youth Hub. We got go some textbooks [study guides] and some tablets which had videos and those videos were very helpful. We got to watch them and they were teaching a lot about the subjects I was doing. I got to revise and then I would say I think I aced my exams. It was very good. I watched the videos and then I revised with the study guides to guide me as well. I had a

question paper of the paper that we were going to write, from the previous year, so it was easy for me to guide myself using the study guide and watching the videos to understand that.

T: Did you do this with anyone?

L: No, I worked at home alone. I had the videos in my USB so I only brought the study guides to school and we studied together. During the exams, when we were going to write physical sciences I had a study guide and others had question papers so I bring my study guide and then we studies together using it and checking the information and the answers. I did this with some of the science cave and some other friends that were doing the same subjects. It was easy that way. It helped a lot because at least the exam was easy, to me. I wrote it better. I would say it is the first time I have studied like this. Mostly I study by myself. Like in term 2 I studied by myself at home using my own textbook from school but with the study guides, it was easy to study. Like it has more expanded knowledge and some exam preparation so it was easy for me. I'm still waiting for my results but I think I kind of did better this time because it was easier to write the exam and it's usually hard when I have to do this stuff. After I studied hard using the resources it was better writing the paper.

**Commented [WU26]:** Collaboration: studying together (process)

T: Do you think that you have had your voice heard during you time at the science cave

L: Yeah, I remember when went to Rhodes where we did an interview with grahamstown radio. I would say our voices were heard because we were expressing ourselves and telling people about what we do, our group. The science cave and like we did the Facebook page whereby we were telling people about knowledge and things we do in the science cave and people go to see the videos and what we participated in. They got to like our page and some heard on the radio that we need a sponsor so

like that helped a lot because like some people our age and in our school found something interesting about that and about science. So I think that it encouraged them a little bit.

Commented [WU27]: Voice: radio and peer interaction

T: Do you know of a few people that are interested in the science cave?

L: yeah, some of the learners are interested in getting in the science cave but we told them that we are going to try next year since it is the end of the year now. When we are organising for the cave so that the science cave doesn't end with us in grade 10.

T: if you could achieve anything next year, with or without the science cave, what would it be?

L: I would like to enter the science expo again. I have a new project in my mind. I would like to work harder to improve my marks in physics and study hard. The resources at the youth hub will help me because I will study better. I would go every weekend if I have to so that I can study and watch the videos so that they are helpful a lot.

Commented [WU28]: Aspiration: future goals (In Vivo)

[He asks me if I enjoyed participating min 13-14]

T: do you know what my research is about?

L: I think you told us your research and you were looking for some learners whom you want to help with science or any subject. You wanted to do a project with them. I think that's what you said.

[I explain what the research was about]

T: How would you say what we did and what I planned to do are related?

L: Well Makhanda has mostly resources. People are lazy to do stuff. People say there is no work and nothing to do. They are sitting in the streets. When they are finished with matric they don't have anything to do, they don't have money to pay school

fees for tertiary education. But I learnt a lot that anyone can start any project and it could be funded and there are many opportunities because when I saw the computers at the youth hub they were sponsored by Rhodes University and there are many projects done at Rhodes University. For example I could do a project and I could ask to be funded by Rhodes University like I present what I want to do to help the community. When you help the community it is a good thing and they see it as something that is rewarding to the community and they support you in what you do and it can be a great value for the community and you can be rewarded for doing something great. So I would say that there is nothing such as there is nothing to do in Grahamstown. There is a lot to do because there are problems here like we have no money, water scarcity but there are many solutions and people have ideas. It's just that they don't have platforms to speak about them. Many people here have ideas and yeah.

T: Do you think your ideas have been given a platform?

L: Yeah, I would say so because my idea during the science expo got to expand and I got more ideas on how to do it and to design my project and it got to be seen and it was a great one. It got a reward. I was happy about that.

T: Do you think that young people get enough opportunities to express themselves?

L: I would say yes. There are many opportunities here in Grahamstown it is just that people don't go out there to look for them. They want the things to come to them straight but no there are many opportunities because we have Rhodes University. We have museums, we have the monument. There are many projects that you can do and they can be heard and seen by the community and they can be valued by the people and the environment. There are many opportunities so we as

people have to go out there and find them and they will very rewarding to us. So we can get our names up high, we can be seen and we can get the opportunities to keep moving upward.

T: How has it been working with the group?

L: Like some of us were shy to speak in front of each other. Like public speaking was the biggest problem we had to overcome. Some of us were scared to speak in public. I was scared to speak in front of people, many people. But like when we not laughing at each other and saying “wow that’s bad or it’s not great”, we opened up to each other and we saw great opportunities coming in each other and we worked together as a team and became friends together and enjoyed each other’s company. We worked together and we united as a bond in that way we were able to work together and overcome our troubles and challenges. I would say I’m no longer devastated to talk in public now. I am free to talk in front of many people. Well for example in the radio Grahamstown, when you talk there, you are talking in front of many people and many people will hear. But I told myself that if I really want to do it, I must do it and I did it and it felt great because people got to hear about us.

T: Do you think that people still know about you?

L: I would say yes because many have seen our Facebook page and have liked it and some have tagged it and said that it is a great thing and we must continue the great work. People like what we are doing and they trust in it.

T: What kind of facilitator would you like next year?

L: He or she must be like you. He or she must not be like someone like who forces you to do something. He or she must be free to work with us, to share any ideas and be nice with us and we work together and help us with other problems. They must encourage us to do more so that we cannot be like be sleeping while we need to us. They must encourage us to do

**Commented [WU29]:** Resources: in Grahamstown (In VIVO)

**Commented [WU30]:** Collaboration: example of success (process)

more and work hard so that we can improve ourselves and improve our self-esteems.

T: Has your self-esteem been improved?

L: yeah, I would say yes. Because I'm not scared anymore to do some things like I was afraid to do some work like if maybe I see something like when it is going to be done it will take a long time but No! If you like start doing it now you will finish it in the right time.

**Interview with Siviwe**

S: the science cave is a group of 10 learners, who support each other on some projects that they do. We once, in term three, participated in the Eskom Expo where the majority of those who participated went to the internationals in Johannesburg. We supported each other in the process when we were preparing for entering the Eskom expo thing. I was new at that time at the science cave. I heard about it from my friend Lindelihle. He told me about some of the things that the members do here and I got interested. I just said okay let me join this group because it, they boost each other from where they are to the next level.

T: When you joined how were you received?

S: everything went well basically because I learnt a lot from the club. I learnt how to work with people. Things that I didn't put interest on but when I joined the science cave. I can say they opened my eyes about working together and everything like that.

T: What role do you think you play?

S: I basically played the role whereby. When we were preparing for the expo thing, I supported those who were going to the internationals. So I could say that I supported those who needed support at a particular time. Now since there is no project we

**Commented [WU31]:** Resource: future (In VIVO)

**Commented [WU32]:** Collaboration: learning to collaborate (process)

**Commented [WU33]:** Collaboration: learning to collaborate (process)

are working on right now we are just looking forward and planning, we are planning. I put on ideas on the Facebook page. When I am running the Facebook I let people know about what is the science cave and the other interesting facts in science and not just science. In subjects like Botany. I am also planning for next year on WhatsApp's, when we chat, I put on ideas about what we can do next year and some of the activities we want to do.

T: Did you start the Facebook page?

S: Yes I started the Facebook page. After we attended the Expo, I don't remember the exact date. The aim was to let people know about the science cave and to try and get… so that when people know we can try and get support from the outside so they can support this group because we need their support. We need them to sponsor us with transport and stuff like that. I invited my friends, family and other people that I know to like the page. Those who have liked, I also tell them to tell people to like the page.

**Commented [WU34]:** Communication: Facebook page

T: what do you think about working as a group in a cave?

S: we support each other and boost each other to the maximum. It's a space where everyone can reach his or her best. It's like a family because when we do projects there's support in everything that we do.

T: Do you think that your voice has been heard?

S: I think so because we once went to Rhodes University in September, where five of us went to an interview on radio Grahamstown. They were telling people about what science cave is. So I think a lot of people have heard what science cave is and what is the aim of us. A lot of people have listened. Some of our teachers now know about the science cave. Our science teacher knows about the science cave because we have shown him our models when we were entering the expo. When we

showed him the model he said I need a tri-pod and showed me that he has interest about what we are doing and some of our teachers like mam Jack we also told her about our models and then she asked about what is the way forward after these projects and we told her that if we have wont we are going to go to the internationals. All I am trying to say is that they showed support to us.

