Community of Practice as a teaching approach in a postgraduate environment.

An insider ethnography of a higher education institution in South Africa

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Abstract

This auto-ethnographic description of the experiences in the development of the teaching and learning approach, at the postgraduate level, introduces the impact of the community of practice in the development of the learning processes in South Africa, with an international view. The principles of community of practice are outlined and the theoretical grounding is provided in terms of the notion of assemblage theory, the definitions of fundamental and derivative epistemic authority, as well as the assemblage boundary and the personal intents of the community of practice members. The theoretical grounding is then applied through several iterations of the community of practice between 2006 and present. The adaptive nature of the community of practice as an assemblage and the function as a sociology-of-knowledge system are outlined.

Keywords: community of practice; teaching approach; learning; assemblage theory; sociology of knowledge; South Africa.

Introduction

This work is an attempt to describe some aspects of teaching I have been involved in at postgraduate level at a South African University between 2006 and present. Aspects of international collaborations will also be mentioned and the activities I have been involved in are going to be discussed. Challenges that I have faced in teaching have been caused by various factors. Firstly, there existed a gap in my understanding of the links between knowledge and the social settings in which it is generated, evaluated and utilised by humans. I struggled for a long time to grasp that nature, essence and interpretation of knowledge, that it is always connected to individual people and a society they are part of. Secondly, the cross-cultural issues in teaching and learning have been difficult to grasp for me, as I was coming from a natural science background. Finally, the creation of knowledge by me and collaborators (other academics and postgraduate students) has been a complex process which is still ongoing. New challenges and re-working of modus operandi is a constant feature in my teaching and learning activities, in my academic life.

I struggled for a long time to see the way to address these challenges. However, I could not or did not want to dismiss them outright given, as there has always been a need for me to refute assumptions based on evidence and hard data only. There was always the need to gain understanding of things I did not grasp at first glance. In dealing with these challenges, I tried to follow the scientific method. The scientific method and data would provide a way disprove my original beliefs that were wrong. It would allow me to obtain a new way of understanding a subject better and grow as an academic. The scientific method, as I understand it requires one to question all assumptions of one's understanding of the world around them. It requires us to answer questions we have and use the answers to come up with new questions to ask as we move along the path to knowledge generation and dissemination. This is similar to the description of the nature of exploratory research in social science (Reiter, 2017) and exploratory research in the natural sciences (Jaeger and Halliday, 1998). I definitely think confirmatory research is present in the scientific realm, but I consider it to be a relative term as most scientific knowledge is a fluid entity. It evolves at the speed of light in the 21st century and what is ground-breaking today is often old news tomorrow.

During my journey as an academic, the way I have seen and interpreted the term *data* has been continuously re-defined to include student and my own perceptions about higher education. *Data* is connected to my interpretation about the nature of scientific reality, connected to my teaching and learning space, connected to me working with other people in the generation and dissemination of knowledge and scientific information. One of the elements in the process of learning and one's personal growth is to identify or give names to the perceptions of knowledge we have, to things we perceive to be true and to the processes through which we interpret data and engage with scientific knowledge. As a result, I thought for many years that teaching and learning were simple. Basically, there were scientific facts that were published after rigorous scientific discovery, they were peer-reviewed and often after became part of subject matter in textbooks. As such these scientific facts describe, help us interpret and ultimately are the correct representation of reality. They are true and everyone needs to perceive them the same way, or in a very similar way. Scientific facts were derived from data.

As this was "reality" in my academic career when I had started, I thought this reality was absolute and it had to be the same reality for the students' academic careers, the students I would teach or pass the knowledge onto. Background of a person had no direct relationship to the validity of scientific information and knowledge in my opinion. Data measured using the same method by different people would always be same within statistical error or range of measured/observed values. The next steps in the scientific process would be the same, i.e. interpretation of the data, data processing and then the conclusions would be the same as well, regardless of identity of the scientist or researcher. Knowledge was seen by me as the receipt of the scientific facts by students, their dissection and personal development of subject understanding by an individual student, and then finally their internalisation and creation of the mental construct of such knowledge by the individual student. Thus I use to teach students in a "straight line", when the subject matter and methods of scientific inquiry were delivered to the students by me. The students were presented with hard and unquestionable facts, and they had to practise established methods that led to the scientific findings. I later learned that this way of processing knowledge was a combination of transmissionist education and a version of radical constructivism (University of Buffalo, 2021; EduTech Wiki, 2014).

My reality was from a philosophical point of view looked in line with the priority principle, namely "Priority principle: We human persons have mental properties (like hoping for rain) in the primary and nonderivative sense. We think our thoughts in the primary and nonderivative sense" (Bailey, 2015, page 165). Data in my mind was always measured, perceived and interpreted in a particular way. It was characteristic of just one reality and its interpretation should be constant by all scientists in a field of specialised academic expertise. This "absolute nature" of data and derivation of facts/knowledge from that data by processing were absolute in my mind. Data and methods of science were seen by me as absolute, for my brain such interpretation of scientific data was part of me in the non-derivative sense. The way I taught was correct and if the students struggled than this would result from their lack of engagement, their lack of skills or lack of understanding of the subject matter. Additional tools to facilitate learning would be simple, e.g. frequent testing of the progress in student knowledge development, scrutiny of the measured results by me to see if the students followed the procedure correctly. I saw teaching as completed when my understanding of reality and the students' one achieved the status of a "singularity" (Gale et al., 2020). In other words, teaching and learning were successful, if my understanding of data, scientific methods and reality converged at the same end point, as the students understanding of these terms did. The reality was the one in the postgraduate teaching and learning space.

In a way, I could say in retrospect here that I saw myself as a kind of limited fundamental epistemic authority as defined by Spaić (2013, pages 145-147), but in the realm of science not legal practice. To unpack this, the following reasoning can be provided. I showed commitment to knowledge and its generation through long-term engagement with science and academia. I succeeded and this was reflected by obtaining a PhD degree in Pharmaceutical Sciences. I then proceeded with interest to continue working in academia by doing a postdoctoral fellowship. In other words, I have paid my dues, I created new knowledge and in terms of that knowledge I was an expert…I was a fundamental epistemic authority on a scientific topic, which was limited in scope. When

I started teaching I thought I had sufficient knowledge in various biological science fields, and I desired to pass that knowledge on to students at a university. I also wanted to continue developing myself as a fundamental epistemic authority and to help students achieved the same. Based those facts and the priority principle, where I believed that scientific facts were absolute and beyond contestation, I demonstrated reason for belief (of sufficient knowledge and academic acumen) and reason for action by attempting to become and educator at a university and pass on this knowledge I possessed in the derivative sense onto the next generation (see Spaić, 2018, page 145 for the definitions).

