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Action learning, action research: Towards greater 115 collaboration amongst networks Colin Bradley ALARA membership information and article 121 submissions

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Editorial

Welcome to the only issue of the *Action Learning and Action Research Journal* for 2018. As in previous issues, just over half of the received papers did not meet the exacting standards of the review panel, reducing the ability to produce two issues this year. The included articles, however, are very interesting papers, with two self-explorations.

Nadine Broodryk and Johannes Slabbert explore the role of action research in Nadine's autoethnographical transition from natural sciences to scholarship in education. Nadine's education programme involved the design of an action research idea that would result in the innovation and/or improvement of her higher education practice (a concept similar to our second article – see below). The journey she took challenged, and changed, her understanding of education, when she was exposed to facilitating learning. Her

research was practitioner-based, because the aim was to transform a traditional knowledge-transmission educational practice into an innovative facilitating lifelong authentic learning practice. (p. 27)

While she followed all the steps (identify, plan, act, observe, reflect, review) in all the cycles of the spirals of her action research methodology, the authors present a holistic narrative of the findings to represent the complexity that action research can accommodate within its structure. This narrative demonstrates the purpose of facilitating lifelong authentic learning as personal development of the highest order to enable the learner to maximise their human potential.

The narrative is an interesting description of Nadine's personal development while developing student-teachers in their method of educating school students.

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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... (p. 42-43)

In addition to this personal and student-teacher development, the authors note that

[t]he significance of the study, however, lies within the value of what action research can offer, in providing meaningful insight into personal development. (p. 45)

The proposal to develop new ways to educate was the challenge faced by Bing Qin Koh and Yoke Ung Wong in the second article in this issue. They wished to develop a functional framework to teach and learn science at the three conceptual levels of understanding. These levels are macroscopic (observable reactions), sub-microscopic (atomic interactions) and symbolic (chemical symbols and formulae).

They were concerned that guidance for educators to link and deliver concepts effectively at these three conceptual levels of understanding is inadequate. Their analysis of students' understanding of science indicated the students had problems with terminology, conceptualisation of particles and the "language" of science (chemical symbols, etc.). Students tended to resort to rote learning, which is not appropriate for new situations.

The authors used an action research approach to develop a lesson design framework to address this concern. They tried strategies with students and evaluated the strategies to seek continual improvements, reflecting on the process as they thought of ways to help them in the planning of the next cycle of action. They implemented three cycles, with a gradual shift from teachercentred to learner-centred and participatory approach in every subsequent cycle. During the first cycle, the authors used teacher-

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observers to collect qualitative data during the lessons, and formative assessments following the lessons. The authors gathered important information about the impact of the changes to the lesson design that led to the second cycle. In this cycle, they shared details of lesson design process with the students, effectively inviting them into the action research process.

This attempt to make the research student-inclusive served to encourage students to be mindful of their participation in the lesson activities which would lead to a stronger and more meaningful engagement in the post-lesson discussions. (p. 76-76)

In the third cycle, their aim was

the use of the framework as a lesson design tool for educators, ...[and] that it may also be used by learners as a guide to structure their thoughts and achieve independent learning. (p. 81)

The inclusion of data gathering to inform the modifications to the lesson design, and the increasing involvement of the students in the design makes for an interesting read (and presentation, as the first author presented at the ALARA 2018 World Congress).

The third article comes from David Collins, who describes an action inquiry in the context of his doctoral study that seeks to explore how art-based pedagogies may empower educational practice. The author discusses distancing, a process of estrangement, as a means of exploring and analysing personally generated data. He developed two devices to enhance distancing in self-inquiry, particularly when the data is challenging because it is 'too close' to the inquirer.

The first is a visual Johari Window..., involving a series of self-portraits and collaged images related to the author's educational journey in life. The second is a dramatic device inspired by the work of Dorothy Heathcote ... that involves the development of a fictitious character who presents the work of the author and provides opportunities for transformative reflection. (p. 87)

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The author created William Loveday as a character to speak at a number of conferences and educational events to explain and critique aspects of research work that he was finding difficult to articulate as an artist, social work educator and inquirer.

