The role of action research in my autoethnographical transition from the natural sciences to scholarship in education

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Abstract

Having graduated with a Master's degree in Natural Sciences, the educational aspects that I engaged in during my studies seemed to have ignited my latent affinity for education, which prompted me to pursue a scholarship in education. Fortunately, I did not have to choose between the two disciplines but could merge the Natural Sciences into the field of education. However, I obtained my entrance to the field of education through enrolling for a Postgraduate Certificate in Higher Education (PGCHE).

This qualification assumes that I am engaged in a professional education practice which I could comply with when I became a Life Sciences teacher-educator for postgraduate student-teachers. Obtaining the PGCHE qualification revolved around the continuing improvement and/or innovation of my education practice through a comprehensive action research project.

From the onset it became clear that being a good scientist does not mean that one is a good educator. Through this action research project I quickly learned that it is not only the improvement of my professional education practice that is under scrutiny, but, since learning is personal and fundamentally holistic in nature, my personal development is also under investigation. This also provided the impetus to extend my action research project into my proposed autoethnographic PhD scholarship.

> *I was surprised by how the simplistic cyclic conception of action research could be transformed to support a complex endeavour of cycles and spirals in which personal development of the highest order to maximise one's potential (being not only central but also an ethical imperative in education) could so effectively be fulfilled through action research.*

Key words: Personal development, transition, natural sciences, education science, PhD scholarship, maximising potential

Introduction

Several educational experiences as a student tutor and assistant, occasional presentations of my own research, as well as participation in conferences as a Natural Sciences postgraduate student convinced me to pursue a scholarship in education. This will allow merging these two fields and becoming a Natural Sciences educator. Thus I started to explore the pathway through which this can be accomplished.

My research challenge

I concluded that the most appropriate way to achieve my purpose was to seek a Postgraduate Certificate in Higher Education (PGCHE). Initially, I was overwhelmed by the transfer from the relatively exact Natural Sciences to the relatively inexact human science of education. This was mainly due to the radical differences in the nature, structure and object of these two disciplines. The essence of the education programme I enrolled in revolved around the design of an action research idea, which would result in the innovation and/or improvement of my higher education practice. This type of design provided a vehicle through which I could improve my higher education practice, which was extremely attractive in view of my vision. However, since I was not engaged in such a practice at the time, my first challenge was to find a suitable practice. Fortunately, one of the lecturers proposed that I act as a part-time lecturer, under his mentorship, for his Postgraduate Certificate in Education (PGCE) for grades 10 to 12 Life Sciences student-teachers. My transfer from student to lecturer

exposed some of the major misconceptions that I cherished about education.

As my induction, I visited these student-teachers during education practice at their schools and came to realise that it is not the teaching but the learning that defines education (Barnett, 2007; Ackoff & Greenberg, 2008). Within the demanding challenges of the 21st century, the quality of learning is of vital importance (Hargreaves, 2003; Van Merriënboer & Paas, 2003; Könings, Brand-Gruwel & Van Merriënboer, 2005). Besides becoming a competent e-learner, the importance of learning to learn (Matijević, 2014), to work confidently despite the challenges and uncertainty of an unknown future (Barnett, 2007) and to become powerful real-life learners is undeniable (Claxton, 2008, p. 157). I was surprised to find that the key to learning quality is to be found in how we naturally – authentically – learn:

> Children are born true scientists. They spontaneously experiment and experience and re-experience again. They select, combine, and test, seeking to find order in their experiences – 'Which is the mostest? Which is the leastest?' they smell, taste, bite, and touch – test for hardness, softness, springiness, roughness, smoothness, coldness, warmness; they heft, shake, punch, squeeze, push, crush, rub, and try to pull things apart. (Fuller, 2010, p. 82)

Such holistic experience of the nature and structure of the constituents of reality and the power of their interconnecting relationships, together with the children's discovery of which of their responses to these relationships may be more appropriate than others – all first hand and hands-on – constitute the quality of their learning. When confronted with escalating difficulty, we also witness children accessing their potential in the development and growth of personal human qualities or virtues such as courage and resilience that allow them increasingly to overcome the obstacles they are experiencing and subsequently, to improve their learning quality. "We're born to learn" and to keep on learning as long as we live in this authentic way (Smilkstein, 2011). The challenge of education, however, is to ensure that the quality character of personal development is maintained and at the same time, ensure

that a possible haphazard, trial and error, inefficient learning is prevented. My curiosity about how this would be possible was soon addressed when I was exposed to 'a new pedagogy', that of facilitating learning (Alexander & Potter, 2005, p. 179). Mohanan (2005, p. 5) indicates that facilitating learning is fundamentally different from teaching; functionally, it is the direct opposite of teaching, and its sole purpose is to ensure the highest possible quality of learning.

This inspired me to engage in the required action research project of the PGCHE programme. For this purpose, I turned my focus to understanding its theoretical foundation. I could summarise this as a cyclical process of research while acting within a particular practice that consists of six steps (identify, plan, act, observe, reflect, review) sequenced in one or more iterative spirals (Whitehead & McNiff, 2006; Greenwood & Levin, 2007; Stringer, 2007; McNiff, 2013; Bradbury, 2015; Herr & Anderson, 2015). In my case, this process would innovate my newly adopted education practice. Since I am the object of scrutiny in this unfamiliar education and action research environment (McNiff & Whitehead, 2011), I approached my imminent personal transformation with some apprehension. I formulated my research question in the following way: How could I innovate my higher education practice from the current dominating transmission of knowledge and skills, to ensure that the highest possible quality of learning will ensue with the subsequent personal development towards maximising my potential?

A theoretical framework

Since learning is pivotal to education, the purpose of this theoretical framework is to explore some of the concepts related to learning, that had struck me as important during my exposure to the field of education.

The authenticity of experiential learning

According to Fry, Ketteridge and Marshall (2009, p. 15), experience on all levels of life is fundamental in learning and is referred to as 'experiential learning'. Kolb's (1994) Experiential Learning Theory is significant in that it originates from his research on how human beings naturally – authentically – learn (Kolb, 1984, p. 21; Ellis, Kiesinger & Tillmann-Healy, 1997, p. 26).