I expected the students to take my position of a postdoctoral fellow and later academic, as a sign of status and as an "acknowledgement" that I was a limited fundamental epistemic authority on scientific knowledge in the space they interacted with me (see below for details). In my (partial) hubris, I expected the students to believe the knowledge I was transmitting to them. I motivated the students to see the science space the way I did and to see what true my way. This was beyond contestations, the scientific methods and knowledge I was teaching the students were the only way to generating their own knowledge, i.e. their theses and that they should automatically believe in my competence in science. I expected the students to assign derivative epistemic authority to me in relation to scientific knowledge, which I did not create and which I taught the students such as biological scientific methods. I thought they had to believe what I told them and act on the information I transmitted to them automatically, without contestation. In a way, my transmissionism and radical constructivism combination led to me expecting the occurrence of a true singularity, i.e. a brain capacity of my brain and the student ones would converge in the same way as that of a computer and human might (Gale et al., 2020). However, the practical picture turned out to be far more complicated.

Scientific knowledge, me and the wider community

Marbaniang states that the "philosophy of science is the study of the general nature of scientific practice, explanations, theories and the relation of scientific knowledge to philosophical issues" (2009, Available on Google books, page ii). The epistemology of science in particular will be relevant to tertiary education and postgraduate studies in particular, as it will deal with the "justifiability of the scientific methods" and the "nature and scope of scientific knowledge (Marbaniang, 2009, Available on Google books, page iii). In the developing world and in a country such as South Africa, another important element of the philosophy of science and scientific inquiry will be axiology of science. Axiology of science describes or studies the relationship between scientific knowledge and human values, or rights (Marbaniang, 2009, Available on Google books, page iii). Induction, deduction and even Peirce's abduction (as defined and analysed by Fann, 2020, Chapters 1 and 3) can play a role in the generation of scientific information (Marbaniang, 2009, Chapter 1).

As a result, I had to evolve my understanding of the teaching and learning environment beyond the transmissionism and radical constructivist realm of a singularity. I had to start looking at the knowledge creation, e.g. in the form of postgraduate student theses, as a collaborative process. The way in which reality and its teaching/learning were executed by me had to change substantially.

Many philosophers of science and knowledge generation state that reality is often not discernible in one or another physical sense by a human being. However, higher education in South Africa does not exist in an abstract sense of reality, not in any shape of form. It lives and is interconnected with the lives of real humans, i.e. the students, the academics, the support staff and the South African society at large. Life at a university is as real as anything else that humans perceive, or rather experience on a daily basis. In South Africa, higher education should facilitate the achievement of many social functions, the pillars of the academic university's project. The primary pillars here are teaching and learning, research and community engagement (Kagisano No. 6, 2010, page 2). Part of the multi-pillar focus of the academic project in higher education in South Africa is driven by the notion that universities should not be seen as "ivory towers" that are located at a set of GPS coordinates. Rather university and higher education institution should interact with the communities they are physically embedded in or close to. A sort of integration should take of the higher education institution, i.e. it should become part of the community that is located in its geographical proximity. A collaborative relationship should develop between the community of the university and the community that surrounds it in the physical and micro-geographical sense. This collaboration will and should include exchange of ideas, and by extension will overlap with creation of knowledge.

The nature of reality can be perceived, interpreted and understood in many ways. However, the university such as Rhodes University is intertwined in the sense of reality to the existence of South Africa. Rhodes University prospers and suffers in unison with its population, with the conditions of existence of the community of the City of Makhanda, the Province of the Eastern Cape and South Africa at large. Therefore the Rhodes University's reality, and by extension the reality of the students and academics who work here or study here, are intertwined with the reality of the South African society that partially funds university, where the Rhodes University students and often academics come from. To fulfil the pillars of its mandate, a university is not to become an ivory tower that just exists in physical proximity of a community. For this to be achieved, a collaborative relationship should develop between Rhodes University and the community that it is geographically embedded in, i.e. the community of the City of Makhanda and the Province of the Eastern Cape. The reality of the community and the South African population, and the reality of the researchers and academics at Rhodes University much converge towards a singularity of sorts. Structures of teaching and learning, structure of research and data generation, the structure of knowledge generation must reflect this. As I am part of the Rhodes University community and the larger geographical community as well, I need to be and have long ago become part of the collaborative relationship mentioned in this paragraph. Next section introduces a mechanism and principles, sociology of knowledge structures which can facilitate the development of a collaborative relationship. This mechanism was then adopted in my postgraduate teaching as routine tool for knowledge generation, sharing and dissemination.

Assemblage theory and community of practice in my teaching and learning

To achieve the convergence in the individuals' perception of realities in South Africa, to meet the pillars of a South African University's mandate, a community of practice in knowledge generation, dissemination and utilisation must be developed. This community will encompass students, academics and the community that lives in the vicinity of a higher education institution. Assemblage theory has been used to describe, study and model social interactions. The fundamental element of this theory is an *assemblage*, which can be defined as a "working arrangement" (Buchanan, 2015, page 383). In the context of this essay, the working arrangement will apply to my teaching and learning in the postgraduate space at Rhodes University, and in connected spaces. Summary of the assemblage theory by Buchanan (2015) indicates that the benefits from the assemblage are benefiting outside stakeholders (page 385). An assemblage is formed for a given purpose and there is a deliberate plan in the creation of a particular assemblage (Buchanan, 2015, page 385). In an assemblage, causality is often distributive and so the outcomes are the results of the actions of a network of individuals (Buchanan, 2015, page 385). Buchanan finally goes on to state that literature data indicates in part that there is only one reality and humans experience it differently (page 386). This concept of one reality and different perceptions of it by individuals could be applied to the context in which postgraduate students complete their degrees. The reasoning for this will be provided by the author as follows.

It can be seen in the context of science and higher education as a working arrangement and creation of space during the knowledge generation. A team of supervisor, postgraduate students, academic functionaries of the higher education and other stakeholders such as technical staff are formed for the accomplishment of each postgraduate degree. First of these goals is that the existence of the assemblage is driven by the development and generation of new knowledge. Such can be knowledge can benefit society, i.e. stakeholders outside of the assemblage, e.g. the community of Makhanda, the Eastern Cape and South Africa at large. Second of the goals of the assemblage would be personal development of the student and the career development of the academic. This is a directed and purpose-driven assemblage of individuals, who interact and work together to achieve a particular set of goals. Thirdly, a crucial goal of the assemblage existence would be the achievement of its other goals through the interactive process, i.e. it does contain distributive causality between the input and output variables of the assemblage. Thus groups consisting of the postgraduate student, the supervisor, academic functionaries (of the higher education institution where the assemblage in formed and where it exists) and the technical staff does constitute an assemblage. Community of Makhanda, the Eastern Cape and South Africa will be connected to this assemblage indirectly through the settings in which the research project takes place. They will also be a great resource to communicate with members of the assemblage about the research topics and questions, which are local in nature, urgent in the need to be solved and pertinent to the common reality of the existence of Rhodes University and the communities it is embedded in.