T: Do you know what my research is about?

S: Maybe because you are doing journalism, you are trying to be with the community and see where they are and see the potential of the community that it has.

T: what are some of the challenges that exist from the science club?

S: when there are events, like in town, we don't have transport to go there. That is one of the problems. Then the other thing, the venue thing, where are we going to meet when it is a holiday or a weekend. But I think we were once offered the Joza youth hub. But those are the challenges that we had and some of them we still have like the transport thing. Another challenge is communication between us because some of us have phones and some of us don't. We struggle to let know of each other if there is a meeting. Some of us will come and some will not. Like now some will know what is happening in the group and some won't. This could cause friction as time goes. There will be some that misunderstandings because some will think there are favorites because some talk about what is going to happen and some will not know because they don't have the resources to know and get hold of us.

T: if you could achieve anything next year or in the years to come, with or without the science cave what would it be?

S: before I was with the science cave I was not that interested in science but when I joined the science cave I gained interest on

**Commented [WU35]:** Voice: various examples (communication)

**Commented [WU36]:** Challenges: resources) (communication) (In ViVO)

botany when I was doing the project for the expo. We had to use dehydrated charcoal for the model then I researched on what is the alternative for the charcoal then I found that grass is the alternative. Then I got the interest of grass, then I researched more on what grass consists of then if I achieved something I would achieve, I am going to study botany at Rhodes university and I would like botany and I would be thankful to the science cave because if I hadn't joined the group, I don't think I would have found my interest and what I wanted to do. I didn't know before I joined the science cave what I wanted to do after grade 12 like when I get into varsity. The thing that I would like to achieve is to be a botanist with the science cave. I didn't even know about botany before this.

**Commented [WU37]:** Aspiration: studying Botany

T: did you get to use the study guides and tablets to study for exams

S: we shared the study guides and the tablets. The tablets basically depended on how you work with the person that you live close to and share with. I tried to get the tablet from the others who had the tablets because I did not get one of my own. When they were done using the tablet they would borrow it to me then I use it and then I give them back the tablet. When I am using the tablet they would be using the study guides and when I am using the study guides they would be using the tablets. We did it for physical sciences and Maths. We did this sharing at school and at home. It helped a lot. There was this topic in physical science which is stociomethod. The majority of the class did not understand that topic and there was a video on the tablet that explained on this method. Then it brought an easier way of doing all the long process and it helped a lot to do it on your own without using the textbook. It made a big difference with my understanding especially for this method, now I find it easy. I always studied on my own and this is the first time I am studying with other people. It helps a lot because when I don't

understand the concepts and things, maybe the one that I am studying with does understand that and then he or she can help me with that thing.

**Zuko exit**

S: I had a lot of fun at the science cave and I also got to learn and that was a great experience. I got to get to know the other learners well and how to interact with them. We did the expo and we also had this competition, with photographs and stuff. We got tablets and study guides to help us study and yeah.

T: what was the most exciting thing that you got to do this year?

S: I think it was the expo even though I was not a part of it. Because it is a very big competition and there are many great prizes to be won. What made it exciting was that I got to see the other learners' projects and they were great. Some of them I have never seen before.

T: what are some of the challenges that you faced in the science cave

S: when we had to go to these events and we had to organize transport and stuff.

T: what role did you play in the club?

S: I was helpful. I helped the others that were entering the expo and also did the voiceover for the rise for climate change event.

T: tell me about that?

S: it was fun. I got to learn a lot about what climate change is doing to our planet all over the world and what is causing it. It is human activities, business and government. So I learnt that we should not do some of these things because they cause harm to the planet. Like polluting was the number one cause for climate change. After you came up with the idea that we should

**Commented [WU38]:** Collaboration: group interaction (process)

**Commented [WU39]:** Challenge: transport

attend the rise for climate change and you asked us if we wanted to be a part of it, I thought that it was a great idea to do something related to our community. So I saw it as an opportunity to try out new things. I had considered doing journalism so I thought that it would just be a start. What let to us doing that video was seeing that there is pollution and we need to do something about it. So I think that rise for climate change conversation was our platform to tell the story of our community. The message was that people should just try not to pollute everywhere in the dumpsites because it is causing a very huge problem.

T: Has there been any changes in your life since you joined the science cave?

S: Yes, well after we received the tablets and the study guides, those video on the tablets helped me a lot because sometime you don't get something in class and then when I watch it in the video I'm like "ahhh okay this is how you do that things that I didn't get in class". Sometimes it is very difficult to ask the teacher to repeat what he was saying so you just watch the video and it helps and you just pause and look at what they were writing, write it down and listen to it again and learn it properly and understand. It helped a lot, especially during the exams. I did it for physics and mathematics and life science and geography at home. I learnt with Vuyiseka. We would watch the video and the we would just study together after and if one of us misunderstands the person we would just explain to each other. And I would also explain to the others with no tablets.

**Commented [WU40]:** Resources

T: Why do you say this was one of the major changes?

S: Well, I think it helped boost my confidence a bit. I stopped being shy and was able to express myself and tell others what I know. I felt clever doing this with people during exams. I was

even thinking that in the future even if we don't get tablets I can just download them on my phone.

T: do you know what my research is about?

S: I think maybe you were trying to, I remember when we met rod at the youth hub he told us that there are lots of resources that are available for learners to use so that they can learn. I think you were trying to get us involved in that so we can use those available resources to see how us as learners in schools, how we interact with them. I think this process took place.

T: are there any things that were challenges for the process to take place?

S: Yes, I know some of us couldn't show up because we were very busy with our stuff. I sure you had a lot of hope that we would come and use those opportunities, but we didn't, some of us. And another challenge, as you said you don't have a job, you are still a student so you don't have money, but whenever we would come together you would try to get refreshments and help others with transport so I think that was a challenge.

**Commented [WU41]:** Challenge: time and participation (In VIVO)

T: looking at the future, what would like to achieve with or without the science cave?

S: with the science cave, I would like it to continue so that it could help others the way that it helped me and I don't want it to end after we leave. But I want to pass grade 12 with great marks so I can go to university and study.

My own challenges NB (16 minutes)

T: What was revealed during this process?

S: what was reveal is that if you bring those resources that we need to us then it makes things a whole lot easier rather than us going to find them. Once we know where to find them then we are able to go find them ourselves. It up to us now, sometimes

with a bit of help. We gained a lot of confidence. You have really helped us a lot so thank you, I really appreciated it.

T: What recommendations would you have about the process?

S: I think if we added more learners, I think things would be a lot better if there were more learners that benefitted from the science cave.

**Themba Interview**

T: Tell me about your experience with the science cave?

S: I have experience all about the things that I can and cannot do like I can use creative things. Like the projects of the science expo and all the things that o have experienced there like we can do whatever we want to do. I joined it at the beginning of the year. I heard that everyone helps each other in this club and nobody will do bad things to each other and that we will feel comfortable. When I first joined the science cave I felt comfortable with nobody bullying me. I found out about the cave when I would see my friends working on some things and I liked the things that they were working on. I did not know that it was a group, but I felt like I wanted to join them to get help and help with some things.

**Commented [WU42]:** Collaboration

There were two exiting things, the photo walk and the science expo and the fact that we got to another level and saw amazing projects. For example someone did a stick for a blind man and it directs the blind man and when the blind man is close to an object, it rings and then whenever he or she is far away he will know that he is not next to an object. In the photo walk I learnt about many birds and many trees and some insects and other creatures that were there for example I didn't know there was a tree that is called a monkey puzzle tree so like, when the monkey goes up it won't know that… the monkey will think that, that tree is a cage for it and the monkey will not climb up

because it will feel dizzy and it will go down. Then I learnt about snakes that on cold day the snake is not able to move itself and then on hot days it can because its blood will be warm and when it's cold its blood will be cold.

What made these experiences exiting is that I learnt more about the scientific things for example when I am talking about scientific things I mean the trees and their names that they are known as and other creature that were there like the birds.

What brought me the most joy is the eskom expo because I learnt more and even next year I will attend it.

T: what kind of helping has taken place this year?

S: I have helped with doing my project for the science expo, doing the thermodynamic flask was exciting and everything was comfortable. What made it comfortable was that we were all united as in our group, we are a group of 10 learners, and all of the 10 learners helped each other. With things that I did not understand I asked others.