William Loveday developed using an iterative spiral of planning, performance, evaluation and further performance.

In my experience of enacting William Loveday, I did feel a degree of estrangement from being myself. This helped me experience my ideas and work differently. The distancing effect supported a deeper analysis by stepping outside my familiar frames of reference, looking from a different perspective, and engaging the reactions and reflections of others in the process. (p. 108)

The author describes the development of this character and his use of the characterisation and the Johari window. He found that

[t]he use of visual art and drama has provided potent possibilities to critique and reappraise my doctoral work through a process of distancing. (p. 109)

The final article is a short piece that I wrote about collaboration between action learning and action research networks. I have frequently received questions about cross-membership between networks, which has a potentially significant financial implication for some networks. Of more interest, in my view, is how the networks can work together, while maintaining their independence, to achieve greater outcomes than they might by themselves. There seems to be an increasing willingness to explore opportunities for this sort of collaboration.

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

Johannes Slabbert

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.

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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

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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; Konings, 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

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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.

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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)

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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)

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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.

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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:

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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

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(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.

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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

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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,
		 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 (t LU L (C	 (b)	 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). 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
	Cooperative Learning (CL)	 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	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:
	Feedback	a) the learner's (re)engagement with LTE;
	(LTF)	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:
		 requesting them to answer their own questions;
		 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
		 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 knowledgetransmission 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 studentteachers 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

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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 studentteachers 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.

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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

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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 studentteachers 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

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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 studentteachers' 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 studentteachers 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.

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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 studentteachers 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 studentteachers would use, to assess my assessment practice. The face toface 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;

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- 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

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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.

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Figure 3. Model of my action research: Semester 1

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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 studentteachers 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

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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 studentteachers 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

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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

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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 onememorised-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

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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

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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

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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 studentteachers 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' mentorteachers 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

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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?

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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 fourty 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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maintains that education is, in principal, not an epistemological task of the acquisition of knowledge and skills, but it is, primarily, an ontological challenge of the transformation of the human being – nothing less.

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Developing a functional framework to teach and learn science at the three conceptual levels of understanding: An action research approach¹ Bing Qin Koh

Yoke Ung Wong

Abstract

Many educators advocate that the teaching and learning of science should be done at three conceptual levels – the macroscopic, sub*microscopic and symbolic levels. Although there are simple* resources available to provide learning experience at these levels, *the pedagogical guidance for educators to link and deliver concepts* effectively at these three conceptual levels of understanding is inadequate. Using the action research cycle of planning, acting, observing and reflecting as a research methodology, we developed a lesson design framework to address this concern effectively. The framework was aptly applied to design lessons for abstract concepts that are perceived to be difficult to learn by secondary school students such as the strength of acids and the precipitation of salts. The efficacy of this framework is evident from the direct feedback garnered through interviews of participating students as well as the positive teaching outcome based on the qualitative and quantitative data collected. We leveraged on the data and feedback gathered after each implementation to refine our framework and plan for the next cycle of action. This paper not only seeks to illustrate an effective pedagogical model for all science educators,

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but also exemplifies how action research may be used as a methodological approach to address gaps in teaching practices.

Key words: lesson design framework, conceptual levels of understanding, action research