To achieve the assemblage goals, the assemblage participants will need to be involved in certain cognitive processes, they will have to utilise their skills and develop new ones and they will have to work through trans-cultural boundaries in a country like South Africa, where multiple ethnic groups make up the population and where they interact in everyday life, including scientific knowledge creation at higher education institutions. Cultural values of the students and academics will come into play. Multi-cultural assemblages can be expected in the development of the knowledge in South Africa. The assemblage in South Africa will be multi-cultural in nature and it will have to respect multiple backgrounds, varying types of skills and multiple ways of knowing. In the teaching and learning process, a balance must be struck between individual's "*Cogito, ergo sum*, i.e. I think that's why I am (Stanford Encyclopedia of Philosophy, 1997-2019) and the social ways of knowing.

As academics at tertiary level of education, we are adult educators and we just practise Andragogy, i.e. the education of adult learners. Határ (2012, pages 7-9) builds on the Hasselman's definition of Andragogy. According to this definition, an educator should interact with students at tertiary level through helping and assisting them. Therefore the educator should be supportive through the (self-)education and (self-) development of the adult learner (Határ, 2012, pages 7-9). Such support and tertiary education should be multi-pronged and multi-dimensional in relation to various life situations. It should play a crucial role in the self-education, continuing professional development and self-development of the adult learner (Határ, 2012, pages 7-9). In other words, tertiary education should be seen as voluntary and driven to some extent by the self-interest of the adult learner, with the academic and Andragogy playing a supporting role in the achievement of the adult learner goals. This would indicate a need for collaborative nature for the tertiary education, i.e. a type of an assemblage forming for the purposes of educating postgraduate students.

Universities are today intricately integrated into their immediate surroundings (Pavlov, 2014). They also carry a community engagement or civic engagement as part of their mandate to assist and uplift communities they are embedded in (Pavlov, 2014). One of the ways that this mandate of tertiary institutions can be carried out is through conducting research which addresses the immediate and pressing concerns of the country and geographical location, where a particular university is found. In the context of my academic and teaching career at tertiary level, research into water, sanitation and hygiene (WASH) in South Africa and water quality in South Africa have been examples of such endeavours (Whittington-Jones et al., 2011). Since my arrival in South Africa research has shifted from inside to outside, or from a lab rat I became a partial lab mouse. I will try to demonstrate part of this process in my essay.

Határ (2012, page 10) states that Andragogy in the present day entails social education and awareness, as well as professional education of adult learners. I would in my experience interpret this to mean that Andragogy is a multi-faced area of academic endeavour, which requires an academic to master a combination of educational theories and their application to local problems, conditions and educational settings. In this way, the adult learners as partners of academics on the journey to knowledge generation can be most productive during their educational activities and self-participation in them. They can be provided and embedded in the most stimulating environment, where they thrive from an educational point of view.

Social Andragogy entails adult education which can be examined or be looked through the lens of sociology of knowledge, i.e. the systems which exist in a society for production, propagation/spread in the public and scientific domain and the ownership, exploitation and reaping of benefits of knowledge (my interpretation of text on page 17, Határ, 2012). Systems of sociology of knowledge and their shifting or fluid, ever-adapting nature would also form part of social Andragogy (my further interpretation of text on page 17, Határ, 2012). Education of any and all learners does not take place in vacuum, it is not transmissionist in nature…not in the present day anyway (Pavlov, 2014). Generation of knowledge, its ownership and propagation, its beneficiation in a society will and does depend on the interaction between stakeholders in the system of knowledge generation (Ulewicz, 2017).

To continue the discussion and analysis, social andragogy and the role of the academic in it will be linked to understanding of the social factors that an individual faces in terms of their participation in the system of knowledge generation (Petrová and Duchovičová, 2016). In addition, micro-anthropological dimension or the role of the other stakeholders, who accompany an adult learner on their journey through the knowledge generation system, must be kept in mind and form a strong part of the practice of teaching and learning at tertiary level of education, in adult education. The interactions between the adult learners such as postgraduate students and adult educators, e.g. academics such as me, can be viewed as a micro-system for creation of knowledge, its development and dissemination. It is an assemblage in the context of a specific purpose, e.g. completing a postgraduate thesis or completion of a funded project.

During the tertiary education process, an academic must work constructively with the adult learners to help them master the vocabulary of a particular field of academic endeavour (Petrová and Duchovičová, 2016). The academic is also obliged to introduce the adult learner to the methods of knowledge generation in a particular academic field, e.g. the WASH and water quality monitoring tools, which can be used in the environment of limited resources in South Africa (Whittington-Jones et al., 2011; Malema et al., 2019; Tandlich, 2020). Through the introduction, transmission, construction and adaptation, and internalisation of the knowledge by the adult learner, the academic must take the student from the introduction to the methods of an academic field to their practical application. This application should be done inside the sociology of knowledge relevant to the context of an adult learner, i.e. the systems of knowledge that the learner is familiar with, that they are part of and that they will use in the professional career, should be the primary site of Andragogical activities at tertiary level of education (Határ, 2012). Assemblage formed for a particular academic purpose, e.g. completion of a postgraduate thesis, is a micro-system in the sociology of knowledge because one of its functions is to master the vocabulary and methodologies for data and knowledge generation in a specific area of academic endeavour.

According to further thoughts by Határ (2012, furthermore my interpretation), the social andragogical practice must include a combination of theory and practice from an academic field. The teaching and learning of methodology from a particular academic field must be complemented by practical application in known settings, e.g. laboratory practicals, and then in the generation of new knowledge. At the same time, as I have learned throughout my academic career at Rhodes University, it is also part of the scientific method to value the opinions of your colleagues and the opinions of students. It is necessary for a system of knowledge generation must provide for the exchange of opinions and information, a pluralistic construction of knowledge of all assemblage stakeholders.

In my view, a community of practice is a good technique to allow academics and students to get most of each other's professional expertise. In education and higher education in particular, it is kind of a learning community that allows academics and students to absorb existing knowledge and to create new knowledge and skills. Over the years and after making many mistakes and errors in judgement, I believe I have finally developed the ability to listen and take on board/consult opinions of my academic colleagues and postgraduate students. This I believe has been the main personal and academic transformation since I joined Rhodes University as a postdoctoral fellowship in early 2006. I have adopted and put at the centre of my academic endeavours a cooperative approach to research and generation of new knowledge.

Beginning of the community of practice, assemblage in teaching and learning

In late 2005, I started looking for a new challenge and wanted to return to the academic environment after spending some time in the pharmaceutical industry. After about three months of looking, one of the email applications I have sent out came back with a positive response and contained an opportunity I was interested in. This was from researcher at Rhodes University, who was looking for a postdoctoral fellow and a laboratory manager to replace an outgoing collaborator. I had never considered coming to the Southern hemisphere, not to mention South Africa which was not even on my radar of potential work places. However, the opportunity to return to wastewater treatment and to learn new things from a field I did my Master of Science thesis in, was tempting.