T: What role do you think you played in the group?

S: Organising people with things. Like for example that people must do their project and how they must do it.

T: What has been the most tiring or frustrating part of being in the science cave?

S: some of our group members did not attend the competitions like for example the expo and the photo walk. So it was not feeling comfortable because others were not there and like other schools were going with a group of children and they can help each other with some things there. I would have liked if all the members were there because when we are united we are like brothers and sisters.

**Commented [WU43]:** Challenge: participation

T: Do you think your voice was heard this year?

S: Yes, it was heard by the people all over South Africa like when we were at Joburg. They didn't know that people can use recycling materials to make a flask. They now know that everybody can do anything with their hands like even using a chips packet as an insulator. They said that they will use the idea to do the flask on cold days. I feel happy because my project can be accessed by the people who need it. Not everyone will feel poor. They will have the flasks to drink warm tea on cold days.

**Commented [WU44]:** Voice: eskom expo

T: why is important that you didn't feel bullied?

S: It is important because if I was bullied in the science cave I was not going to have more experiences in it. I was going to go away and not be in the group anymore. I would leave the group. When I was not bullied, I just felt like I am with my family. It made me want to participate more.

**Commented [WU45]:** Collaboration and safe space

T: Do you know what my research is about?

S: It is about journalism and it's all about you making sure that children don't feel poor. They must feel wanted and in that journalism you have the projects of… with us you are a monitor of us and even at the photo walk competition you showed us how to use cameras and how to voice record and we have learnt about journalism. This helped the science cave with many things like not to be scared of asking questions about other things to people. Like even the things that we made the video of people burning rubbish.

[I explain about my research]

T: did you get an opportunity to use the study guides and the tablets?

S: I did not get to use the tablets and the study guides because on the day they collected them I was at a funeral. I did not get to share with anyone but I did use my text books and I even went to the library to borrow some books then I started to study. I

didn’t share with the others because I stay far from them and I didn’t get the opportunity to go and borrow with others. Farai came with the tablet and went to Mr. Johnson and showed him what the science cave is involved in. I was not able to go and borrow it because Farai was also on the tablet.

**Noluthando Interview**

T: Tell me about your experience in the science cave

S: science cave has done a lot of things for me. It has opened my mind to new experiences and given me new knowledge. It has given me a lot of confidence because before I could not even ask a question in class but just communicating with other, because at science cave there are a lot of students, and just communicating with others gave me that courage that I could communicate even in class when I don’t know something. It has helped a lot, even in science, at the science expo I saw projects that I never thought could even be exist or could ever be done. I joined the science cave last year.

Commented [WU46]: communication

Last year there wasn’t anything much that we did because, I don’t know if other were busy or what but there wasn’t much doing last year. This year we got to have new member and we got to do things and we have been doing projects.

T: What role have you played in the club?

S: I would say that I have been helpful because I didn’t get to finish my project but I was able to help the other finish their projects so I would say that I have been really helpful to the other members. Well with the group, when they were doing their projects I helped them cut their bottles, I helped them with research, I helped Aphiwe when he wasn’t here, I collected his research and explained some of the things to him.

Commented [WU47]: collaboration

T: what have you been doing since science cave?

S: I wasn’t that interested in science, I was doing it because I want to be a forensic scientist so now it just made me more

interested in science. I have been reading more about astronomy and those kinds of stuff. It has been helpful, even in classes because with Lindelihle, he is very good in science, sometimes we will be having our meeting and he will say something that we didn't know about science and that will make me more interested about that thing or I will even go to him and ask him what he was saying. So it has helped me in class when the teacher is saying something I will be like "ah ah I know that thing" even if the others don't know it.

T: did you use the tablets

S: Well I didn't get those things because I was not at the meeting but I did download myself some stuff, including study guides and past exam papers and they have really helped me. I downloaded them on the internet, I am actually not sure of the websites I just used google. When I found out that the others had gotten tablets and stuff that was downloaded from the internet, I knew that if they could download, I could also get those things that they copied from the youth hub and so I searched the internet for passed exam papers, study guides for geography and they would be certain websites that would pop up and I would click and download. I shared the stuff with my friends. I sent them those exam papers that I downloaded on share it [application]. It is the first time that I am doing this but now I know that it helps a lot so I will continue to do it next year.

**Commented [WU48]:** resources

T: what are some of the challenges you have faced in the club

S: I would say that the challenges I when we are going to do something and we would decide to be all there and some don't come and some miss out on what has been happening. It slows down our progress because now we have to go back to the things that we did and explain what happed and how things went, what we talked about and those sort of things

**Commented [WU49]:** challenges

T: what has been the most exciting?

S: the most exciting thing that we did this year was when we did the expo project. It was fun and thrilling. It was energetic. It used our brains and exercised our minds. Helping the others with their projects was quite a nice feeling because I knew that because I couldn't finish my own science project, I was able to help the others with their projects and other things that they couldn't do. And so it was nice because it meant that I was really helpful and that I have Ubuntu. Which is very important. It is actually important everywhere to be helpful to other because another day you might need those peoples help so it is very important to be helpful. You have to be willing to help not helping because you are forced to.

Commented [WU50]: collaboration

T: how would describe the cave

S: It has been like family because at first some of us didn't know each other and some of us are friends but we all got to get closer to each other, we got to know things about each other. We got to communicate with others and we go to share knowledge amongst others and we have been closer and sometimes you are not afraid to speak to this other person because you know this person is a nice person and you are willing to talk to them. At first we were just afraid, "like uurrg, I am afraid of this person" but that has changed because we have been sticking together from the beginning.

T: do you feel like your voice has been heard by anyone?

S: Yes, I would say my voice has been heard because I have been more talkative to the science cave. I have been communicating. Something that I don't normally do even in class and so it has been very helpful because now even if I don't know someone, I am able to start a conversation with them because I know I have the confidence to do so. At first I was afraid.

T: What would you say confidence is?

S: I would say confidence is when you are not afraid of doing something or you are willing to do it even if it is your biggest fear. Like I said in class I have been more communicative and I am not even afraid of talking in class anymore. I just stand up there and talk and talk and I look people in the eyes. At first I would look down and stutter when I am taking but now I talk fluently and I am nor confident. I am not even afraid of watching the teacher watching me talking. I am not afraid of the learners watching me talking. And when the other learners ask me a question after a presentation, I am able to answer them back. Sometimes I am even eager to be the first one to speak in class. I am able to talk to my teacher in the class but even outside of the class.

**Commented [WU51]:** confidence definition: COMMUNICATION

[Stuff about grandma]

T: if you could achieve anything with or without the science cave what would it be?

S: I would like to start a group, but, where I would teach primary school learners how to speak English or how to write it because I have a cousin who is a slow learner. She doesn't know English that well, she even asked my younger sister to teach her and so I would really like to do that, teach others English. Because English is very important and even in high school you have to know English very well. Being in the science cave has inspired me to want to do this because when you decided to help the science cave you were aiming for us to know more about science and learn more about science while having fun, and that has happened, you have achieved that. And so I also want to do something that makes me feel better about myself and will be able to benefit others and benefit myself at the end.

**Commented [WU52]:** aspiration

What I think you wanted to do with us was make us more open minded about science, make us have more knowledge about science, make us have experiences about science and do science related stuff.

What I would like to achieve with the science cave is, well next year I would like us all to enter the science expo and to make it to Johannesburg and even if not all of us win but just one member of the science cave wins and goes further.

**Appendix 2**

**Ethics approval**

1. Title of research project

# A Communication for Development project aimed at enhancing communication, action and learning within a learner-led Grade 10 science club in a public school in Grahamstown.