Introduction

The secondary science curriculum in Singapore requires students to be able to think deeply to make use of the concepts they have learnt to comprehend information and solve problems. To complement this initiative, the Curriculum Planning and Development Division (CPDD) Science Unit in the Ministry of Education, Singapore, produced a teaching and learning guide (2013 Secondary Science Teaching and Learning Guide, n.d.), which advanced the idea that science, especially chemistry, should be taught at the three conceptual levels, namely, macroscopic, submicroscopic and symbolic. The guide provides teachers with a few activities that they could conduct to give students some experience in learning chemistry at these three conceptual levels. However, we feel that these activities do not provide direct instruction for students to link the sub-microscopic level to the other levels (macroscopic and symbolic). This is not ideal according to a study conducted by Gabel (1993), where students performed better in tests when the teacher provided extra instruction that required students to link the sub-microscopic level to the macroscopic and symbolic levels. Drawing from our teaching experience of the common difficulties that our students encountered in learning science, we thought about how learning could be made more effective if we were able to provide more opportunities for our students to learn concepts at the three conceptual levels, with an emphasis on students being able to link these levels. This gave us the impetus to conceptualise a framework which incorporates different pedagogical approaches and strategies which educators of science may adapt and apply to augment their lesson delivery, while learners in these fields may use it as a guide to delineate and enhance their understanding of abstract concepts at the three conceptual levels of understanding.

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In order to evaluate the impact of our framework to educators and students, and improve and refine our practices, we decided to embark on action research as a critical inquiry process. We adopted the Action Research Spiral introduced by Kemmis and McTaggart (1988) in this project. Our application of the four 'moments' – plan, act, observe and reflect – as described in this model is elaborated in the later section of this paper.

Background

Our analyses of our students' responses in their daily assignments and regular formative assessments revealed that they found science, especially chemistry, to be a difficult subject. Some common difficulties experienced by students are described below.

- 1. Students found chemical symbols, formulae and equations to be confusing because, taken all together, they looked like a new language to be learnt.
- 2. Students had difficulty in using specific terms in science. For example, when carbon dioxide gas is bubbled into limewater, students are expected to record their observation as the formation of a white precipitate. Phrases such as 'limewater turned chalky / milky / cloudy' are not acceptable. This type of difficulty was mentioned by Gabel (1999).
- 3. In order to understand some concepts in science, students need to be able to visualise particles (collectively used to describe atoms, molecules, ions, formula units and electrons), their behaviour and interactions. Because these particles are not visible to us, many students had difficulty trying to imagine them. For example, methane can be seen to burn when ignited but students must be able to explain that the reaction involves the breaking of bonds in methane so that the carbon, hydrogen and oxygen atoms can rearrange themselves to form carbon dioxide and water.
- 4. Students could not differentiate between the macroscopic and sub-microscopic conceptual levels. They were not able

to discern that an observation at the macroscopic level may not be due to a similar occurrence at the sub-microscopic level. For example, carbon is a black solid but it does not mean that the atoms of carbon are black.

Due to the various difficulties in understanding science, many students resorted to rote learning. They preferred to memorise concepts rather than to understand them. This was a much faster way of learning according to the students. When they encountered a difficult question that required them to think deeper, they resorted to what they could remember and wrote answers that did not reflect a coherent understanding of concepts.

According to Nakhleh (1992), most alternative conceptions in chemistry stemmed from students' inappropriate understanding of the particulate nature of matter. In fact, "an acceptable concept of the particulate nature of matter lays the foundation for understanding many chemical concepts".

We decided to conduct a preliminary study with Secondary 3 students (equivalent to Grade Nine in high school) offering chemistry. The purpose of this study was to assess students' understanding of the behaviour of particles after the topic of Kinetic Particle Theory was taught. A quiz consisting of two-tier multiple-choice questions was administered using the mobile app, Socrative. Table 1 summarises students' responses in the quiz.

As can be seen in Table 1, over 80% (81.48%) of the students incorrectly responded with A4 as the answer for Question 1. The students knew correctly that the particles in a solid can only vibrate about their fixed positions. However, they thought that these particles could not move randomly in all directions. This could be because students could not comprehend how vibration about fixed positions can also be a random movement. This could be due to the students' lack of understanding of the meaning of the terms 'fixed' and 'random'.