My further correspondence went on and an application was put together for a National Research Foundation of South Africa (NRF) a postdoctoral fellowship for me. The application was chosen by Rhodes University among three to pass on for consideration by the NRF. As usual NRF took its time, but there was interest for me to get me down to South Africa as soon as possible. Thus I arrived in Grahamstown and at Rhodes University at the end of February 2006. Second day in the country, namely 1st March 2006, I was thrown into the deep end of working in South Africa. Laboratory introduction and the administrative background were completed by the morning tea time. The role I signed up for proved to be far more challenging and complex than I originally thought. My first official day at work was like hitting a wall head on at 200 kilometres per hour.

When I walked into the laboratory of new research group, I was introduced to the person I was going to replace. This was the outgoing postdoctoral fellow and laboratory manager who had decided to head back to her home country with their family. My boss, Rhodes University researcher and the outgoing postdoctoral fellow walked me through the laboratory, the individual projects/research which were ongoing on and the extramural tasks of community analyses of water samples that I would be responsible for. The initial walk through everything felt like I was back in the first year of undergraduate studies at the Slovak University of Technology in Bratislava, Slovakia and was overwhelming. I realised that I had to “hit the books hard again” to find out among other things what exactly total coliforms were and how to measure their concentration in water samples.

Keyword here being MacConckey agar…..I had never even heard of up to that point and I was surprised that “faecal coliforms” might have been so significant in a research group, the second keyword which will become important in the creation of my academic community of practice. The third keyword was diversity of research topics and people. There was sorption as one of the topics in the research group that I was familiar with, but not in the context of mixed wastes such as mining effluent. The fourth and final keyword of the first day on the job was greywater. I knew about domestic wastewater in broad terms, but I had no idea that such "everyday research topic" like greywater would become the core of my research activities at Rhodes University for many years, once I was hired in a full-time capacity.

By the time the second-day excursion was done, I was lost in South Africa and not sure if I would survive the first three months. In the next few days, I began to familiarise myself with professional things at Rhodes University and outside my research group and laboratory. Among others, I got a tour of some of the other facilities in the Department of Biochemistry, Microbiology and Biotechnology where the research group was located at that time. Nothing was familiar to me, until finally on the top floor of the building I saw an old gas chromatograph. This was significant, because until then the focus of my expertise and professional development had changed multiple times, but one constant remained….gas chromatography. As a versatile technique, I had worked with it in Slovakia during my undergraduate and Master studies; and in the USA during my PhD studies. In South Africa, it would become the oasis I could escape to when things got tough, the source of my grey hair when it refused to "budge or behave". One of the first Bachelor of Science (BSc) Honours' projects I co-supervised at Rhodes University happened through this old HP-5890 gas chromatograph. At the same time, this gas chromatography facilitated meeting one of the best collaborators and colleagues I have had to this day at Rhodes University. This collaborator has since then played an important role in my "community of practice" that is the basis and driving force of my teaching and research at Rhodes University at the postgraduate level. They have been part of assemblages I would help constitute in the course of many projects to come in my postgraduate teaching and learning at Rhodes University.

After the first few weeks in my new job, I settled in and started my routine which has not changed much to this day. I hit the books to familiarise myself with the basics of all colorimetric methods that were used in the new laboratory and research group I was part of. Until I came to South Africa, the Lambert-Beer law which governs quantitative analyses in colorimetry and UV/VIS spectrophotometry had been on my radar, but I did not care much about it as it has not played a central role in my research activities. This proved to change very quickly as it was the basis of majority of the experimental and analytical work done in the research group, depended on it. It might have felt silly at time, but the fact that the Lambert-Beer law became the focus on many of my daily activities proved to be of significant importance in my future career at Rhodes University. This was troubleshooting which I had to get involved about a month and a half into my new job. The problem in question originated from various issues that were identified by myself and by some of the postgraduate students with the data produced in the Lambert-Beer law measurements.

The supplier that most of the instrumentation and consumables were purchased from could not explain to anyone in the research group, me or the postgraduate students why the calibration of their pre-calibrated spectrophotometer purchased in 2005 was not working optimally (Merck Corporation, 2017). This was a single-beam spectrophotometer which is one of the cheapest on the South African market with a price tag of about 25000-30000 ZAR (about 2000 USD). This had make it popular with research laboratories in academic institutions and industry where basic water research and analyses are conducted. Besides its price, one other practical advantage is the fact that it is marketed as a "factory-calibration" instrument, i.e. the calibration data come stored in the instrument when it is delivered to the customer ready to use (Merck Corporation, 2017). Similar instruments are available from several other suppliers (Hach, 2017; Aqualytic.de, undated).

The basic premise of this instrument configuration is that the customer purchases a versatile and easy-to-operate instrument which the supplier has calibrated for a wide-range of analytical methods (Merck Corporation, 2017). Therefore once purchased by a customer's laboratory, the "factory calibration" stored in the instrument should allow a standard research and academic laboratory to accurately and precisely quantify the concentrations of water quality parameters that indicate the efficiency of water and wastewater treatment. In theory and if the calibrations really meet the manufacturer's specifications, then the spectrophotometer can increase the number of samples a student or trained operator can process during a standard working day in a laboratory at the minimum cost. The decrease in costs is that calibration must be performed only infrequently, e.g. twice a year, without compromising the accuracy of analyses. The other massive advantage of the single-beam and easy-to-use spectrophotometer is that training is simple and takes about 1 day, after which a Bachelor of Science/Pharmacy Honours level student could start working with it independently and produce reliable results. However, the spectrophotomer that was in the research group I was part of in early 2006 was not performing optimally for the water-quality parameters it is was used to quantify.

I will illustrate this with the following example. In April 2006, two Bachelor of Science in Honours students were starting their projects and required training on the spectrophotometer. While working with these two students, we attempted to quantify concentrations of ammonium and the chemical oxygen demand (COD); and other parameters in model wastewater samples. The spectrophotometer we used provided highly variable and irreproducible results. I trained the students properly and I had by then mastered the instrument myself. Subsequently, I oversaw the work of the two Honours students, examined the instrument and interviewed the students, once they first reported problems to me. I could not figure out what was wrong as the investigation into the cause of the results yielded the following findings. The instrument did not suffer from any technical faults, no parts had to be serviced and both Honours students followed the correct procedures. Thus the problem had to lie elsewhere.

I started working on figuring out the exact cause of the problem. The community of practice I was unknowingly building played a crucial role in figuring out the answer. Concurrently with hitting the books on the cause of the problem, I spoke to my boss about the history of the instrument, to the technical staff in the Department of Biochemistry, Microbiology and Biotechnology and postgraduate students from the research group I was part of. An assemblage was formed for the solution of this problem. Several potential causes of the unreliable analytical results were identified and so I analysed some calibration solutions for reference. The ultimate cause was quality assurance of the single-beam spectrophotometer and the calibration procedure in particular. This indicated that the quality assurance and calibration procedures stated by the supplier were out of date; and novel ones had to be developed. An assemblage was created for the solution of a problem that would have fundamental implications for the quality of the scientific data measured and the scientific knowledge produced in the research group I was part of.