Slabbert, De Kock and Hattingh (2009, pp. 68-76) have used Kolb's experiential learning cycle to identify characteristics of authentic learning (Figure 1). The cycle starts with an immersion in a challenging real-life experience, followed by an intentional reflection on the challenging real-life experience, that is the key to authentic learning that transforms concrete experience into dynamic knowledge (Korthagen, 2001, p. 43). These steps allow for a cognitive construction of mental models of that challenging real-life experience, that provides the foundation for the exploration of a new real-life experience (Van Merriënboer & Paas, 2003, p. 5).
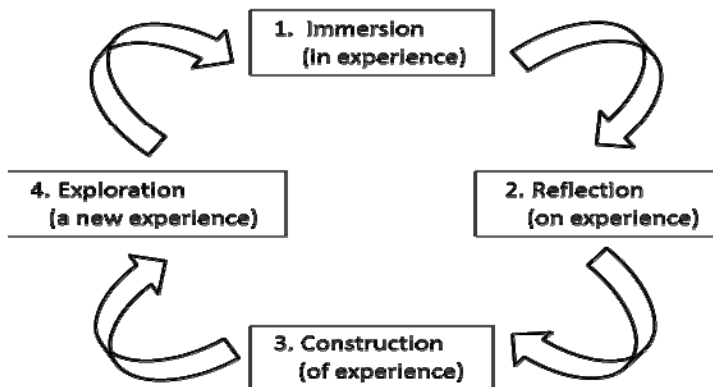

Figure 1. The cycle of authentic learning

(Slabbert, De Kock & Hattingh, 2009, p. 73)

Authentic learning – characteristics

Authentic learning has become a prominent feature in 21st-century education within a super-complex world with an unknown future (Newman, Marks & Gamoran, 1995; Van Merriënboer & Paas, 2003; Barnett, 2007; Thomas, 2012) because of its potential in the transformation of the human being as educational purpose (Barnett, 2007, pp. 101-103). The following simplistic conception of learning is provided by Claxton (1999, p. 15): "Learning is what you do when you don't know what to do". According to the constructivist epistemology, knowledge cannot be transmitted through teaching. It is when learners are in interaction with their environment, in an attempt to make sense of the world, that they are constructing knowledge or meaning through their experiences (Von Glasersfeld, 2005, p. 11). Authentic learning has the following characteristics (Lombardi, 2007, pp. 5-6):

a) It takes place while immersed in a real-world experience with its uncompromising complexity;

b) It is a confrontation with a demanding, ill-structured challenge;

c) It requires sustained investigation;

d) It considers multiple dimensions and perspectives;

e) It is sustained through continuous critical reflection;

f) It challenges the attainment and flourishing of cognitive (academic) and non-cognitive (personal) potential; and

g) The final product is real but has multiple possible outcomes.

The constructivist character of authentic learning has been criticised firstly, as too time-consuming when used in education, to the detriment of the disadvantaged living in impoverished learning environments and secondly, as an apparent denial that knowledge is socially constructed. The counter-argument to these criticisms is that learning inevitably takes time, and quality learning takes even more time. Besides, the (cognitive)

construction of meaning (knowledge and skills) is inherently and ultimately individualistic, even though it may be constructed in a social environment. So is the attainment of the (non-cognitive) personal qualities of human potential (Mohrhoff, 2008, p. 18). In fact, the support of research in many fields, especially that of neuroscience, has elevated constructivism to a physical reality (Smilkstein, 2011; Zull, 2011).

The quality of learning style versatility

Coffield, Moseley, Hall and Ecclestone (2004) made an overview of 71 learning theories (style/models) and upon analysing 13 of the major ones intensively, they identified four flexibly stable learning preferences, namely Kolb's learning style inventory (Kolb, 1971; 1977; 1994), Honey and Mumford's learning styles questionnaire (Honey & Mumford, 1982), the Herrmann Whole Brain® Thinking Model (Herrmann, 1995) and Allinson and Hayes' cognitive style index (Allinson & Hayes, 1996). The theory of learning style flexibility (Du Toit & Petegem, 2006, pp. 1665–1687) focuses mainly on the first and the third ones.

Regarding these learning style models, learning style flexibility states that learners who may have a particular learning style preference and any number of weaker subsidiary preferences, may also venture into utilising their weaker learning styles and thus become flexible in the learning styles they utilise (Du Toit, 2012, p. 96). The Herrmann Whole Brain® Thinking Model is one example of the key learning style models indicating flexibly stable learning preferences. Its major features are depicted in Figure 2.
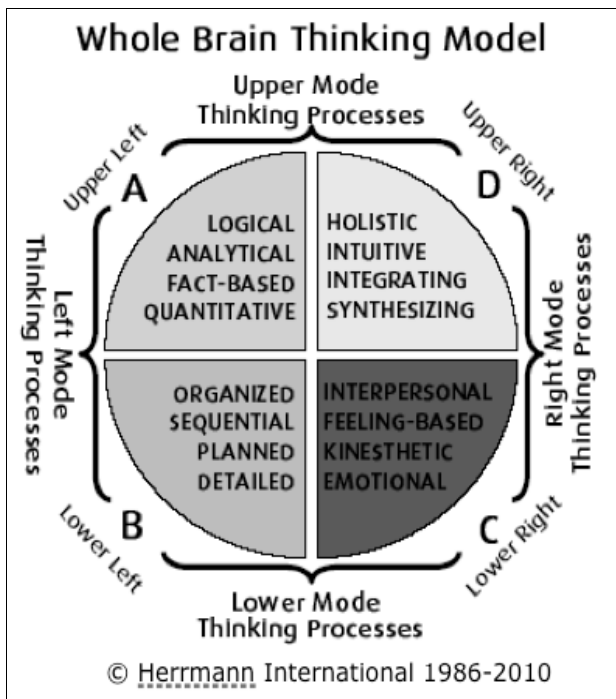
Figure 2. The Herrmann Whole Brain® Thinking Model
(Herrmann, 1995)

Any of the four brain quadrants, A, B, C or D, may be an individual's preferred learning style. However, scrutinising the learning modes available in the other quadrants, makes it clear that the ability to function well in all quadrants will radically improve the quality of learning. The quality of learning, in turn, will assist in resolving the challenges of real-life in a holistic, integrated way. This would also characterise someone who is operating from a fully maximised human potential context. Turak (2014) reminds us that such an achievement, not only in some learning theory but in all dimensions and on all levels of life, is not optional but an ethical imperative:

> Whether you call it personal development, personal growth,
> self-actualization, self-transcendence, or spirituality does
> not matter. What matters is realizing that the reason you
> were born is to become the best human being you can
> possibly be. Personal development is not a tool for reaching
> a bigger goal. Becoming a complete human being is already
> the biggest and most noble goal you can aspire to.