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Question No.	Option	%	Question No.	Option	%
Question 1	A1	3.70	Question 3	A1	2.50
	A2	1.23		A2 *	88.75
	A3	1.23		A3	0.00
	A4	81.48		A4	0.00
	B1	1.23		B1	2.50
	B2 *	11.11		B2	2.50
	B3	0.00		B3	0.00
	B4	0.00		B4	3.75
Question 2	A1	25.00	Question 4	A1	36.25
	A2	28.75		A2	5.00
	A3	3.75		A3	0.00
	A4	1.25		A4	0.00
	B1	0.00		B1	0.00
	B2	1.25		B2	1.25
	B3 *	21.25		B3 *	53.75
	B4	18.75		B4	0.00
*Correct answer				C1	0.00
				C2	0.00
				C3	2.50
				C4	1.25

Table 1. Students' responses to the two-tier multiple-choice questions quiz on the Kinetic Particle Theory

For Question 2, the common incorrect answers were A1 and A2. More than 50% (53.75%) of the students thought that the spaces between the particles in a solid are occupied by air. They were

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unable to deduce that the spaces between the particles in a solid are too small to hold any particles at all. When the question was discussed in class, the students were surprised to find out that the spaces between the particles are effectively empty spaces. This showed that the students could not reconcile themselves to the fact that a vacuum can exist within a solid.

More than 80% (88.75%) of the students were able to answer Question 3 correctly. This is because the question was a commonly asked question and the students could have remembered the correct response to the question.

For Question 4, 36.25% of the students gave A1 as the incorrect response. The students' understanding of density was correct but they failed to apply what they had learnt about the random movement of particles to the context of the question. They did not consider that the molecules of a gas can move randomly and, as a result, the molecules of gases were mixed.

The results of the quiz prompted us to reflect on and evaluate our teaching practices. We felt that our students were not able to intuitively link what they had learnt at the sub-microscopic level to the context of a problem presented. These findings agree with what we learnt from the literature review (Nakhleh, 1992; Gabel, 1992 & 1999; Sirhan, 2007). Thus, we decided to explore how scientific concepts could be taught at the three conceptual levels for better understanding.

The objectives of this Action Research project are:

- 1. to propose a framework that could guide teachers to plan and design lessons that teach the concepts in science, especially chemistry, at the three conceptual levels of understanding; and
- 2. to exemplify the use of the framework to design lessons to illustrate how opportunities could be provided for students to link what they have learnt at the three conceptual levels.

Literature review

A literature review on the learning of chemistry revealed that many chemistry educators were concerned about the difficult nature of chemistry and the reasons why many students were not learning chemistry well. Alex Johnstone first introduced the idea of the three conceptual levels of understanding chemistry in 1982 (Taber, 2013). Since then, many researchers have taken the idea further and made recommendations on how chemistry should be taught for greater understanding.

According to Johnstone (2000), the three conceptual levels are macroscopic, sub-microscopic and symbolic. The macroscopic level refers to the tangible nature of chemistry, that is, that which can be seen, touched and smelt. Nakhleh (1992) used the term observable phenomena. Teaching that provides a macroscopic view of chemistry usually involves laboratory activities. Here, students conduct an experiment and observe what happens during a reaction. They could be recording what they observe and making measurements.

The learning of chemistry requires students to be able to explain chemical reactions with reference to the behaviour and interactions of particles. For example, in a highly abstract topic such as electrolysis, students must be able to describe that an aqueous solution of copper(II) sulfate contains copper(II) ions, sulfate ions, hydrogen ions and hydroxide ions. When an electric current is passed through the solution, the copper(II) ions gain electrons to form copper metal. Since ions and electrons are not visible to the naked eye, students are left to their own devices to imagine the interaction between copper(II) ions and electrons. This is the highly abstract nature of the sub-microscopic level of understanding in chemistry, which we believe to be the most difficult for students. When students encounter difficulties, it is not surprising for them to memorise all that is found in their textbooks without understanding the content. Consequently, they are likely to reproduce incoherent content from memory in order to answer test or examination questions.