Quality assurance is a concept which describes a set of procedures that need to be followed and adhered to guarantee reliability of results in analytical chemistry and consistency in manufacturing of pharmaceutical products (AAFP, 2017). All the investigations led to the identification of one fundamental cause of the variable sperctrophotometer results. If not addressed urgently, this problem could have had wide ranging implication and could have invalidated all future research findings in the research group I was part of. Service records on the spectrophotometer we had from late 2005 indicated that the problem was new and it only occurred first after the previous re-calibration and service at the manufacturer's facilities around November 2005. No new students' data collection had taken place between the last instrument service on the spectrophotometer and when the calibration problem was identified. I spoke to assemblage members about the results of the team's investigation into the spectrophotometer problem, the team, as I was not the only one who contributed. We agreed that I should devise a strategy to address the problem as a top priority, to work with all the postgraduate students in addressing the problem and to keep the boss updated. Technical staff and the postgraduate students, who were part of the assemblage...the community of practice, were also to be kept in the loop.

I started by consulting the postgraduate students and the lists of potential interferences provided by the manufacturer; and interferences documented in the reference literature as having potential influence on the measurement of the water quality parameters (e.g. US EPA, 1993). If the concentrations of interferences, e.g. chlorides in the COD method (Environmental Express, 2017), were high enough, then they could influence the spectrophotometer readings due to cross-reactivity (Environmental Express, 2017). The COD values were influenced by this problem and so a new calibration procedure was devised. Here MilliQ water (Millipore/Merc, Port Elizabeth, South Africa) was replaced as the solvent in the preparation of the COD calibration solutions with aqueous solution of sodium chloride with the weight concentration of 1000 mg/L. In this way, part of the calibration and quality assurance problems with the spectrophotometer was solved. The nature of the calibration solution was changed and interferences were eliminated as the cause of the quality assurance problems with the COD measurement using the spectrophotometer in the research group I was part of. Unfortunately, the COD were not the only cause of the variable results of other assays, e.g. the measurement of the phosphate concentration in effluent samples, even after the interferences' problem was addressed.

Therefore an additional problem had to be addressed to provide a guarantee that the spectrophotometer I worked with the provided results and the data that the postgraduate students could put in their theses and publish in subsidy-earning journals. The urgency of the solution was demonstrated by the fact that I myself was involved in co-supervision of one PhD student and two BSc Honours students. The solution to the second problem was found by the cooperation inside my community of practice/the assemblage under consideration. The calibration of the instrument did not hold for the wastewater samples that were being analysed in the context of the projects in the research group I was part of. Fresh calibration solutions were prepared with each batch of samples.

Practically, this meant that when an experiment was about to start, the scientist/assemblage member running it would prepare a fresh batch of calibration solutions and read their signals against the signals provided by the spectrophotometer instrument. The correlation would then be established to determine the degree of agreement. During the individual experiments, when actual samples were run, the scientist running them would run control samples. With control samples and the new calibration, mid-level of the calibration curve prepared by the scientist in question before the start and during the experiment would be analysed with each set of samples (Zuma et al., 2009; Tandlich et al., 2009). If the control sample signals were within the limits set in the control charts, then all samples in that set could be analysed without delay. If the reading for the control sample fell outside of the control limits, then re-calibration was required.

The efforts I participated in as a part of community of practice had practical impacts on the work and research conducted in the research group I was part and the assemblage which formed to solve the spectrophotometer problem. These include the following achievements: one successful presentation at an international conference on wastewater treatment (Melamane et al., 2006) and the increased number of publications for the PhD student (Melamane et al., 2007a-d). The knowledge I gained through the active engagement with the analytical techniques and the members of my then community of practice, was also incorporated into the laboratory work of two Bachelor of Science

Honours in Biotechnology from the research group. This in turn contributed to the publication of two-subsidy earning journal articles for one of the BSc Honours students (Tandlich et al., 2009; Zuma et al., 2009). I have completed the 2006 academic year with three successful co-supervisions under my belt.

The community of practice that was created in the example above follows the general principles of the learning community as described for teachers' education by Vescio et al. (2008). In education in a learning community or community of practice, knowledge is generated, transferred and shared among various practitioners; and it is mostly derived from the day-to-day educational activities (Buysse et al., 2003). This fits to the activities that took place in the solution of the quality assurance problem I discussed above. The practitioners or assemblage members included myself, my boss/senior academic, the postgraduate students who used the instrument in their projects and the technical staff from the Department of Biochemistry, Microbiology and Biotechnology. Here this group of people became a learning community/community of practice that adapted existing knowledge and generated new knowledge through a collaborative effort. This led to the solution to "active engagement" of the community of practice with the knowledge and its implications in terms of real life problems. Publications on greywater treatment by Zuma et al. (2009) and Tandlich et al. (2009) indicate that professionals such as myself and the postgraduate students learnt from this experience and improved their understanding applicable to their professional field.

The solution of the spectrophotometer issue demonstrated the assemblage came together and it applied its cognitive functions, namely application of the knowledge of the Lambert-Beer law and the tracing of the problems/errors in an analytical system, distinguishing between various sources and the analysis of the impact of various factors on the measurement outcome, and creation of new knowledge by identification of the problem with the spectrophotometer measurement. This is in line with the cognitive categorisation of the assemblage as outlined in the revised of Bloom's taxonomy (see http://docplayer.net/38534090-Pomocka-pre-formulaciu-specifickych-cielov-a-ucebnych-uloh-prehlad-taxonomii-kategorie-taxonomii.html for details). The common efforts to solve the spectrophotometer problem have also demonstrated a collaborative and organised and creative efforts of the assemblage members, as outlined in the Kratwohl's taxonomy of affective functions of the assemblage members (see http://docplayer.net/38534090-Pomocka-pre-formulaciu-specifickych-cielov-a-ucebnych-uloh-prehlad-taxonomii-kategorie-taxonomii.html for details). Manipulation of the calibration solutions and other steps taken by the assemblage/community of practice in terms of the spectrophotometer problem show the application of the skills of the assemblage members to solve the problem (see http://docplayer.net/38534090-Pomocka-pre-formulaciu-specifickych-cielov-a-ucebnych-uloh-prehlad-taxonomii-kategorie-taxonomii.html for details).

In the research group I was now part of, each project was planned in regular meetings between the senior academic and the respective postgraduate student. With students I was co-supervising, I sat in on these meetings. In these meetings, experiments and tasks the students had to complete during the coming week were planned and results from completed experiments were discussed. Between two meetings, I was then responsible for overseeing the execution of individual experiments by each student I was co-supervising. During that time, I tried the hand-on approach and some postgraduate students struggled with this attitude. Hands-on means the combination of the transmissionist and radical constructivism. Besides co-supervising three students, I also had to assist all postgraduate students in the research group with ordering of research consumables and with fixing instrumental problems. With the students I was co-supervising, both the students and I felt a sense of ownership of the projects we collaborated on. When it came to the rest of the postgraduate student projects, I felt a sense of being part of the solution which was sometimes accepted and sometimes not. Some students did not share my views and communication problems started to occur. I tried to manage the situation as best as I could by using a “feedback loop”. There was no singularity between mine and the students’ opinions of the scientific reality.