For this to become possible, however, the professional practice of facilitating lifelong authentic learning could be employed in education.

I prefer to replace the word 'flexibility' (pliable, changeable) with the stronger concept of 'versatility' indicating the ability to do many things well on two accounts. The one is because versatility states a particular possession of an ability (to do many things well – all the time – and not only to cope when a particular task is at hand) and the other is that versatility refers to the inclusion of a quality requirement ('well') and not only to cope.

The professional practice of facilitating lifelong authentic learning

The concepts of learning in all its variants, (lifelong learning, experiential learning and authentic learning, for example), of facilitation in education and associated concepts, have been the object of research by many authors. Only a selected few have been referenced in this study. I did find the work of Slabbert, De Kock and Hattingh (2009) a valuable resource for its holistic integration of all these concepts into the field of education. It is a field often fragmented into isolated theories, methods and techniques, used eclectically in a technocentric fashion, stripping it from its holistic purpose. It was my search for a substantial, universal aim of education that initially attracted me, my reward of my search being the aim defined as follows:

> The aim of education is designing the most powerful
> learning environment possible (real life context in its
> uncompromising supercomplexity) that will evoke the
> learners' own empowerment (will to learn) to maximise
> (completely develop and fully utilise) their human potential

> (essential human virtues) through facilitating (demanding
> the highest possible quality of) lifelong, authentic learning
> (resolving personalised real life challenges) in order to
> create a safe, sustainable, and flourishing future for all.
> (Slabbert, 2015, p. 132)

From all the preceding paragraphs, facilitating learning essentially requires the deliberate and purposeful intervention of a facilitator who thoughtfully confronts learners with authentic real-life challenges. The learners must resolve the challenges for themselves, in order to achieve personal development of the highest order while producing the highest possible level of learning quality.

In practice facilitating learning is a complex process. It is determined primarily by the learners' responses to the real-life challenges and to the continuous progression of improving the quality of their learning (Slabbert, De Kock & Hattingh, 2009, pp. 99-119). Facilitating learning, then, consists of three purposes, each with one or more functions to achieve that purpose. I have summarised this process in Table 1.

Table 1. The professional practice of facilitating lifelong authentic learning (adapted from Slabbert, De Kock & Hattingh, 2009, pp. 102-119 & CD-ROM)

What is the facilitating learning purpose?	What is the facilitating learning function?	Description
INITIATING LEARNING	Learning Task Design (LTD)	Everything in facilitating learning revolves around a learning task that has to be designed. A learning task is a demanding real-life challenge within the curriculum context. The learners have to experience this in person in the form of an existing real-life problem to be solved by the learners themselves or a serious desire to improve the quality of life for which there is currently no known resolution - at least for the learners. As a powerful learning environment, the learning task has to aim at the development of complex and higher-order knowledge and skills, deep conceptual understanding and metacognitive competences that enable learners to be in control of their learning and personal development. Such outcomes are the most appropriate for the transfer of learning (Van Merriënboer & Paas, 2003, p. 3). The challenge has to demand immediate resolution by the learners themselves, even if it is a required proactive action now to prevent disaster later. Finding the resolution to the challenge should be possible only through the acquisition of the knowledge, skills and values indicated

What is the facilitating learning purpose?	What is the facilitating learning function?	Description
		in the curriculum by the learners themselves. Resolving the challenge has to be an actual experience of their personal development by the learners and the subsequent improvement of the quality of their lives.
	Learning Task Presentation (LTP)	Presenting the learning task orally in the form of a monologue and accompanying support in the shortest possible time, only to indicate clearly what the real-life challenge is, the importance and urgency of resolving it within implicated parameters and stressing that action is required immediately. Its purpose is to immerse the learners into actually experiencing the real-life challenge in its holistic uncompromising complexity but without allowing any interaction from their side at this stage. Only the essence of the oral presentation should also be provided to the learners in written form for reference purposes.
LEARNING	Authentic Learning (AL)	After learning task presentation, authentic learning will commence throughout the entire learning task execution phase, as the foundation for all learning actions in the authentic learning cycle, which comprises: a) the immersion of the learners in the challenging real-life experience; b) demanding their reflection on the real-life experience to establish what the actual real-life challenge is and what would be necessary to resolve

What is the facilitating learning purpose?	What is the facilitating learning function?	Description
		it;
		c) ensuring that learners purposefully probe all appropriate existing curricular avenues that might contribute to the resolution of the real-life experience; subsequently
		d) constructing the best possible quality real-life experience resolution; and finally,
		e) eliciting the exploration of executing the proposed resolution to the challenging real-life experience.
	Learning Task Execution (LTE):	This commences immediately after learning task presentation and simultaneously with authentic learning. Ensuring that the learners execute the learning task themselves by resolving the demanding real-life challenge upon an authentic learning foundation through metalearning and cooperative learning.
	(a) Metalearning (ML)	Ensuring that learners resolve the real-life challenge – personally and individually on their own - by taking full control of and responsibility for their own learning, through planning, executing, monitoring and assessing their learning to submit the following highest possible quality end products:

What is the facilitating learning purpose?	What is the facilitating learning function?	Description
MAINTAINING LEARNING		a) the resolved challenge (Why: values); b) how it was resolved (How: skills); and c) the content learned (What: knowledge). Subsequently, the learner becomes an active, effective, independent, lifelong learner, who continually increases the quality of their own learning, maximising their potential and personal development through attaining fundamental (essential) intrapersonal human virtues (qualities).
	(b) Cooperative Learning (CL)	Ensuring that the learners help one another to learn in small groups with the sole purpose of enhancing the quality of their learning and that of others through the following demanding requirements: a) base groups of four learners; heterogeneous groups – academically and socially; b) positive interdependence; individual accountability; c) promotive interaction; and d) assessment of cooperation. Besides the achievements of the individual learner during metalearning,

What is the facilitating learning purpose?	What is the facilitating learning function?	Description
		learners also become interdependent through attaining fundamental (essential) interpersonal human virtues (qualities).