The third level of understanding is the symbolic level. Ask any adult what he or she can remember about chemistry and most will recall chemical symbols, formulae and equations. Although this level of understanding is important, it should not be overly emphasised such that it becomes a distinctive feature of the subject. We had encountered students who were overwhelmed by this level of understanding and, as a result, were not able to progress further in this subject. Consequently, they could not achieve decent grades in chemistry and lost interest in the subject. All the chemical symbols, formulae and equations represented a new and foreign language that was too difficult to learn.

Figure 1 shows the three conceptual levels of chemistry (Gabel, 1999), with each level represented at each apex of the triangle.



Figure 1. The three conceptual levels of chemistry (Gabel, 1999)

Although distinct from one another, Johnstone stressed the need for learners of chemistry to be able to coordinate their thinking within these three levels of understanding (Taber, 2013). The three levels represent the different domains of chemical knowledge and complement one another. The nature of chemistry is such that learning at each of the three conceptual levels of understanding is necessary to ensure that concepts are fully understood. Gabel (1999) suggested integrating the three levels of understanding to eliminate the possibility of alternative conceptions occurring. In fact, many researchers concluded from their findings that, if

students were taught explicitly with the macroscopic, submicroscopic and symbolic representations, they would develop better conceptual understanding (Wong & Wong, 2013). Gabel (1999) proposed how the three levels of understanding could be integrated to help students to understand the electrolysis of water. The following sequence of activities could be conducted:

- 1. Macroscopic level Laboratory work could be conducted where students perform the electrolysis of water. Students view and measure the volume of gases produced. This provides students with an observable phenomenon that they could relate to at the sub-microscopic and symbolic levels later.
- 2. Sub-microscopic level Students could be asked to represent the decomposition of water molecules using models of atoms and molecules. However, in order to link the sub-microscopic level to the macroscopic level described earlier, students could be asked to perform some calculations involving the volume of gases collected.
- 3. Symbolic Finally, students could be asked to write a balanced chemical equation to represent the electrolysis of water. In addition, students could be asked to find the relationship between the measured volumes (macroscopic level), calculated volumes (sub-microscopic level) and the mole ratio as represented in the chemical equation (symbolic level). The final step would be effective in helping students to connect their understanding at the three conceptual levels.

Posthuma-Adams (2016), working with her colleague, Horner, proposed a 'planning worksheet' that could be used as a teacher tool or shared with the students. Figure 2 shows a template of the planning worksheet while Figure 3 is an example of how the worksheet could be made use of (Posthuma-Adams, 2016). Ideas from the template and example could be adapted to design the framework in this project.







Figure 3. An example of how the planning worksheet could be used (Posthuma-Adams, 2016)



Learning is the result of a social process involving the teacher, students and a medium of instruction. According to the social constructivist learning theory, knowledge is constructed through interaction with others. Figure 4 shows the social constructivist model proposed by Krajcik (cited in Gabel, 1999) which we have modified for our use in this project.

According to this model, students construct new knowledge when they engage in a social discourse with their teacher and peers, preferably while engaging in some form of activity. During this interaction, students have the opportunity to describe, exchange and clarify what they understand. This will eventually lead to students constructing new knowledge or restructuring their own understanding. When given the opportunity to apply this new knowledge, students develop a deeper understanding as they are required to construct linkages between concepts.



Figure 4. Social constructivist model adapted from Krajcik (cited in Gabel, 1999)



Action research as an approach

Action research is identified as a disciplined process of inquiry performed by researchers taking actions to refine their practices or develop others (Sagor, 2000). Several models of action research can be found in the literature. Coghlan and Brannick (2005), for instance, mentioned a four-phase action research cycle of diagnosing, planning action, taking action and evaluating action while Kemmis and McTaggart (1988) introduced the Action Research Spiral consisting of the four 'moments' of plan, act, observe and reflect.