06/03/2018

id. 10494409

by **Thandi Bombi** in **HUMAN SUBJECTS ETHICS APPLICATION**

bombithandi@gmail.com

## Stipulations Required

06/14/2018

Applicant's response to Stipulations requested

**Stipulation: Please clarify how video-recording of the participants, will be dealt with, particularly with regards to anonymity? For example, will the faces of the participants be blurred?**

**Response: For the continued anonymity of the participants, the video-recording will show hands and gestures rather than their faces. Extra editing will be done to ensure that the faces of the participants do not appear in said videos. This editing could include blurring the faces of participants as well as cutting video out and only using the sound in the video. I will pay very special attention to this when recording in order for the changes/ edits if necessary, to be minimal. This way I will also not risk missing anything out if there are too many recordings.**
**In the case of making videos for campaigns, as stated in step four of the methods, I will also pay special attention to these factors. We will have to be creative in creating effective messages that do not infringe on the participants anonymity. These videos are less likely to include the participants. Inclusion could be in the form of voice overs and other non-identifiable technical contributions.**

**Stipulation: Similarly, the proposal needs to engage more critically with the security implications of using WhatsApp and other digital platforms. How secure are these platforms, and in light of this, how can anonymity be guaranteed?**

**Using Whatsapp groups:**
**In a whatsapp group, the person who starts the group is the only one who can invite new members to the group. This way the starter of the group can limit access to the group as they see fit. In my role as a facilitator will start the whatsapp group and invite the 10 participants as they are members of the science club. Although each participant**

**knows who the other participants are (because they are in the science club together) no one else but myself will have access to this group, its conversations and activities. Another measure we could employ is to clear the group every few weeks. I don't think this will be particularly necessary as the group will be a platform for discussions and deliberations that have to do with the group activities and not the individual participants involved. I will however use my discretion and keep a copy of the conversations in my private computer where I will keep the rest of the raw data.**
**Using closed Facebook Groups:**
**While Facebook allows for anyone in a closed group to invite others outside of the group. I will discuss it with the group that we need to ensure only members of the science club are involved in the group. This space generally leaves an individual more vulnerable to security breaches so this platform will be strictly to share educational resources. This will be in the form of books, links, video and even websites. Any discussions that occur on this page will be about how to use the resources, where to find similar ones and how they have benefited the sharer. For this purpose I do not think I will need to clear this page, I think it could be beneficial for the participants to have it even after the research process is over in order to have a rich repository of information they have decided is useful for them.**

**Stipulation: By being a participants observer the researcher immediately enters a domain of contested power. The proposal needs to engage with how power issues will be addresses. This is particularly pertinent in this proposal as the researchers is an adult and the participant are children.**

**Response: This is very important! I have chosen the theory C4D particular because of the emphasis it places on challenging the power relationships and structures within research. This is because it involves actively engaging the participants and encouraging voice as well as active listening. My role then as a participant observer will to facilitate a process where the club names and frames its own issues, deliberates alternate frameworks for addressing those issues, identifies available resources, organises actions (including communication with peers, teachers and other actors), and reflects on the possible learnings and changes that accrue from the process.**

**They will always be aware that I cannot have more insight than them because I am not in Grade 10, at their school or in their science club. My only contribution (that I am aware of) is to suggest possible ways to begin to do the process above. I will however step in if I believe one participant is not allowing another participant to actively engage and voice their concerns, I will encourage active listening and one way of doing this is by showing the participants that I listen too. I will share personal ideas and experiences only if I am asked to or if it is necessary. But I deeply understand that as a young person, one is taught that listening to an elder is the right thing to do, what I hope to do with this process is to show that the voices of young people are just as important and older people need to listen too. If that happens then other things that contribute to learning can also take place.**

| | |
|---|---|
| | **Even if it's just that one young person feels listened and therefore they can speak out about certain things regarding their school engagements.** |
| File Upload | n/a |
| File Upload | n/a |
| File Upload | n/a |
| File Upload | n/a |

## Original submission

06/03/2018

Have you obtained a recommendation for ethical clearance from your departmental/faculty subcommittee? If yes, please upload relevant clearance documents here. If no, please obtain this clearance before continuing with this form.

**JMS_provisional_approval-Bombi.pdf**

| | |
|---|---|
| 2. What are the anticipated start and end dates of the research project? | **23 July 2018- 20 September 2018** |
| 3. How will the research be funded? | **Publically funded** |
| 4. Does the proposed research involve collaboration with external (to Rhodes University) research partner(s)? | **No** |
| 5. Indicate the level of the research project: | **Student research project** |
| 5.1 Student researcher name and student number | **Thandi Bombi: g13b2549** |
| 6. Principal researcher's name, department/faculty and contact details | **Mr Rod Amner, Journalism and Media Studies, rodamner11@gmail.com and Prof Anthea Garman, Journalism and Media Studies, a.garman@ru.ac.za** |
| 7. Institutional affiliation of the principal researcher | **Rhodes University** |

| | |
|---|---|
| 8. What is the purpose of the research? | **This research seeks to design, execute and reflect on a process where the principles and techniques of C4D and Social Change are applied to enhance, support and develop qualitative changes within a learner-led Grade 10 science club at a public school in Grahamstown. A successful process is one where members of the club take control of their communicative practices and actions to take advantage of some of the resources they identify and unlock, in partnership with other stakeholders, tracing a blueprint to make the same process possible for their peers inside the classroom.** |
| 9. Provide a brief descriptor of each method of data collection and required sample | **Stage 1: Using ethnographic research methods, I will conduct participant observations which I will record using field notes and where possible audio and video recordings.**<br>**Stage 2: The club will participate in face-to-face Focus group discussions as well as closed Facebook and Whatsapp group discussions that I will observe as well.**<br>**Step 3: The group will create and share media (in the form of videos,and articles and podcasts) through a blog and other digital media platforms of their choosing.**<br>**Step 4: I will conduct in-depth exit interviews with the members of the club to reveal the complex role C4D has played in it.** |
| 10. Is gatekeeper permission required in order to access information and/or participants and/or research sites? | **Yes** |
| 10.1 From whom will gatekeeper permission be sought? Indicate: (a) title and name, (b) institutional affiliation, (c) contact details | **a. Principal Madeleine Schoeman**<br>**b. Ntsika Secondary School**<br>**c. ntsikasecondary@gmail.com**<br><br>**a. Mr M Sangqu**<br>**b. Eastern Cape Department of education**<br>**c. monde.sangqu@edu.ecprov.gov.za** |

10.2 Upload a template of the letter(s) requesting gatekeeper permission

**Letter_to_Ntsika.docx**

**Letter_to_Department_of_Education.docx**

| | |
|---|---|
| 11. Which of the following activities does this research involve: | **A: Interaction with human subjects** |

| | |
|---|---|
| 11-A: Provide a comprehensive description of: (a) the nature of the interaction(s); (b) their frequency and duration; (c) the procedure(s) involved | **Our interactions will take place in the form of 1 meeting a week on Mondays after school for 2 hours. (This may change to two meetings once the project is running, if the group decides that they want more contact time).**<br>**The nature of the interactions are as follows:**<br>**• By 'scanning the environment', I will conduct an ethnographic field study where I attend and observe the meetings of the group to map the communicative ecologies of the club. Here I will negotiate access to the environment and build relationships with the group and other stakeholders.**<br>**This step should take a few weeks as it is vital that we understand the dynamics and culture of the group before we attempt to make any changes.**<br>**• 'Co-designing the intervention strategy', will involve meeting with the club to highlight the key questions about the changes we wish to promote for the exploration and appropriation of the communicative ecologies. Here we will decide on the objectives of the intervention and the tools and channels we have and need to ensure that the intervention is effective. This can take place in one meeting.**<br>**• In 'Implementing the strategy', I will play a facilitative role in implementing and ensuring that campaigns possibly in the form of videos, social media, and club debates are carried out by the group. In this process we can, as a group, start to identify resources (e.g. newspaper articles about Science) and target outside stakeholders (e.g. Science experts). This also could involve me introducing some media skills in the form of writing, taking video and recording and editing audio but this will depend on the form of media the club wishes to take on.**<br>**• In the final phase the club members and I will reflect on the process. This step will be done by conducting hour long one on one in-depth exit interviews with the members of the club to reveal the complex role C4D has played in the club.** |

11-A: Attach a draft copy of the proposed interview schedule and/or survey questionnaire and/or description of the assessment task and/or copy of the observation schedule etc. as applicable

**draft_exit_interview_questions.docx**

| | |
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| 11-A: Indicate the Minimum/Maximum sample size required | **The research is focused on an already existing science club and there are 10 members of the club. Therefore the sample size for the research will be 10 participants.** |
| 12. Will any records contain any individually identifying information? This is includes information about third parties | **No** |

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| 13. Does the proposed study constitute health research? | **No** |
| 14. Will the research involve the use of anything (e.g. a procedure/ technology/therapy etc.) which constitutes Intellectual Property (IP) and for which particular protections or permissions apply? | **No** |
| 15. Does any aspect of the research require the involvement of an appropriately trained and/or accredited and/or registered professional? | **No** |
| 16. List and briefly describe all of the sampling criteria | **The only criteria is that they are members of the grade 10 science club when approval from the ethics committee is received.** |
| 16.1 Is any information collected from sources located in an institutional setting? (e.g. hospital, prison, school, university)? | **Yes** |
| 16.1.1 Identify the institutions(s), including: (a) Name, (b) Location, (c) Type of institution | **a. Ntsika Secondary School**<br>**b. Grahamstown, Eastern Cape**<br>**c. School** |
| 17. Does any aspect of this research require obtaining informed consent and/or assent? | **Yes** |