	Learning Task Feedback (LTF)	This is the epitome of facilitating learning through the intervention of the facilitator of learning during AL, ML and CL. The sole purpose of LTF is to improve the quality of the learners' learning through the appropriate execution of a hierarchical order of actions executing the next one only if and when the current one does not result in:
		
		a) the learner's (re)engagement with LTE;
		
		b) the learner's emotional encouragement and support (non-verbal, then verbal);
		
		c) asking for clarification from learners (What are you doing? Why are you doing it?) to elicit metalearning from them through:
		
		  o requesting them to answer their own questions;
		
		  o demanding reflection by asking content-void but quality-enhancing questions (Where/how could you find what you need? How would you convince me that what you are doing is the best? What else is possible? How would you ensure that you have explored all avenues/resources/possibilities? and so forth);

What is the facilitating learning purpose?	What is the facilitating learning function?	Description
		o requiring resourcefulness; demanding resilience; advising auto-education; providing edutainment.
	Learning Task Consolidation (LTC)	Ensuring that learners ascertain the rate of their learning progress, assess the quality of their learning and determine what exactly is to be done to sustain the focus on resolving the real-life challenge in the next learning period, thus significantly bridge the time gap between this learning period and the next.

My research design

My research challenge required a qualitative participatory action research approach through an interpretivist view of the practitioner's endeavours. My research was practitioner-based, because the aim was to transform a traditional knowledge-transmission educational practice into an innovative facilitating lifelong authentic learning practice. Since I am both the practitioner and the researcher taking an active part in the research itself, while innovating my education practice, the research constitutes a participatory action research mode of inquiry. This mode consists of many singular action research cycles and a number of action research spirals that may contain one or more cycles.

The sample of participants was the entire cohort of student-teachers who had enrolled in Life Sciences education in the PGCE programme. The lecturer responsible for the education of these student-teachers – and who allowed me to become their lecturer and subsequently became my mentor – was included in the sample. I collected data through direct observation of my own education and audiovisual recordings, making field notes as I was conducting my education practice and keeping a reflective journal. The assessment of the student-teachers' education practice took the form of an audio and/or visual recording of a semi-structured interview. Data was recorded formally during and after I had conducted an educative event. Data analysis was done through manual coding in thematic categories.

My action research in practice

The purpose of this article is not to be exhaustive in all the details of the action research cycles and spirals, but rather to represent the complexity that action research can accommodate within its structure. It demonstrates the purpose of facilitating lifelong authentic learning as personal development of the highest order to enable the learner to maximise their human potential. I followed all the steps (identify, plan, act, observe, reflect, review) in all the

cycles of the spirals diligently, however, herein they have been replaced with a holistic narrative of the findings, which best serves the purpose of the article.

Semester 1: Spiral 1 – finding my higher education practice

The events of the first semester with the first spiral's cycle follows.

Cycle 1: Three attempts at finding my higher education practice

In discovering my higher education practice, I initially considered mentoring or tutoring different groups of students. However, I found my mentor's proposal to become a formal part-time lecturer for his Life Sciences student-teachers the most appropriate and doubly challenging in view of the complexity of educating educators. Visiting the student-teachers at the schools where they were busy observing what education in practice entails, I came to the conclusion that education is in essence the transmission of knowledge and skills because neither myself nor the student-teachers had had any exposure to facilitating learning at this stage. Because of my education experiences as a student, I felt that I would be successful in teaching student-teachers to do this.

Throughout the process of my action research project my mentor was iron-fisted in giving advice and in answering my questions. He demanded that I always carefully considered what I wanted to do and why and insisted that thereafter, I critically reflected on my experiences in a substantial evidence based way. I was left on my own to discover the nature of the deficiency of my education practice and how to rectify and improve it. An example of the outcome of my mentor's (facilitator's) demands – in effect representing the action research steps – is shared as the first cycle of the next spiral that follows.

Semester 1: Spiral 2 – my first experience of facilitating lifelong authentic learning

I will consequently discuss the events of the first semester with the second spiral's cycles.

Cycle 1: My first experience – challenging the student-teachers to improve their transfer of information with good PowerPoint presentations

I identified that I needed to challenge the student-teachers with the learning task of designing a lesson that revolved around a PowerPoint presentation on a Life Sciences topic of their choice. As an introduction to this learning task, I planned to provide a concise overview of the characteristics of a good PowerPoint presentation from my own experience. I had prepared some notes on the characteristics of good PowerPoint presentations after a previous experience in which I was awarded a prize for the best presentation. I decided to present the remainder of the lecture to the student-teachers by providing them with a variety of PowerPoint presentations from bad to excellent. I planned to present these PowerPoint presentations to the student-teachers and to ask them to assess the presentations critically.

I executed what I had planned to the best of my ability. However, during my presentation, the whole brain model wallpaper was displayed on my laptop. When the student-teachers saw the whole brain model, they asked questions about what the model represented. That prompted me to immediately incorporate the concept of whole brain learning in the lecture, since I was exposed to whole brain learning in the PGCHE programme. I subsequently challenged the student-teachers to consider whole brain learning when they design their PowerPoint presentations, although this was not part of what I originally planned to do. I realised that I could refine my learning task formulated in the 'Identify' step of a cycle even during the later occurring 'Action' step.

I found that my presentation of the overview of presentation skills was not a smooth one and I experienced some discomfort about this, even though I did it in a pure transmission mode. I could also detect a reciprocal discomfort in the student-teachers. However, when I started to present the variety of examples of PowerPoint presentations, the student-teachers reacted well and I achieved a more productive outcome, because the student-teachers became more engaged with my presentation. There were also differences

in opinion between the student-teachers and me about the quality
of individual slides and the sequence of slides in my PowerPoint
examples and I could not always provide completely satisfactory
responses to their objections. When they observed my whole brain
model wallpaper on my laptop, their engagement with the lecture
increased once more and they asked questions about it. I could use
my most recent experience about whole brain learning and reveal
to them what I had just learned. It seemed as though they were
interested when I challenged them with the possibility of
incorporating the use of the whole brain model in their future
PowerPoint presentations. My mentor also observed my
presentation, and provided me with oral feedback.