The nature of our work would involve us to try out strategies with students and then evaluating our strategies in order to seek continual improvements. We would need to be reflective in the process as we thought of ways to help us in the planning of the next cycle of action. Hence, we envisaged that the adoption of the Action Research Spiral as an approach would greatly complement our pursuit and provide us a scaffold to develop a functional framework to teach and learn science at the three conceptual levels of understanding.

We began each cycle with the development of a lesson design framework and trialled the framework by designing a lesson. We enacted the lesson and observed students' responses in class. In addition, we analysed students' responses in formative assessments and interviews. Based on all of our observations and analyses, we reflected on how our framework and practices could be improved for the next cycle to be implemented. Figure 5 shows an overview of our action research approach.

A total of three cycles were implemented, with a gradual shift from teacher-centred to learner-centred and participatory approach in every subsequent cycle. As we ultimately want our work to be a research for the improvement of students' learning and not an advancement of a theoretical proposition by researching on students, we conducted our research with the two Secondary 3 classes which we directly and closely taught. Each class consisted of about forty students of mixed gender and ability.



Methodology

The first cycle

Expanding on the work of Posthuma-Adams (2016) and taking into consideration the advantages of the use of social constructivism in developing learners' cognition, we conceptualised an initial lesson design framework (Figure 6) to guide us in planning and delivering lessons which incorporated the three levels of understanding chemistry.

As presented in the framework, the sub-microscopic level of understanding is identified as the bridge linking the macroscopic and symbolic levels. It is common for teachers, for instance, to teach the concept of precipitation by first demonstrating the formation of precipitate with an experiment (macroscopic level), and, thereafter, directly explaining the observation with a chemical equation and arrows to represent the 'exchange' of ions (symbolic level).

$$KI(aq) + AgNO_3(aq) \rightarrow KNO_3(aq) + AgI(s)$$

This approach does not allow students to understand the dissociation and movement of, and interaction between the ions involved. Students are not given the opportunity to look into the world of particles (sub-microscopic level). The results of our preliminary study have already shown that students' knowledge about the behaviour and interaction of particles was limited to what their textbooks could offer. As a result, they have difficulty in applying their knowledge when presented with problems to solve. Thus, developing the sub-microscopic level and the links between the different levels strongly are emphases of our lesson design framework.



Figure 6. Initial lesson design framework

Although scientific knowledge is usually introduced at the macroscopic level, with the emphasis on inquiry learning and laboratory work, we propose that the initial conceptual level at which to deliver a concept in chemistry is dependent on the topic and profile of students. For instance, a topic such as the mole concept introduced at the macroscopic level may pose learning difficulties for visual learners. In such a case, the topic could be

presented in the form of a visual stimulation for these visual learners. In other words, teachers may need to consider the learning preferences of their students (visual, auditory or kinaesthetic) when deciding on the lesson design.

Predict-Observe-Explain (POE), a strategy developed by White and Gunstone (1992), has been widely adopted as a pedagogical approach to teach science in many secondary schools in Singapore. This strategy is particularly effective for laboratory work. Before the conduct of an experiment, students predict the outcome of the experiment. They then conduct the experiment and make careful observations. Finally, they try to explain their observations using concepts learnt or, in the process, develop and construct new concepts. This strategy is incorporated into our framework to guide us in designing lesson activities and crafting questions at the macroscopic level. Additionally, it serves as a conscious reminder for us to draw connections between the macroscopic and submicroscopic levels to enhance students' understanding of concepts in chemistry. In our framework, we propose that the teacher deliberately design laboratory work that requires students to explore the behaviour and interaction of particles at the submicroscopic level when constructing an explanation for their observations.

The framework that we developed aims to enhance not only the effective delivery of concepts, but also our competency in revealing alternative conceptions from students. This makes formative assessment an integral part of our teaching approach. Formative assessment refers to an ongoing process where teachers evaluate students' learning so as to gather feedback to inform future instruction. The formative assessment strategies that we propose include two-tier multiple choice questions, concept cartoon, class discussion and interviews with individual students. Questions crafted should be pertinent to each conceptual level of understanding so as to allow the development of appropriate intervention strategies that are tailored specifically for a particular conceptual level.