To mitigate the impacts of the spectrophotometer problems, before any experiment was supposed to begin, a meeting between the senior academic, me and the postgraduate student in question took place. Besides planning, the student was instructed to read some articles and familiarise themselves with novel experimental techniques which the student might not have used up to that point. A sequence of steps in a particular experiment was then discussed. These tasks were the responsibility of the student to complete and I assisted where necessary with minor issues or queries; and planning/ setting up of experiments to be run. On the morning before a particular experiment was then supposed to begin, I met with the postgraduate student in question and touched base with them. After initial problems, it turned out that the best approach was to draft standard operating procedures (SOPs) for the basic operations. This meant that if the student was running a particular experiment, we drafted a detailed procedure together. The procedure, i.e. SOP, was a way to break down an experimental procedure into individual steps or basic operations. This is a standard way of conducting unit operations in chemical, biotechnological and pharmaceutical industry.

If adhered to without exception, such approach allows the researcher to trace the sources of discrepancies, which might occur in the process and trouble-shooting becomes more manageable (Patel and Chotai, 2011). Exchange of opinions between members of the assemblage led to the mitigation of problems and development of new knowledge. After realising the feedback loop was not working, I started to take a step back, to listen and try to accommodate people as necessary. The assemblage grew in scope and number of voices which were taken into consideration in the generation of new knowledge. I gave up on my transmissionism and radical constructivism approach to teaching and learning in the postgraduate realm. I became a collaborator, a member of the community of practice in chemical analysis/water analysis and biotechnology. The transmissionism and radical constructivism approach was transformed to an assemblage or a community of practice.

The community of practice was strengthened here through the use of students' own experiences in their projects and through my assistance. Too little supervision has been shown to fuel discontent and disengagement of the supervisees, i.e. the postgraduate students in the case discussed here (Nissly et al., 2005). Assistance was always welcome by all postgraduate students, regardless of whether I co-supervised them or not. The communication between myself and the postgraduate students started to become problematic probably when the point was reached that their community of practice started being one-sided and they might not have been equal or useful members of this community anymore. As a result, the dynamics in the assemblage and the research group was altered and my function was changed. This took place after mutual agreement between all parties. The ordering of consumables and other laboratory manager duties were still carried out by me as before. Postgraduate students were empowered to take the initiative and drive the process of requesting what needed to be ordered. I continued to co-supervise all students that I was involved with their projects before. However, I assisted only hands-on, if this was requested by a particular postgraduate student.

Going forward in my academic career, I learnt that communities of practice were dynamic structures which are always in a state of flux. Assemblages that were formed to carry out particular projects had a permeable boundary, i.e. members of the assemblage could enter and leave the assemblage upon need and possibly return is necessary. A constant communication and feedback loop between all its members is required to achieve the necessary level of flexibility and ability to react to rapidly arising problems and changes in the academic/work environment. Through the communication and constant exchange of information epistemic justice was strengthened inside the assemblage. The postgraduate students had their voices heard and could be active participants in the knowledge generation. Their values, skills and cognitive processes were part of process of generating knowledge. A state of singularity was reached when the postgraduate students finished their degrees. However, instead of the "computer like singularity" view...a convergence of communication and co-authorship of knowledge were reached. The knowledge that formed art of the final theses of the students in question, was generated through input from all assemblage members, i.e. it was the result of distributive causality.

Taking this lesson on board, I had to shift the next stage in my academic career. It became clear that it was necessary for me to work in an environment with more independence, where I would be (at least) partly in charge of my research path. The part of working with other people was great and very beneficial to my career, but I had more research ideas of my own, which needed to be developed. This was necessary so that I could interrogate and decide independently which career path to take and which research topics to focus on. At the same time, my next assignment should provide me with the ability to continue being part of a community of practice in the areas of water research and related research topics. This arrangement would play to my strengths and also allow me to assist potential collaborators when requested and in the most efficient way. Therefore I moved from Department of Biochemistry, Microbiology and Biotechnology to the Institute for Water Research (IWR) to continue my postdoctoral fellowship in 2007. I left the assemblage I was originally part in South Africa and helped form a new one. Singularity of opinions was not necessarily achieved, not on a permanent basis anyway. However, knowledge was created and shared within the assemblage, i.e. within the community of practice.

Community of practice 2.0

At IWR, I became involved in research in water toxicology and the faecal contamination of potable water supplied in Makhanda local government to its residents. Building on the skills I acquired in the 2006 research group, I helped adopt a method for the quantification of sulphate concentrations in water and wastewater by adopting and modifying an existing protocol (US EPA, 1978) to the instrumentation available at IWR. This provided a better understanding of the water quality at study sites of IWR and facilitated improved understanding of the links between environmental water quality and river health assessments that were ongoing at IWR at the time. In the context of this work, I continued working closely with one of the former Honours students in co-supervised in 2006.

My collaboration with this postgraduate student is clear from the articles we have co-authored and that I have been citing and will be citing in this essay. Our professional association and collaboration has been ongoing for 15 years (as demonstrated by Zuma et al., 2009). I have come to rely on this collaborator's advice, knowledge and research excellence in my previous and ongoing research projects and supervision of postgraduate students. Therefore I feel that the obvious nature of my research association with this colleague and other members of my community of practice in postgraduate and teaching set aside all ethical implications justify me discussing our collaboration in this essay or autoethnography. In 2007 at IWR, I assisted my colleague with getting their experimental techniques of the ground for their Master of Science project on microbial water quality in the Eastern Cape Province of South Africa. We have exchanged ideas about the various techniques we both used. My colleague tested the sulphate method that I have adopted and mentioned in the previous paragraph.

Collaboration of this student and me overlapped with our active involvement in the community engagement activities around water quality in Makhanda throughout 2007. Through this interest, we became acquainted with a pupil from one of the local high schools in Makhanda. That pupil was working on a water quality project for the 2007 Eskom Expo for Young Scientists. The project was entitled: Towards conservation of purified water. Data on chemical and microbiological quality of greywater was gathered in the Eastern parts of the Grahamstown area of Makana. Questionnaires have been distributed among the local business community and members of the public to ascertain their attitudes to the reuse of greywater in improving the sustainability of the potable water use in Makana. The project results were presented as a poster at the 2007 Eskom Expo for Young Scientists. The pupil in question won the Gold medal at the Regional Expo in Grahamstown in July 2007. The pupil qualified to participate in the National Expo, where he was awarded the bronze medal, for ranking among the top 10 % of the participants at the event.