17.1 Upload templates of all information letter(s) and consent and assent form(s)

**Consent_Form_Parents_and_Learners.docx**

| | |
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| 17.2 Describe the process by which consent to participate in the research will be negotiated and obtained | **Once having discussed the project with the Principal of Ntsika Secondary School, I will ask her for permission to meet the science club to talk to them about the project. Here I will only explain the information I have provided on the consent forms and then I will ask them to think about it and discuss it with their parents. I will then meet them at a later stage to see if they have the signed consent forms and have a similar session where I explain that they are free to exit from the research as soon as they are no longer interested in being participants. In this session, I will also ask them to share any personal concerns they might have and we can keep a record of this just in case we need it.** |
| 17.3 How will participants be contacted and notified about the research? | **I have an already existing relationship with the science club and have explained it below.**<br><br>**During my time as a Media Officer at Scifest Africa, I interacted with various schools in Grahamstown. This is where my initial relationship started with Ntsika Secondary School. During this time, Principal Madeleine Schoeman, sent me a list of learners with an interest in science. That is how I came to know of the learners and their interest in starting a science club. After my time at Scifest Africa, the relationship with the students continued but the interaction would take place at their school on days where I would meet their principal to talk about some of my work.**<br>**After some time the group asked to meet on a more regular basis to talk about their club and help with their exam preparation. We met for the last time for this in October 2017, when I began to write my proposal. The club has since contacted me to find out when our meetings can start again as they are interested in growing the club to achieve more.**<br>**I have spoken to Principal Madeleine Schoeman, about my relationship with the club and she is very excited to see the science club reach its potential. While we have not done anything research related, we speak regularly about school and how members of the science club can support one another in the process. The learners' parents are aware of the relationship as I formally introduced myself through a consent form (to speak to the learners) during my time at Scifest Africa. While the learners are aware that I am interested in meeting with them more regularly and speaking to them about my own research, this is something I will not do unless I have institutional permission to do so. In the interim I will be in non-research communication with the club as long as they reach out to me.**<br><br>**Because of this existing relationship, I have the clubs contact details and I have access to the participants. I will personally go to the school and ask to meet with the club to talk to them about the research. I will not assume that my already existing relationship with the participants will ensure that they agree, I will also explain that there will be no penalties or love lost if they choose to not participate in the research.** |

| | |
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| 17.4 Will any sort of public notice be used to advertise the research to potential participants and/or gatekeepers and/or legal guardians? | **No** |
| 17. 5 Is the information about the study provided to participants prior to obtaining their consent complete and accurate? | **Yes** |
| 18. Will any of the information be obtained from, or pertain to, people who may be considered vulnerable? | **Yes** |
| 18.1 Which measures will be in place to ensure that vulnerable individuals are not exposed to additional risk or harm as a result of this research? | **The research seeks to explore the communicative ecologies of the participants to attempt to make them less vulnerable (provide a larger network of resources that can help with the education processes). By placing great emphasis on unlocking and sharing resources, the potential risk, which would be possible conflict with teachers, is averted. The participants will be encouraged to share the avenues they have unlocked which could possibly help their peers as well as the teacher.** |
| 19. Does this research pose any risk of harm, embarrassment or offence, however slight or temporary to participant(s) and/or any third parties and/or to a particular social group or institution or a community at large? | **Yes** |

| | |
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| 19.1 Describe the nature of the risks involved: | **1. Although the research takes place outside of the classroom setting, it is possible that the participants, which are school learners, could feel they are doing something that could potentially cause a rift between them and their teachers. This is due to the fact that some learners believe deeply that teachers are the depositors of knowledge and learners are depositories. By beginning a process where the participant unlocks other avenues that could benefit their education, it is possible that they might feel guilty or like their are doing something bad behind their teachers back.**<br><br>**2. Another risk could be conflict within the group because of competition and one member seeming to be achieving more, or seeming to be more highly favored than another.**<br><br>**3. Once the communicative ecologies are outlined, participants will be contacting some of those who could potentially help them achieve their education goals. This process opens up the risk of them dealing with stakeholders that may have and age, education and therefore 'power' advantage and an unsuccessful process could leave the participants feeling less empowered then when the process began.** |
| 19.2 Which remedial measures will be in place in the event such risks occur? | **1. If this takes place then there will be the need for a re-understanding of what the research process is for. Instead of participants seeing the potential conflict with the teachers we will use the mapping of the communicative ecologies to highlight the teachers role as a potential stakeholder and partner to the club. This way the participants are working independently, yes, but also alongside the teacher and realizing something more significant than without the teacher.**<br><br>**2. Here we will have to go back to the aims of the process and discuss the importance of collaboration. We can participate in team activities that require every individual and reflect of the process. Once the reflection is done we can, as a group, apply the situation to the group and discuss competing behavior and what it can do to the group. Once that is done I can talk to individual members to see if they have been affected differently by the exercises to ensure that once we proceed with the research process we are back at an equilibrium.**<br><br>**3. Communications with stakeholders will be done primarily 'through' me and the club. Although the participants and I will identify the stakeholders, use the club email address and write draft emails to the stakeholders together, I will type and proofread the emails signing off with my details as well as the details of the club rather than the participants personal details. This will ensure that the stakeholders know they are dealing with the club rather than the individual participants taking away any personal harm or risk from any individual.** |

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| 19.3 What provisions will be made to minimize the potential of these risks occurring | **1. As this is a participatory action research process, I will ensure that we constantly reflect on the process as well as talk about any conflicts the participant is experiencing (such as the example above). Taking this measure will ensure that risks such as these, or others I have not anticipated are highlighted so we can resolve them immediately. This will also alert me as to whether extra measures need to be taken within the research to ensure that the participants end off with a positive and uplifting experience.**<br><br>**2. From the very beginning, I will highlight my role as one that is of a facilitator. I will also encourage the group to share information and take on a culture of working collaboratively in order to achieve more. This way the group will see that the achievements are not personal but rather when they have all contributed something meaningful. This should lesson the need for competition.**<br><br>**3. My role as a facilitator here is then very important. The measure for this risk would be to ensure that the communication is mediated and that the participants are made aware of the boundaries that such communication would need. I then switch roles from being a researcher to being one of their resources and use the process to guide them towards having regular and professional communications with stakeholders of their choosing. The process of them deciding on which stakeholders are important and appropriate would also be something I have to guide them through carefully to ensure that once the research process is over, they know how to go about the process independently.** |
| 19.4 Has the person administering the project previous experience with the particular risk factors involved? | **No** |
| 20. Which benefits, if any, are expected to accrue to individual participants, and/or third parties, and/or a particular social group and/or institution and/or community or society at large as a result of the research? | **This research proposes to introduce a Communication for Development (and Social Change) C4D process with a Grade 10 science club at Ntsika High School, to explore the club's communicative ecology and resources, and their potential to contribute to learning practices.**<br><br>**There are an array of assets to support learners like these, who are trying to create learning spaces outside of the classroom. In Grahamstown, these out-of-the-classroom assets include annual science festivals, science quizzes and a science expo; the Joza Youth Hub, the Albany Museum. There are also many digital learning resources that can be found on zero-data-rated websites all aimed at providing extra tools to nourish and support young and curious minds.**<br>**Even though there are a variety of resources available, there are learners that either don't know that the resources exist or have no ideas about how to use them to support learning already taking place in the classroom. This research proposes a framework for the guided** |