It became quite obvious to me that there was a vast difference
between being able to design and utilise PowerPoint presentations
during science shows, lectures and conference presentations, and
teaching someone else to do so. That became clear with my quite
deficient introduction to PowerPoint presentation skills.
Fortunately, I used a wide variety of PowerPoint presentation
examples, from bad to excellent, that compensated, in part, for my
lack of success teaching PowerPoint presentation skills through a
transmission mode. I realised that the unintentional wallpaper
added to the success of my lecture because of the interest it
aroused in the student-teachers. My mentor's oral comment
confirmed my own preceding reflections. After my presentation, I
wrote the following comment in my reflective journal:

> I have presented many times in my life to a wide range of
> audiences, and I was quite confident that my presentation
> would go well. However, my presentation did not turn out
> well, and my discomfort, which I hid from the student-
> teachers and my mentor, surprised me. I realised, though,
> that to be competent in my field of expertise, Natural
> Sciences, did not necessarily make a good teacher.

My major challenge stemming from this experience, related to my
lack of experience teaching. I realised that even if I had superior
knowledge about the content (information/knowledge), teaching

it, even in transmission mode, required serious professional pedagogy and practice which I did not have – yet.

Cycle 2: Improving my education practice by introducing learning style versatility

At this point, the student-teachers attended their first school-based learning. Because the student-teachers showed considerable interest in the whole brain model displayed during my PowerPoint presentation in the previous cycle, I seized the opportunity to challenge them, this time, to design a lesson to present to their learners using PowerPoint and based on the learning versatility that the model portrayed. I had to study all the relevant documents regarding the student-teachers' school-based learning requirements and the relevant assessment rubrics. For professional reasons, my mentor briefed me thoroughly before the visit to the schools to assess the student-teachers' school based practices. Although my mentor took the lead in the assessment of the student-teachers, he would increasingly and unexpectedly demand my substantive contribution. I dared not falter in the presence of the student-teachers and their mentor-teacher.

Despite my attempt at teaching what the student-teachers needed to do, I was quietly disappointed with what they exhibited concerning learning style versatility, although they were quite satisfied with their exhibition. However, the thoroughness with which my mentor and the student-teachers' mentor-teachers exposed the sufficiencies and the deficiencies of the student-teachers' practices, was a revelation to me of the professionalism that I needed to achieve but which seemed almost unattainable. What was encouraging though, was that I could confirm most of their comments because I had carefully observed what the student-teachers did. Nevertheless, the way forward would require a much more concerted effort from me, to access the abundance of latent potential that I had available for this achievement.

Cycle 3: Improving my education practice through enhancing learning style versatility

I confronted the student-teachers with challenges that constituted the enhancement of their learning style versatility. The first challenge was not to use a PowerPoint presentation and to avoid transferring information as far as possible. In addition, the student-teachers needed to ensure that the learners became active participants instead of remaining passive recipients. Although the purpose was to enhance my learning style versatility practice, it was the assessment of the student-teachers that would reveal its achievement.

From this point onward, I was in full control of the assessments of the student-teachers. I used my constructed assessment observation rubric in addition to the rubric that the student-teachers would use, to assess my assessment practice. The face to-face assessment revealed that my assessment practice still needed considerable improvement. I realised that I was not prepared enough and I was nervous because I could not depend on the assistance of my mentor as in the past. Upon reflection, I could identify the following fundamental principles relating to my education practice:

- I should not ask for suggestions regarding how to improve something, unless I can provide at least one recommendation for how it can be achieved;

- I tend to go back to issues already covered; my questions should be asked in the order: (i) How do you feel about the lesson? (ii) What went well? and (iii) What was challenging?;

- Fluency in my assessment is crucial, as is the order and structure in which the questions should be asked;

- I should know why I ask the specific questions; the questions should be precise and direct;

- I comment too much and ask too little;

- I should ask 'evocative' questions rather than 'confrontational' questions;

- I have an unnecessary long run-up before I ask a question; and

- I do not adhere to a specific logic or a given structure during the assessment process.

The student-teachers at least exhibited an awareness of learning style versatility and what whole brain learning could offer. However, learning style versatility is not enough if the demand for quality is not added to the challenge, as I noted in my journal:

> A highlight for me in Cycle 3 was my interaction with the student-teachers after they had presented their improved learning style opportunities (the feedback). Although I felt the session ran fairly smoothly, I realised I could improve my facilitating learning a lot! Another crucial revelation was that versatility in learning style is not nearly sufficient. The demand for quality needs to be added to the challenge.

Cycle 4: Improving my education practice through learning style versatility by enhancing learning quality

I provided the student-teachers with learning material that introduced them to facilitating learning in the transcendental paradigm of education. Within the four existing paradigms (transmission, transaction, transformation and transcendental) the transcendental paradigm is the only paradigm that transcends all the restrictions and limitations of the current education practices, maximises human potential and demands the highest learning quality (Slabbert, De Kock & Hattingh, 2009, pp. 136–137).

This challenge was either to use a previously presented lesson and transform it, or to design a new learning task (as opposed to a 'lesson'), using the provided learning material as the foundation. In effect, the challenge was to design a learning task in the transcendental paradigm for the most challenging learners. Unfortunately, the student-teachers interpreted this challenge incorrectly, and there may have been many reasons for this. The introduction to something this novel was too quick, the

transformation of a lesson to a learning task was not reasonable and to design a learning task that would not be operationalised (as opposed to presented) was irrelevant. In short, my learning task presentation did not meet the clarity criteria. I took this to be a reflection of my lack of versatility in learning style because I could not make appropriate provision to accommodate the required level of learning and the represented learning styles.

Although the challenge was unsuccessful, I realised the importance of emotional encouragement and support in facilitating my student-teachers' learning when they became upset because they could not fulfil the requirements that I could not articulate properly. Fortunately, I had a professional facilitator of learning as my mentor, who could emotionally encourage me during this experiential learning challenge that I initially perceived as a personal failure. It took me a lot of courage to acknowledge this, as well as time, to ensure that the student-teachers gained the best possible understanding of this learning task and its function. This was important as preparation for what would be required during their second semester school-based learning period.