As Science Expo project, it was not just another poster which ended up giving the pupil a one year scholarship to study at Rhodes University. However, the study went further and it resulted in a peer-reviewed conference proceedings publication (Tandlich et al., 2008). The study started with water quality data collection on greywater composition and risks associated with its reuse in Grahamstown and Makana at large. At the same time, it was one of the first fairly systematic studies that examined the population's attitude to the reuse of greywater in irrigation, toilet flushing and similar applications in South Africa. The pupil, under guidance from my colleague and myself, collected this data in the Eastern part of Grahamstown, which is today's Makhanda. An assemblage grew out of this pupil's project and I assisted with microbial and chemical analyses, preparation of the pupil's poster and writing up of the article.

The study and the publication of the results at an international conference demonstrated what can be achieved through an efficient community of practice. This community consisted of four authors on the study. The high school pupil had the original idea and communicated this to my colleague, who provided guidance on the scientific design of the study. A PhD student at IWR at the time, provided help with guiding the student through the sample collection and assisted with logistics. For myself, I assisted with elements stated in the previous paragraph and I also took the lead in writing up the scientific and peer-reviewed publication (Tandlich et al., 2008). I was designated as the first author due to taking the lead in the writing up of the publication and after mutual agreement with the other co-authors. The success of this community of practice was that its parameters and limits; and internal communication pathways were clear to all participants from the beginning and throughout the entire process of completing the study in question.

The pupil got a scholarship to Rhodes University and started in the Foundation phase of a Bachelor of Science degree in 2009. The assemblage from the water quality project in 2007-2008 continued as all of us became the pupil's mentors, now a Rhodes University undergraduate student's mentor in academic matters and I provided assistance with mentoring and financial support for the student, as his scholarship was only partial. The community of practice from the pupil's project remained pretty much intact, but its focus had shifted slightly. This new focus of the community of practice worked to a limited extent. All living and everyday issues that the student faced, were addressed and myself and the members of the assemblage which was now more the community of practice. This experience had a profound impact on my future supervision of postgraduate students and community of practice in teaching and learning. I decided that in my community of practice I would adhere to the following principles from then onwards: I would empower the students as much as possible to take ownership of their project, I would keep a close eye on financial background, i.e. is there a scholarship in place and if not what can be done to address it, and I would rely on a combination of self-reporting and seeking information from postgraduate students first-hand without giving an impression of micro-management. The implementation of this approach started in 2009 and 2010 when I started supervising postgraduate students as the primary supervisor. Implementation with successes and problems are listed in the next section.

The IWR year showed that the assemblage on water quality testing was formed and some of its members were from previous assemblage on the 2006 spectrophotometer problem and the 2006 as a whole year. Two members of the assemblage were the same, and two were new members. The purpose of the IWR assemblage was partially the same, i.e. scientific research and in part postgraduate teaching and learning, and in part different, i.e. community engagement in water quality. The assemblage or community or practice I was a member of, was permeable and had outside benefits in the presentation of the results at an international conference and it also provided for engagement of water testing between the assemblage and the wider Makhanda community. The publication of a scientific publication by a high school pupil on board as a co-author could be interpreted as a singularity occurrence and convergence of the perception of realities among the assemblage members.

Community of practice 3.0

In 2009 and 2010, two PhD students started working under my supervision in the Faculty of Pharmacy at Rhodes University. Their projects focused on greywater treatment and tracing faecal contamination of surface water in the Eastern Cape Province of South

Africa. In the context of this collaboration, the assemblages had three members and that community of practice was then called the Environmental Health Biotechnology Research Group in the Faculty of Pharmacy at Rhodes University (EHB). There was continuity with the community of practice 2.0, in that two members were the same and one was new. The former Honours student, who had by then completed their Master of Science degree, used our previous collaboration as the foundation of their PhD dissertation and its topic. The original system for greywater treatment, which we had developed and published on (Zuma et al., 2009: Tandlich et al., 2009), was a simple system to be built anywhere as needed and that could provide treatment of greywater and eliminate any potential public health risks in the absence of reticulation (Zuma et al., 2009). The system provided some treatment of the greywater in the laboratory, but it did not remove the pathogenic microorganisms from greywater (Zuma et al., 2009). At the time, that colleague started their PhD the system was scaled-up and installed in the Buffalo City Municipality and was tested in an un-reticulated area (Whittington-Jones et al., 2011). This became the first tasks of their PhD, namely to test the efficiency of treatment on-site of the scaled up system and to provide advice/solutions were necessary.

With my assistance and collaboration with other co-authors, the assemblage member completed this part of their PhD on time. Results were published, but the student went further. He took the initiative and communicated with the residents where the greywater treatment systems were installed. It became clear that the municipal officials were not doing site visits to investigate, if any faults occurred in the mulch towers (Whittington-Jones et al., 2011). With my assistance with one of the site visits, it was also established that the greywater treatment systems were not installed properly and two layers were completely missing at some houses (Whittington-Jones et al., 2011). Technical expertise of the municipal officials became an issue and sustainability of the project did as well. This led to open pools of greywater and lack of its treatment in the vicinity of the houses. The project eventually became defunct (Whittington-Jones et al., 2011). The PhD student took the initiative and started looking into the potential causes of the observations we made in the Buffalo City.

Through policy analysis and extensive literature survey, two main and likely causes of our observations were identified. Firstly, there was a lack of technical expertise in the sanitation sector was an endemic problem throughout South Africa (Whittington-Jones et al., 2011; Hoossein et al., 2014; 2016). At the same time, financial mechanisms which were available to local government were too constrained to provide efficient relief and funds where needed (Whittington-Jones et al., 2011). This finding and a revelation to be honest launched a new angle in the research that the two assemblage members that were the same between the community of practice 2.0 and the community of practice 3.0 have been involved in. This is disaster management and the application of its principle to water and sanitation in South Africa. Over the next few years, the EHB conducted research on the application of the mechanism and sense of urgency for action that are natural to the field of disaster management through various projects. From those efforts, articles about the sanitation challenges in South Africa and the potential use of disaster management tools and the potential solutions to sanitation and related challenges in South Africa (Hoossein et al., 2014; 2016).

In the context of the second PhD project which started in 2009-2010, a method for the tracking of faecal contamination in surface water based on bifidobacteria was developed and influence of environmental factors was assessed (Luyt, 2009-2013; Luyt et al., 2013; Luyt et al., 2015). The PhD was successfully completed and there was also a beneficial side-effect. An existing tool for faecal contamination detection, i.e. the H_2S test kit, was modified from the published data and the sensitivity improved to match that of standard indicator microorganisms (Luyt, 2009-2013; Luyt et al., 2011; Tandlich et al., 2014). A standard procedure was developed for the preparation and use of the H_2S test kit; and the use has been expanded beyond the laboratory settings to include community one (e.g. Tandlich et al., 2014; Nqowana, 2017-2019) and the educational journal publications (Nhokodi et al., 2016; Nqowana, 2017-2019). This took place beyond the original scope of the two PhD projects. At the same time, disaster management became a core component of other postgraduate research projects I supervised or co-supervised. I have gained one person who has been a member most partial of the assemblages on all projects that I have been involved in postgraduate teaching and learning. There have been others over the years (Luyt et al., 2012; Tandlich et al., 2013-2014; Collings et al., 2016; Malema et al., 2019).