| | |
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| | **exploration and appropriation of these and other such resources in a learner's communicative ecology, through a C4D process.**<br>**A successful process is one where members of the club take control of their communicative practices and actions to take advantage of some of the resources they identify and unlock, in partnership with other stakeholders, tracing a blueprint to make the same process possible for their peers inside the classroom.**<br><br>**The immediate benefit, even if the club is not successful, would be to the participants. Through this process they will interact with a variety of resources that are available to them. At the end of the process they will at least know the learner support material and resources available to them and their peers. By forming a club to explore their interest in science, this group has taken initiative. To attempt to support that initiative can have a positive effect on the participants self worth and agency; by attempting to support them as a group (with thought, research and institutional support), I hope to reinforce the idea that they are empowered and powerful agents of change even at secondary school level.**<br>**If the club is successful in appropriating some of the resources then third parties (in the form of classmates and school mates) could benefit from the knowledge the club brings to the fore.**<br><br>**From a research perspective, there are a variety of groups and researchers who highlight, learners running their own science clubs successfully as something that is missing. This research could potentially provide information or better yet, a model for such groups to take into schools who are looking to support learners in this way. In general South African science education is something that is in need of support for various reasons. Pupils from rural, public and under-resourced schools could use support in linking them to learner support material that is already available to them. While this project is based on Grahamstown, there a other schools where learners are gathering to support one another and to have this research and information could be a step in the right direction in terms of getting those learners the support they need and deserve.** |
| 21. Do you or other researchers involved in the project have a potential or actual conflict of interest in this project's conduct or outcomes? | **No** |

| | |
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| 22. How will you ensure that information is captured, transferred and stored securely? | **I will use a recorder to record all of the meetings with participants. The recordings will then be transcribed by me (weekly, after the meeting) on to a personal laptop I never remove from my home. All identifiable data will be stored securely the laptop with password-restricted access and only the researcher (and supervisor if applicable), and ethics committee members will have access to it. I will do the same with field notes. The names of participants will not be captured when transferring of the information. I will assign 10 pseudonyms that I will keep and use for the purposes of keeping my data coherent. Because I am dealing with a specific set of participants the pseudo-anonymised names will be potentially link able to the participants. This however can only occur if I have to show my information (upon official request) to my supervisor or this committee.**<br><br>**If I am to move my data (to work on it on another computer), I will do so on a hard drive that contains no identifiable information about the participants. On this, the name of the school, age of participants and names of clubs will not be used. This is a precaution just in case I loose the hard drive, so that anyone who would find it would not be able to link the information back to the participants.**<br><br>**All identifiable information (on the drive/ on the laptop and elsewhere) will be destroyed at the end of the study or after 15 years, whichever comes first.**<br><br>**I will not be using transcribers or translators for my research.** |
| 23. How will you disseminate and feedback project outcomes at the end of the research? | **Because the project requires that I build a relationship with the club, the feedback process will be done in person. I will meet with the club and explain the research step by step. In this presentation, I will explain the theory and findings and invite the club to give feedback that I hope to add to my final write up. I hope to share the research with community partners (particularly Rhodes University Community Engagement) and see if they are interested in the information or the process undergone.** |

| | |
|---|---|
| Please confirm each of the statements below: | **All of the information provided in this application is complete and accurate**<br>**This research will not proceed before ethical approval is obtained**<br>**Only authorised persons will have access to the data**<br>**The information collected will only be used for the purposes for which approval has been obtained**<br>**This research project will only be conducted if funding is adequate to enable it to be carried out according to good research practice and in an ethical manner**<br>**Any and all additional information required by the RUESC either before approval is obtained or as the research progresses will be provided immediately upon request**<br>**The RUESC will be immediately notified in writing of any proposed change to the project which would in any way alter the risks associated with doing this research and await approval before proceeding with the proposed change**<br>**The RUESC will be immediately notified in writing of any proposed change to the researchers involved in the project and will be provided the names and contact details of new and/or departing researchers**<br>**The RUESC will be immediately notified in writing and within seven days of any serious adverse event that occurs in the course of the research** |

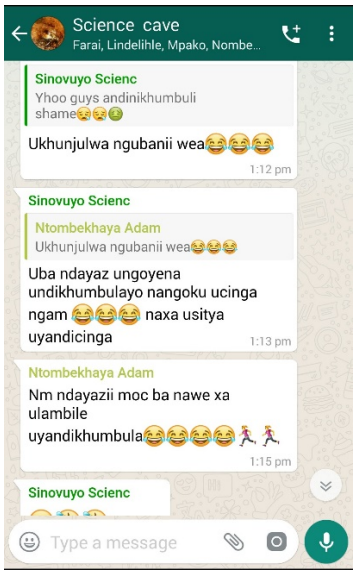
Section H: Additional Documentation

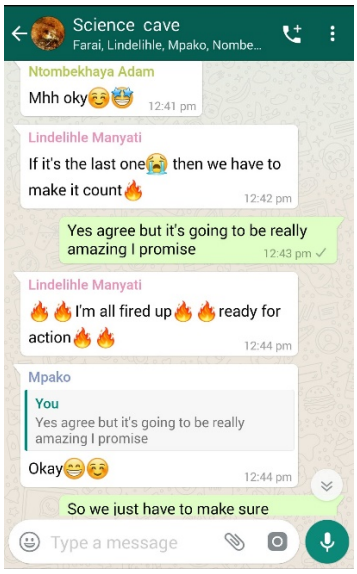
**TBombi_Context_of_participants.docx**

**TBombi_Research_Proposal.docx**

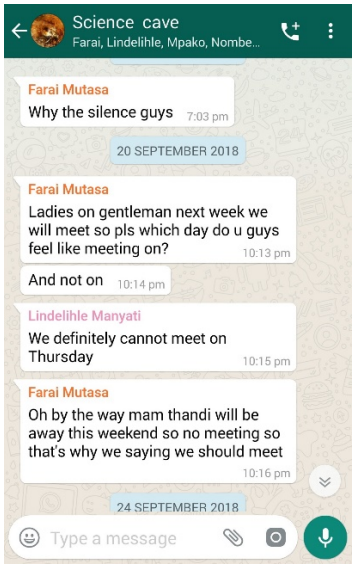
# Appendix 3

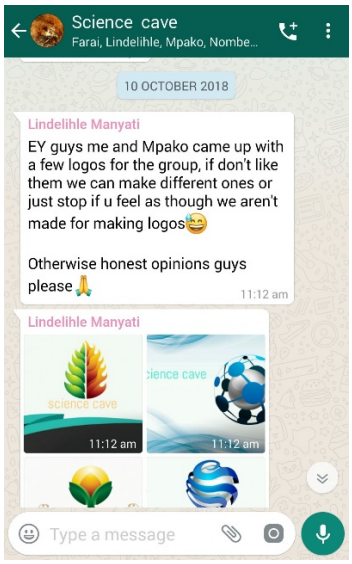
## Screenshots from the Science Cave Whatsapp group