Figure 3 represents my action research project of the first semester.
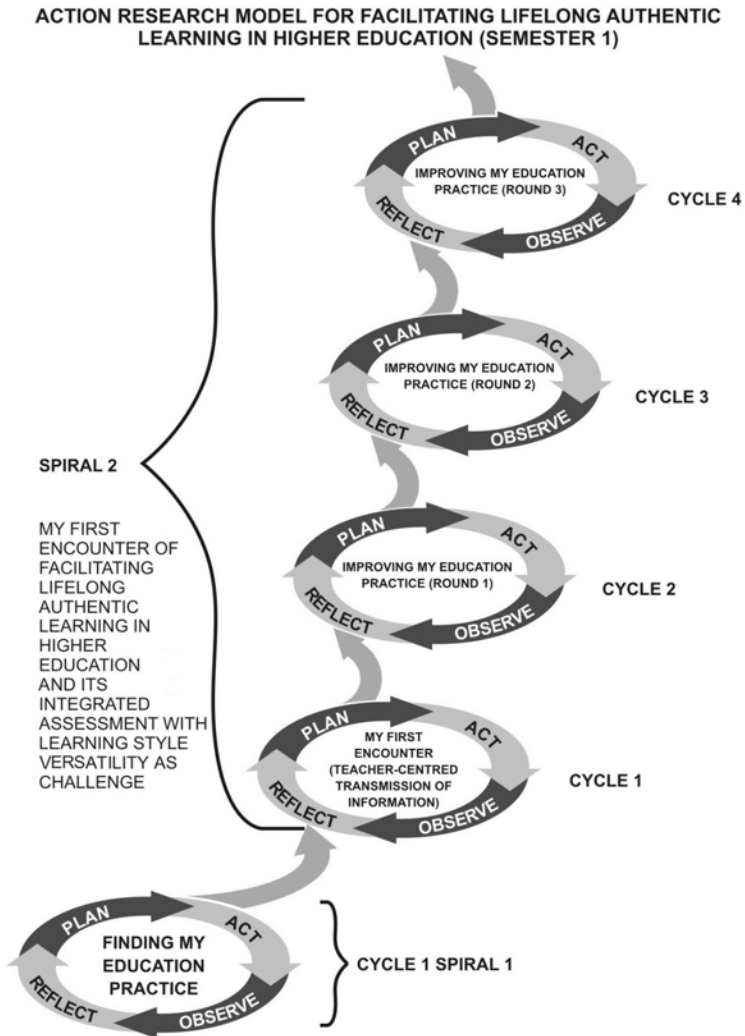
ACTION RESEARCH MODEL FOR FACILITATING LIFELONG AUTHENTIC
LEARNING IN HIGHER EDUCATION (SEMESTER 1)

Figure 3. Model of my action research: Semester 1

Semester 2: Spiral 3 – improving my facilitating lifelong authentic learning practice through real-life challenges in the transcendental paradigm

The events of the second semester with the third spiral's cycles will be discussed next.

Cycle 1: Improving my education practice by challenging student-teachers to design and operationalise real-life challenges in the transcendental paradigm

The time arrived during the second semester school-based learning period, that the student-teachers had to engage in the ultimate of facilitating learning, through learning tasks designed and operationalised in the transcendental paradigm. They had designed and operationalised several such learning tasks for their classes, and I requested them to invite me to assess the one that was the most challenging to them. Although there was thorough preparation for this period, the challenges that the student-teachers encountered were evident and difficult to resolve. These included:

- Translating curriculum content to a real-life challenge – at that moment, finding the most appropriate and demanding real-life challenge for the learners that they would genuinely want to resolve, because of the immediate and personal impact it would have on the quality of their lives;

- Formulating the real-life challenge for presentation;

- Presenting the real-life challenge in the shortest possible time and in such a way that the learners would feel so compelled to resolve it speedily, that they would spontaneously engage in the endeavour;

- Ensuring that initially, learners work individually (metalearning) and subsequently in small groups (cooperative learning); and

- During the learning task feedback, refraining from having a conversation with the learners and/or answering their questions, instead of continuously challenging them to

> improve their learning quality to the extent of maximising their human potential.

Although these challenges persisted to a certain extent, there was evidence of improvement. However, lack of sufficient improvement was a reflection on the quality of my facilitating learning. Improvement is possible only through experience. For this reason, I designed a final learning task for them.

Cycle 2: Improving my education practice through confronting student-teachers with a comprehensive, professional, real-life challenge

In this final challenge for the student-teachers, I designed a comprehensive learning task in which they were confronted with all the challenges of learning task design, while my facilitating of their learning in this task served as an exemplar, illustrating how the other challenges of facilitating learning could be conquered. The challenge that they were confronted with, was to interpret and improve the ecology section of the curriculum. The student-teachers also had to design a learning task that would convince the Life Sciences education authorities that a long term ecology project is essential, because of the holistic academic and personal development of learners that it can produce, to conserve the country's invaluable natural resources and environment. The student-teachers individually had to identify the most appropriate and best possible terrain and investigate it thoroughly and intensively to determine whether or not it would be conducive to achieving the abovementioned outcome in depth, scope, diversity and quality (difficulty/challenge). Thereafter, the student-teachers had to negotiate a decision regarding which terrain would be best. Following this, the student-teachers needed to design the required learning task, so that when they started their careers as facilitators of learning in the following year, they could eventually operationalise it with their own learners.

Although I have had many opportunities to facilitate learning, as a comprehensive and particularly as an exhibition of expertise in facilitating learning, this has been the most nerve wracking experience I have encountered. It took endless, repetitive

preparations and every ounce of effort, energy and courage to arrive at this event. And yet, when it came, I was not quite ready for its reality. After an uncertain start, my thorough preparation was rewarded, and I became increasingly comfortable with my learning task presentation and my appropriate interaction during the learning task feedback. Similarly, the student-teachers' initial uncertainty, revealed by their asking questions and expecting answers, was soon replaced by fewer questions and better responses to my challenges to improve the quality of their actions. Although I became increasingly comfortable, I could never entirely relax because of the continual need to be aware of what everyone was doing. I did not want to lose an opportunity for a facilitative intervention, that could elevate the quality of the student-teachers' learning and the activation of their latent potential.