The EHB was the macro-assemblage and the projects inside it formed parts of it, i.e. they were micro-assemblages. Since 2009-2010, I have been blessed to work with many postgraduate students and many collaborators. Many micro-assemblages have been created inside the EHB macro-assemblage and led to the completion many postgraduate research projects. The geographical scope was expanded to include countries outside of South Africa (Chirenda et al., 2015; Angala et al., 2019). Individual micro-assemblages and community of practice has fulfilled many purposes, e.g. achievement of many postgraduate degrees, novel knowledge has been produced in an environment where various voices are heard and respected, where the cognitive abilities, skills and values/cultural background of all members of the assemblages are respected and provided space to be expressed. Creation of knowledge was accomplished through the combination of students' abilities and my input from the supervisory and collaboration point of view. Thus the knowledge was created through a distributive agency and the micro-assemblages were formed inside EHB for purpose of achieving production of new knowledge.

The EHB macro-assemblage had side-effects such as the H_2S test kit which continues to have impact on the community around Makhanda and beyond. Given this background, the EHB as a macro-assemblage has acted an agency for the production of knowledge, in teaching and research at the postgraduate level, and also there have been “spill-overs” into the dimension of community engagement (see https://www.ru.ac.za/latestnews/communityengagementchampionsawardedatfirstvirtualruceawards.html for details in the category of the Student researcher of the year; and also see https://www.ru.ac.za/latestnews/archives/2019/environmentalchampionshonoured.html for the EHB Rhodes University Environmental Award). Based on these facts and the distributive agency of the EHB macro-assemblage, this community of practice contributed to the fulfilment of the three pillars of the Rhodes University mandate, as a higher education institute in South Africa. Through the accomplishment of those three pillars, the EHB assemblage and its micro-assemblages have been constituted and developed into the fundamental epistemic authorities in the context of the purpose of their constitution. The members of the assemblage/community of practice then hold the derivative epistemic authority towards each other and towards stakeholder outside of the assemblage, while they are members of the assemblage.

The permeable boundary of the EHB macro-assemblage has allowed consecutive members of this community of practice to enter the platform, participate in the creation of micro-assemblages and the distributive agency has resulted in the growth of the research group. Micro-assemblages inside EHB have to the development of the new research directions beyond the original focus on water quality and sanitation (Vumazonke et al., 2020; Farounbi and Ngqwala, 2021). There have been several core members, who I still work with closely and who have maintained continuity of fundamental epistemic authority inside the EHB, the macro-assemblage. There have been other members that have entered the macro-assemblage for a period of time through the assemblage’s permeable barrier. These members have been sources of enrichment for me and other members of the community of practice. They have become part of the fundamental epistemic authority on the subject at hand, after first accepting the derivative epistemic authority of the assemblage at hand (Nqowana, 2017-2019). They have been carriers of this authority outside the original intellectual space after leaving the EHB macro-assemblage. Each postgraduate student had, after graduation, become a holder of limited fundamental epistemic authority which had been created in the context of a micro-assemblage inside the EHB macro-assemblage, inside the community of practice.

Community of practice 4.0 and considerations beyond

My personal journey throughout the community of practice versions up to 3.0 has been transformative in creating new knowledge, creating my personal awareness about the cultural differences and ultimately creating a source of fundamental and derivative epistemic authority in the space of various research topics. The “brute” focus on the natural science as the basis for knowledge generation from 2006 was transformed into an integration into the consideration for various opinions from multiple stakeholders. I will illustrate my transition, as I see it from an auto-ethnographic angle, on the example of water treatment below.

The transmissionist assumption that "what I do as teacher should be my focus" was originally correct when I arrived in South Africa in 2006. Today I see it mostly as applicable only in the in the context of the teaching of practical and relatively manual skills that postgraduate students must master to be able to carry out their professional research activities. The original procedure I started in 2006 and which I began this article with, that procedure which I thought was the scientific method was a combination of transmissionist education and had some elements of radical constructivism. Today I see that it is insufficient, listening to students must be part of the process of knowledge creation. The voices of all stakeholders in knowledge creation must be given equal weight in the construction and production of new scientific facts. As every research project in the postgraduate space is generally linked to teaching and learning, obtaining of Master's and PhD degrees is often executed through an assemblage. This community of practice can be in existence on a limited scale in time and space, but the fundamental and derivative epistemic authority that such as assemblage utilises or creates should and in my opinion does transcend the original platform.

The transcendence of epistemic authorities provides for a continuation of knowledge, it is and co-creates sociology of knowledge systems, and in the case of the assemblage members it transforms them. I am no exception and my transformation has been from a transmissionist and a radical constructivist to a collaborative academic. Water is fundamental to human life and survival. During my teaching and learning activities in the postgraduate space, I assisted students in mastering the vocabulary of the water treatment. They must know water is purified for the removal of chemical, biological and physical contaminants. However, now I also know that water provision and access to it, or a lack thereof, creates a personal connection of the students to the context of the water research, to the assemblage of their research project, to the community of practice in their postgraduate degree. This personal input and drive to join/help form an assemblage, whether macro or micro one, brings the students' perspective to the postgraduate teaching and research arena. The starting point of the assemblage, or community of practice functioning is based on the priority principle, i.e. the knowledge the students have about their water story in the non-derivative sense. Being part of many assemblages, I have come to see that angle of the priority principle in the non-derivative sense, the community of practice has enriched me through the acceptance and non-rejection as non-data the students postgraduate stories.

I recently left the EHB and started a Disaster Management and Ethics Research Group (DMERG) which is still located in the Faculty of Pharmacy of Rhodes University. However DMERG is also a new macro-assemblage which is a vehicle for the transfer of the limited fundamental epistemic authority I carry, along with some of my postgraduate students, on the topics related to disaster management and ethics. This new macro-assemblage is the result of the boundary of EHB which I have crossed and by doing so I have, in my humble opinion, contributed to the transfer of the knowledge created inside the EHB into a new research space. The process of the new macro-assemblage was not an overnight occurrence. It was started as an evolutionary process which culminated in the publication of an educational paper on the results of some of the EHB research (Tandlich et al., 2018) and bioethics in some research and educational activities (Ambang et al., 2019). Since I now sit on the Editorial Board of the journal, where the last two articles were published, I have undergone a complete scientist transformation to an academic who is more transdisciplinary in nature. Further evolution was done through the collaboration with a university in another setting, e.g. Technical University of Liberec. The experiences I have gained are being further developed by interacting and collaborating with academics from other cultural background.

Conclusions

This article provides an auto-ethnographic representation of the development of a personal postgraduate teaching and learning approach, as well as its development between 2006 and present day. Principles of the community of practice as an assemblage, its relationship to fundamental and derivative epistemic authority are put into context of the personal development of the author and the related collaborators. This work represents a way to introduce the personal account of transformation of one's teaching and learning approach. Such perspective is important for documenting researchers experience in a multi-cultural environment and its higher education space in countries such as South Africa.

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