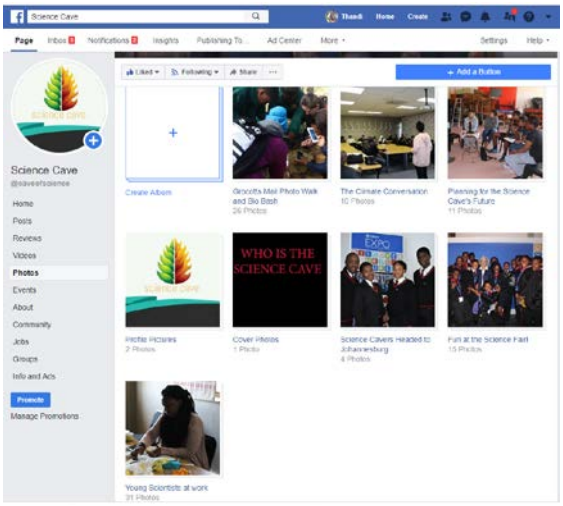


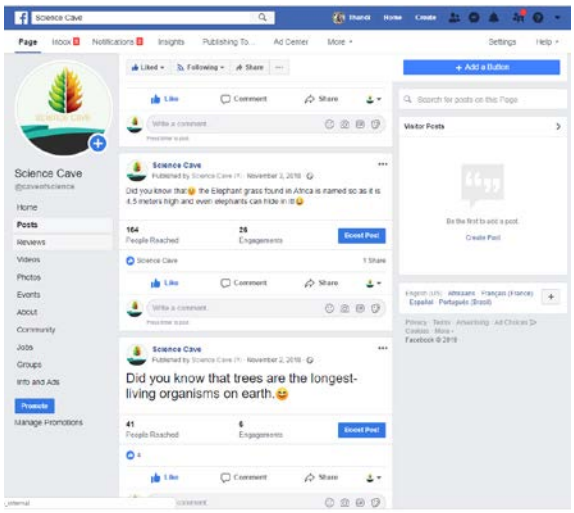


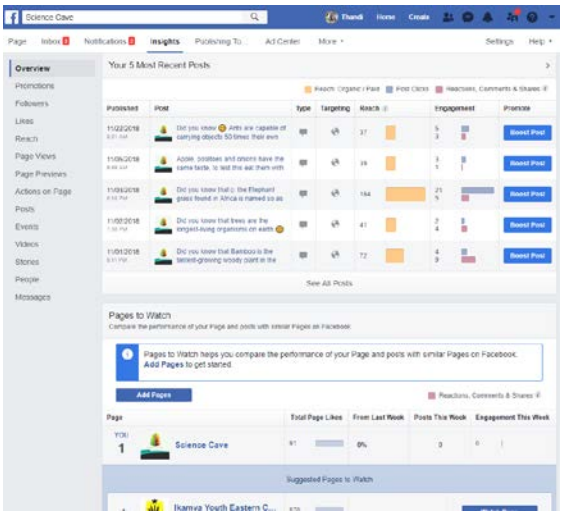



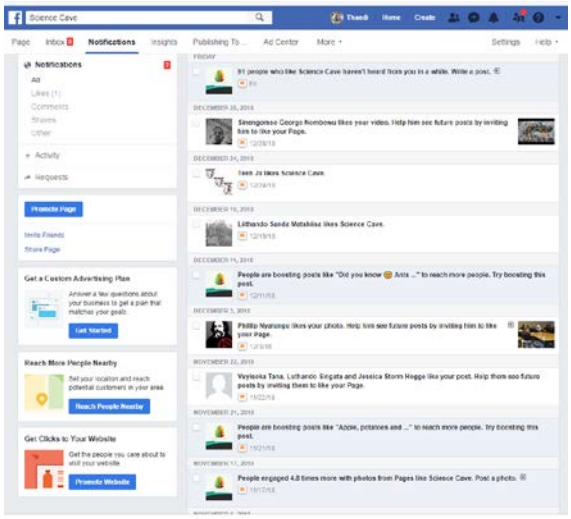
## Appendix 4: Screenshots from the Science Cave Facebook Page

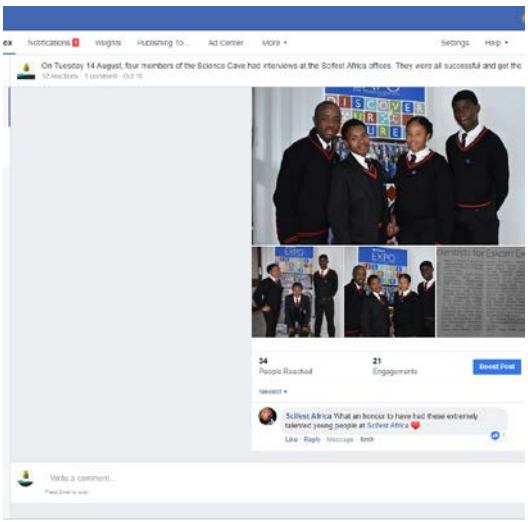
https://www.facebook.com/pg/caveofscience/posts/?ref=page_internal

**Appendix 6 :**

**Science Cave plans**

**What is the Science Cave:**

We are the Science Cave, a group of 10 innovative learners with the potential of making the world a better place. We started the Science Cave to have a community of Ntsika Secondary School learners who motivate each other to be more courageous and communicative about science. We also tend to push each other to try and learn and achieve more. We started the club in mid 2017. This year the Science Cave participated in Eskom Expo and 4 of our members are going to the International Science Fair (ISF). Two of our members are currently participating in the Allan Gray Entrepreneur Challenge. The rest of our members are working hard to organise the Science Cave so we can get access to as many resources as possible. We have had help from Rhodes University student, Thandi Bombi, who is doing her masters project of trying to help us get organised.

**The Clubs Vision:**

**Why did the club form?**

This club was formed because of 10 passionate learners wanted to learn more about science. We wanted to boost each other and make the world a better place in the process. At First the club was formed to help learners to be comfortable in class and be able to ask a teacher about something they do not understand. The club grew into us doing science related activities like Expo and other experiments.

**Who is the club for?**

The club is for anyone who is interested in science and also learners who are doing subjects that are science related. Learners who are interested in science related careers and anyone who is interested are welcome.

**What can be achieved by the club?**

There is a lot we can achieve. So far one of our members has received a Bursary from Rhodes University. Four of our members are going to the International Science Fair and we have been invited to various science related events in and around Grahamstown.

**Roles in the club**

1. **Event organizer**

| |
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| With the help the of the Rhodes contact person the organizer finds and plans events for the club. |

1. **Communication person**

| |
|---|
| This person with the help of the Rhodes person contacts people who the club wants to be involved. |

2. **Secretary**

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|---|
| This person keeps the plan book and records attendance and any important things the group talks about. |

3. **Representative (Media)**

| |
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| This person works closely with the Rhodes person to discuss how the meetings are going and any other things related to the wellbeing of the club. This person also takes care of social media and other kinds of media. |

4. **Rhodes Person**

| |
|---|
| This person will take over from Thandi Bombi. They have to be a not controlling, nice person. They have to speak both English and isiXhosa or at least understand isiXhosa. They will help us with connecting to the rest of the world. They will help |

us in the different roles and they will also help us build and constantly update our calendar.
They will guide us and assist the representative. Help us a lot.

5. **Assisting teacher**

Which teacher:
Mrs Barnard and Mrs Brandth
(They can guide and assist us with little science)

Mam Ralo
(We can update her about everything and she is going to help us when we need help and she will keep some of our documents)

Mrs Jack
(To guide us, lead us and also help us to improve any ideas for the science cave)

**Club Contact details:**

**Email Address:**
sciencecave314@gmail.com
Facebook page:

**Teacher contact**

**Rhodes person Contact**
Thandi Bombi, bombithandi@gmail.com
0769718229

**Prinicipal Contact**

| |
|---|
| **Whatsapp group** |

**Meeting Days**

Mondays 14:30 every week.

Saturdays: 11h00-16h00, every second week

**Venue**

Monday at School, Mrs Barnard's class

Saturday at Youth Hub

**Media Strategy (How do we show the world what we are doing)**

What Kind of media do we want to produce?

| | |
|---|---|
| Radio | |
| Video | |
| Writing<br><br>Photography | |

**Calendar Template**

| Monday | Tuesday | Wednesday | Thursday |
|---|---|---|---|
| | | | |
| Friday | Saturday | Sunday | |
| | | | |
| Monday | Tuesday | Wednesday | Thursday |
| | | | |
| Friday | Saturday | Sunday | |
| | | | |

**Meeting Days**

Mondays 14:30 every week.

Saturdays: 11h00-16h00, every second week

**Venue**

Monday at School, Mrs Barnard's class

Saturday at Youth Hub

**Activities**

**What do we use the Monday meetings for?**

- To discuss our plans for the science cave
- We can discuss improvements and helping each other with our roles
- To discuss the ideas we have on improving and will lead to recognition for the science cave

**What do we use the Saturday Meetings for?**

- To do activities and events
- Also to use the hub to plan other stuff (with access to internet)
- We can watch science movies, study and do research at the Youth Hub as well
- We bring our plans to reality!

**Club Contact details:**

**Email Address:**

sciencecave314@gmail.com

Facebook page:

**https://www.facebook.com/caveofscience/**

**Teacher contact**

**Rhodes person Contact (2018)**

Thandi Bombi, bombithandi@gmail.com

0769718229

**Prinicipal Contact**

**Whatsapp group**

**Organizing Club Venue**

**Email Template:**

**Dear:** (Person being contacted)

**Introduce yourself:**

We are the Science Cave, a group of 10 innovative learners with the potential of making the world a better place. We started the Science Cave to have a community of Ntsika Secondary School learners who motivate each other to be more courageous and communicative about science. We also tend to push each other to try and learn and achieve more. We started the club in mid 2017. This year the Science Cave participated in Eskom Expo and 4 of our members are going to the International Science Fair (ISF). Two of our members are currently participating in the Allan Gray Entrepreneur Challenge. The rest of our members are working hard to organise the Science Cave so we can get access to as many resources as possible.