This was a very exhausting exercise, and although I knew it was not a failure, I could not determine my success until I received responses from my student-teachers and a critical friend of mine, the coordinator of the PGCHE programme and the mentor who assessed me. They delivered constructive criticism on certain aspects that I knew I had presented with deficiencies, but their overall commendation of my facilitating lifelong authentic learning, was a timely reward and a valuable inspiration for pursuing my vision.

Cycle 3: Towards pursuing my education scholarship – my PhD proposal

I was privileged to experience education at a postgraduate level from the perspective of both an educator and a student; this allowed me to understand that education is not determined by the teaching or the educator. It is, in fact, what needs to be achieved by the student, that determines the nature and structure of education. The first part of the development of my scholarship in education during my PGCHE year, confirmed that it is the learning of the student that defines education, with emphasis on the fact that the learning of the student needs to be facilitated. Thus, the issues of what the student needs to learn within the unique and challenging demands of the 21st century and how best to go about it, need to

be addressed. For this reason and because I have experience of being an educator, I chose the student as my focus in pursuing my scholarship in education. Since I have been and still am a student, I decided to find the answer to the critical question – What does it mean to be a student in the 21st century? – through an autoethnographic narrative study. This study includes all my experiences of being a student within the culture of other students, and because being a student is always future directed, it includes interviews with international experts in the field of education, philosophers and futurists who transcend my individual perspective into the realm of universality. Within this academic autoethnography of pursuing my scholarship in an action research approach, Whitehead (2016, p. 139) explains: "In the creation of a living educational-theory each individual generates their own unique explanation of their educational influence in enquiries of the kind, 'How do I improve what I am doing?' " In this context, I also ask: How do I improve myself by what I am doing?

Semester 2: Spiral 4 – the pursuit of my scholarship in education

This spiral represents the pursuit of my scholarship in education, which is based on an action research approach of an autoethnographic narrative to answer the question: What does it mean to be a student in the 21st century? It therefore represents in effect, my PhD thesis.

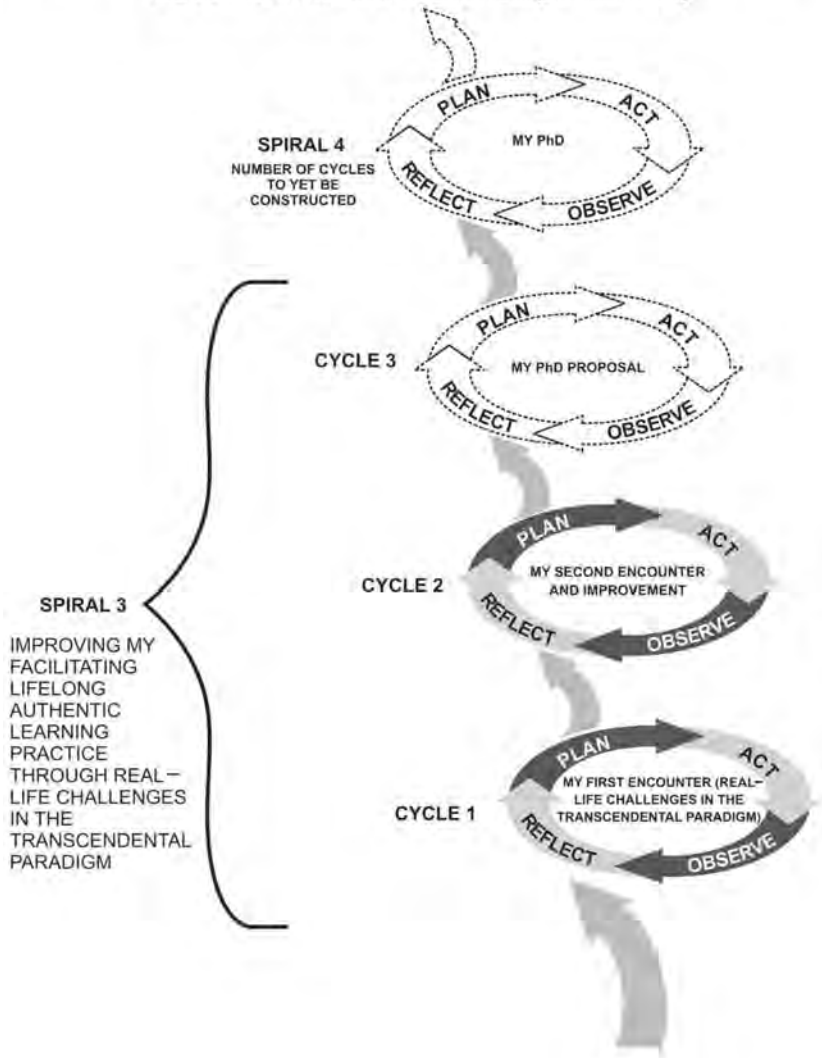The course of my action research in the second semester is depicted in Figure 4.

Figure 4. Model of my action research: Semester 2

Ethical considerations

The ethical considerations contained in all the official documentation and application forms of the Faculty of Education, have been taken into consideration with the emphasis on privacy, data protection and avoiding harm (National Advisory Board on Research Ethics, 2009, p. 5).

Findings

I was confronted with three major challenges in this research project. Firstly, at the start of the year, I was uncertain about most aspects of this action research project. Beginning the year in a totally new field without having had an education practice, was rather daunting. I really struggled to find my education practice, and after several unsuccessful attempts that left me in much doubt about my enrolment in the PGCHE programme, I was very relieved when one of my lecturers suggested that I facilitate his PGCE Life Sciences student-teachers.

The second major shock came when I was exposed to the process of facilitating learning. I needed to act as a facilitator of learning for the first time in my life after being exposed to the traditional teacher-centred approach to learning. Having encountered my education practice for the first time, while simultaneously needing to ensure improvement was a formidable task. I felt confused because the way I was taught for most of my educational life, differed radically from the process of facilitating learning. I started to question my past life as a student seriously, comparing it with what I was currently experiencing. I felt deeply disappointed, hurt even, in realising that I had not really learnt much throughout my life as a student. On the contrary, the education system took learning away from me by constantly supplying me with a one-memorised-recipe answer to an unrealistic question.

Thirdly, as a facilitator of learning, I needed to cope with the restrictions and limitations of the current education practices, as they manifest in a teacher-centred transmission of information. My mentor, a typical facilitator of learning, did not provide me with

any answers during the times when I felt lost. He did, however, provide me with the necessary emotional support and encouragement to reach my own understanding of facilitating learning.

Regarding facilitating learning in my student-teachers, at first, I felt very awkward in facilitating the student-teachers, because I was still so new to the facilitating learning process myself. I tended to 'teach' the student-teachers rather than facilitate. However, I was being scrutinised by a mentor and although I felt tremendous pressure because of this, I knew the mentorship would help me a great deal, especially in overcoming my initial fear of facilitating the student-teachers. I was withdrawn in the beginning, not wanting to be in the foreground too much when I visited the student-teachers' schools, but my confidence grew significantly over the year. Sometimes, being exposed to facilitating learning for the first time, the student-teachers themselves acted very rebelliously towards me, especially in our one-to-one reflection sessions after they had presented their respective classes. This conflict made me feel embarrassed, offended and sometimes even incompetent, but I gained confidence in what facilitating learning entailed. Embarrassment gave way to believing in myself as the facilitator of learning – I needed to facilitate the process of maximising my student-teachers' potential so that they also developed personally. I carried a great responsibility that precisely entailed confronting the student-teachers, so that they could become the best human beings that they could be.

I quickly became amazed by, and even started to admire, the science of facilitating learning. I was thrilled to hear the feedback from a student: "This was a difficult year but worth it. Even my parents noticed how I changed". This real-life situation again made me realise that when you are faced with a real-life challenge and when you are immersed in a situation where you cannot but solve the challenge, that is the situation in which you will learn and not only learn, but develop as a whole human being. I can, of course, say the same about my own development, my presumption

supported by my mentor (taken with his permission from a recorded ad hoc conversation):

> The PGCHE course was a very difficult course, besides that fact that it was therefore in education, which you were completely unfamiliar with, it was very, very difficult … all people really struggle with that. But you managed to go through it, and you managed to go through it in such a way that it was so good to see that you were developing more and more to not have those frustrations take away your energy, but you overcame that and it became more and more a question that you much quicker went over it and could spend your energy on the next challenge, rather [than] on the frustration … And that was a good thing for me to witness.

I learnt and developed so much in a single year, not only concerning academic knowledge and skills, but also, and more importantly I believe, in myself as a human being. After the completion of the PGCHE programme, I was an entirely different person. To me, this indicated a breakthrough – undeniably a transformation – not only of what it means to facilitate learning but also of what it means to be a student: to learn specifically by experiencing the highest possible quality of learning through engaging with an authentic real life challenge (Slabbert, De Kock & Hattingh, 2009, pp. 66, 72). My real life challenge was embedded in facilitating learning in Life Sciences student-teachers.

Within the context of the research question, the findings can be summarised as follows:

a) My design of learning tasks follows a natural sequence of lecturing, which is designing lessons for PowerPoint presentations followed by student-teachers being required to do so in practice during their school-based learning period. The student-teachers achieved some success in these learning tasks, but there was still a vast need for improvement. Surprisingly, one of the student-teachers had already implemented learning style versatility with an element of whole brain learning during the second part of her lesson, by diverting to a practical lesson in which learners worked in small groups on completing

questions on a worksheet. Although this was to be commended, many deficiencies needed to be addressed. Eventually, the student-teachers managed to engage in learning style versatility and elements of whole brain learning.

b) I succeeded in circumventing the limitations and restrictions of current education practices through challenging the student-teachers by designing a learning task in which learning style versatility and whole brain learning were fully exhibited. However, the interpretation of one student regarding the learning task was flawed, and success in this endeavour was only partial.

c) I succeeded in improving my assessment practice, by utilising all the possible resources that I had at my disposal. These included: the official document for school-based learning and assessment; the assessment rubric and assessment forms; my mentor and his assessment; the students-teachers' mentor-teachers and their participation as practising experts; my participant observation during assessment supervised by my mentor; my individual development, thus taking control of the assessment; and the design of a practice theory of, and for, my assessment practice in the form of an observation sheet, to be used by me as a reflection of my assessment practice and a feedback form used by student-teachers to assess my assessment practice.

I have become very conscious of both the importance and the difficulties of ensuring the best possible and most appropriate facilitation of lifelong authentic learning and, therefore, my improvement is vast. The lessons learnt from my first school-based learning period, offered me the opportunity to take my learning experiences forward into my student-teachers' next school-based learning period. With the second school-based learning period, my mentor generally let me take the lead in the facilitation processes, because I was more confident and by that time, I had more experience in facilitating learning. Although it took longer for one student to reach this paradigm, I was satisfied to see how the

student-teachers ultimately transformed to the transcendental paradigm.

Conclusion

The significance of the study, however, lies within the value of what action research can offer, in providing meaningful insight into personal development. The action research steps I painstakingly followed, allowed me to reflect deeply on my actions (before, during and after). This self-reflection made me realise I want to continue with a PhD (as illustrated by Semester 2, Spiral 4). Even though my PhD is an autoethnographic narrative, the basis of the research reflects the action research steps.

As Whitehead (2016, p. 139) argues, action research as a vehicle for my autoethnographic journey contributed to my justification of my educational influence when I asked: How do I improve what I am doing? At the same time, this provided the opportunity to ask: How do I improve myself by what I am doing?

Acknowledgements

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Biography

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Nadine L. Broodryk has been exposed to the field of Natural and Physical Sciences for more than 10 years by being involved in science communication and outreach, conducting student excursions, lecturing, presenting research seminars and tutoring science projects. She is co-author to several research outputs in this field. She became a keen facilitator of learning 7 years ago when she decided to formally merge the fields of science and education by enrolling for a Postgraduate Certificate in Higher Education. She has finally completed her PhD scholarship in Education.

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Johannes A. Slabbert has been a teacher educator for nearly forty years and has disseminated his research at multiple national and international conferences and in numerous publications of various formats. He maintains that education revolves around learning and how to facilitate it. His philosophy of education has Aristotle's authenticity as its foundation with authentic learning and facilitating authentic learning as its compositional structures. He

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