**Give reason why you are emailing**

**xxxxxxxxxxx**

**Thank you for taking the time to read this email.**

**Kind Regards**

**Science Cave, with help from (whoever helps)**

**Who else needs to be contacted for what?**

**Rhodes Contact (2019)**

**Kim weaver**: k.weaver@ru.ac.za,

She is the science faculty community engagement officer

**Joana Bezerra**: bezerra.joana@gmail.com

She is from the center for Epistemic Justice and Engaged Research

**Venue**

**Rod Amner**: rodamner11@gmail.com

He is on the board of the committee for Joza Youth Hub

**Scifest Africa**

**Sibusiso Spelman Mkotyana**: outreach@scifest.org.za

He is the Scifest Outreach person

## Goal Setting Template

| Goal | Date to Achieve it | Who can help + contact details | Was it achieved |
|---|---|---|---|
| **Study Club** | | | |
| **Tree planting** | | | |
| **Getting involved in journalism** | | | |
| **Project interconectivity** | | | |
| **Entering Expo** | | | |

| | | | |
|---|---|---|---|
| | | | |

**First Email Sent**

To: rodamner11@gmail.com, bombithandi@gmail.com

Dear Mr Rod,

We are the Science Cave, a group of 10 innovative learners with the potential of making the world a better place. We started the Science Cave to have a community of Ntsika Secondary School learners who motivate each other to be more courageous and communicative about science. We also tend to push each other to try and learn and achieve more. We started the club in mid 2017. This year the Science Cave participated in Eskom Expo and 4 of our members are going to the International Science Fair (ISF). Two of our members are currently participating in the Allan Gray Entrepreneur Challenge. The rest of our members are working hard to organise the Science Cave so we can get access to as many resources as possible. We have had help from Rhodes University student, Thandi Bombi, who is doing her masters project of trying to help us get organised.

We are emailing to ask for permission to use the Youth Hub on Saturdays. We are hoping to use it every Saturday with a minimum of 5 Science Cavers at the Hub every time.

We would like to start using the hub on 15 September 2018 from 11am to 4pm. We would like to use the space have our Science Cave meeting, make plans about how to use the hub and then for a study session and to download some resources. In the future we might watch movies during this time too.

We would also like contacts for anyone who might be able to support the club with transport to and from the hub.
Kind Regards
Science Cave, with help from Thandi Bombi

**Second Email Sent (Sponsorship)**

To: Julian Jacobs: jlcommunications11@gmail.com

Good Day,
We are the Science Cave, a group of 10 innovative learners with the potential of making the world a better place. We started the Science Cave to have a community of Ntsika Secondary School learners who motivate each other to be more courageous and communicative about science. We also tend to push each other to try and learn and achieve more. We started the club in mid 2017. This year the Science Cave participated in Eskom Expo and 4 of our members are going to the International Science Fair (ISF). Two of our members are currently participating in the Allan Gray Entrepreneur Challenge. The rest of our members are working hard to organise the Science Cave so we can get access to as many resources as possible. We have had help from Rhodes University student, Thandi Bombi, who is doing her masters project of trying to help us get organised.

We are emailing to find out if you have any contacts that might be interested in supporting our club. We are currently awaiting a response from organizers about using the Youth Hub. We are however having trouble with transport costs in preparation for ISF and just our general meetings.

We look forward to your response.
Kind Regards
Science Cave, with help from Thandi Bombi

**Appendix &**

**Science Cave video**

**https://www.facebook.com/caveofscience/videos/479841139184632/**

**Appendix 8**

**Article about science cave**

# Young scientists for Eskom Expo

By THANDI BOMBI

On Tuesday 14 August, finalists from the Eskom Expo Regional Finals gathered at the National Settlers Monument to find out if they would be representing the Eastern Cape at the International Science Fair (ISF) on 2-5 October.

The finalists were chosen on 4 August during the Regional Finals held at Rhodes University. Of the 254 registered pupils and their 187 projects, 13 went through to represent the Eastern Cape.

"It has been difficult to narrow it down to 13 projects," said Scifest Africa Manager, Pumza Tshebe.

Grocott's Mail joins Eskom Expo for Young Scientists in congratulating the following pupils who made it to the interview stage:

Aphiwe Koliti, Ntsika Senoir Secondary School; Nzuzo Mpondwana, Ekuphumleni High School; Sesethu Gaga and Asomeleze Matyumza; Ekuphumleni High School; Michelle Brown and Raquel Knott, Kingswood College; Nicola Kroese and Abongile Nokenke, Victoria Girls' High School; Claude Hilpart, Hoërskool P.J. Olivier; Zaza Germand, Victoria Girls' High School; Ntombekhaya Adam and Sinengomso Nombewu, Ntsika Senior Secondary School; Farai Mutasa, Ntsika Senior Secondary School; Tosca Stolof, Victoria Girls' High School; Siviwe Zuzile and Simamkele Puleni, Nathaniel Nyaluza Senior Secondary School; Shandrei Lockwood, Victoria Primary School; Cassidy Doyle, Victoria Girls' High School; Jessica Lobb,, Victoria Girls' High School; Kate Jackson-Moss, Victoria Girls' High School; Erin Bradley, Victoria Girls' High School; Kamva Daniels, Nathaniel Nyaluza Senior Secondary School; Jaden Keulder, Victoria Girls' High School

The following pupils are the 13 representatives to ISF Eastern Cape:

Aphiwe Koliti, Ntsika Senior Secondary School; Nzuzo Mpondwana, Ekuphumleni High School; Michelle Brown or Raquel Knott, Kingswood College; Nicola Kroese or Abongile Nokenke, Victoria Girls' High School; Ntombekhaya Adam or Sinengomso Nombewu, Ntsika Senior Secondary School; Tosca Stolof, Victoria Girls' High School; Siviwe Zuzile or Simamkele Puleni, Nathaniel Nyaluza Senior Secondary School; Jessica Lobb, Victoria Girls' High School; Kate Jackson-Moss, Victoria Girls' High School; Kamva Daniels, Nathaniel Nyaluza Senior Secondary School; Lolitha Koti, Victoria Girls' High School.

**Appendix 5**

**Radio Interview Transcript:**

**Presenter:** Please introduce yourselves

**Caver One**: in the science cave we are a group pf 10 learners who basically make their own decisions in trying to make our environment better. We are also trying to push each other forward. So basically we create our very own projects of which Ms Thandi helps us with. We make sure that our projects are based on helping the community at all times because that is basically our ultimate goal, making the world a better place.

**Presenter 1:** What projects have you done?

**Science caver 2**: Well a few weeks back, we joined the science Expo where we made some projects to present there. We made a few project for example, a thermal flask, an h20 purifier that cleans water and we did these projects with the hopes of helping the community. Four of our members are headed to Johannesburg to present their projects.

**Presenter 2:** The H20 purifier, how did you guys come up with that idea and how long did it take you guys to do it?

**Science caver 2**: Well, the H20 purifier is uses solar energy to clean water, we were trying to find the cheapest way to clean water. Some people don't have the money to buy electricity so the h20 purifier uses the sun. You put it in the sun for a few hours and the water condenses and rises as water vapor in a tube and the clean water is transferred to another bottle.

**Presenter 1:** People look at science as something difficult what do you guys have to say about that?

**Science caver 3**: in life nothing is easy and nothing is hard its up to you. If you are determined to do something you will do it. The idea that science is hard is what other people with think is they are determined to work hard. But is you are determined you will be able to accomplish what you set yourself up to do.

**Science caver 2:** The other thing about the science cave, we are also trying our best to help the community. We just launched recently and one of our projects is to help the waste pickers of Grahamstown who recently created a community garden. So we want to try and do something where we make compost for their plants to get more nutrition. So you don't have to be like a scientist to change the world all it takes is hard work.

**Science Caver 4:** And you don't have to be a student who does science to be in the science cave, as long as you are interested in science and you are interested in helping the community.

**Presenter 1:** So is there anything you need help with like sponsors?

**Science caver 4:** We do want sponsors if they can help us get some of the materials to accommodate us.

**Presenter 1:** How can sponsors contact you?
**Science caver 5:** We have a Facebook page, the Science Cave and we also have an email address that you can find on the page.

**Presenter 1:** is there anything else you would like to add?

**Science caver 2**: I would like to encourage people who are doing science subjects or thinking of choosing them, if you have a skill or passion for science go for it. There is no time for waiting, there is so much you can do to improve our country.

**Science caver 5:** if there is anyone who wants to join the science cave, they can because we want the group to last because we were thinking what would happen once we get to grade 12. Is that where the science cave will end? So we were thinking of adding more people to the group if they are interested they can join.

**Presenter1:** are you all in grade 10?

**Cavers:** Yes

**Presenter1:** Okay thank you for joining us today.