Bearing in mind the initial framework that we planned earlier, we tested its feasibility by applying it to conceptualise a laboratorybased lesson to allow students to learn the concept of the strength of acids. The correlation between the strength and degree of ionisation of acids in water is a concept that is difficult for most students to comprehend. It is not uncommon for students to erroneously claim that a solution with a high concentration of acid molecules is a strong acid. To address the difficulty in understanding the concept, it is crucial that students are able to perceive ionisation at the sub-microscopic level well.



Figure 7. Lesson design to teach the concept of the strength of acids

the degree of ionisation.

answers and refine them.

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Our designed lesson focused on the comparison of the reactions between strong and weak acids (macroscopic level), and link them to diagrams that represent particles of these acids in aqueous solutions (sub-microscopic level). Figure 7 outlines how we leveraged on our framework to design the lesson.

The lesson began with the recapitulation of the role of hydrogen ions in the chemical properties of acids. A worksheet was given to supplement the delivery of the lesson (see Figures 8 to 10 for examples of students' work).

Macroscopic level: Two activities were included in the lesson. The first activity involved the reactions of magnesium ribbons of equal length to dilute hydrochloric acid and dilute sulfuric acid of equal volume and concentration separately. Students were tasked to drop one magnesium ribbon into each of the two acids simultaneously and compare the rate of bubbles produced in the reactions (Figure 8). The second activity involved a similar procedure with the contrast of dilute hydrochloric acid (strong acid) to ethanoic acid (weak acid).

3. a) Describe the similarities which you observe in both reactions.

Effervescence, could be seen in both test tube. Fog could be seen at the sides of both testtube. The

reaction only coursed on the surface of both acid. The test tube felt warm. Colourless solution is formed. Maenesu ribbon du

b) Compare the rate of bubbles produced in both reactions.

The reaction in the sulfuric acid took place at a faster rate. These were more burbbles produced

. In the test tube with suffaric acid at the start of the experiment. The note of bubbling and dissolving of Mg for suffaric acid has much faster than that of hydrochoric acid.

c) For a fair comparison to be made in part (b), state the variables that need to be kept constant.

Same volume of acid. The same length of magnesium ribbon. Make sure the reaction, start at the same

time by dropping the Mg ribbon at the same time. Initial temperature of both acid to be the same. Concentration

of both acids.

Figure 8. Comparison of the reactions of hydrochloric acid and sulfuric acid with magnesium

Sub-microscopic level: Students were given a diagram to show the ionisation of dilute hydrochloric acid in water. Based on the

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experimental results, students were tasked to derive and draw similar diagrams that illustrated the ionisation of sulfuric acid and ethanoic acid in water. They were expected to deduce that the rate of bubbles produced was related to the amount of hydrogen ions present in the acid solution, which was directly determined by the degree of ionisation and the strength of acids (Figures 9 & 10).

Symbolic level: Students were taught to represent the ionisation of the acid molecules in water using ionic equations. The symbol for reversible reactions (\rightleftharpoons) was also introduced for weak acids.

> $HCl \rightarrow H^+ + Cl^ CH_3COOH \rightleftharpoons CH_3COO^- + H^+$

5. Based on your comparison of results in 3(b), complete the diagram below to show the ionisation of sulfuric acid in water. Make use of the symbols given in the diagram.



Note that water molecules are not drawn.

6. Suggest a reason why the rate of bubbles being produced in the reaction between sulfuric acid and magnesium is different from that of hydrochloric acid and magnesium. There are more hydrogen bis in sulfuric acid compared to hydrochloric acid. A acid properties

is provided by Ht ibns, thus more hydrogen ions allows the reaction between surfuric acid

and magnesium to be faster. There is a higher number of hologen ions per unit volume of water. Hence the reaction was much faster than that of surface and. rextent

7. Comparing the diagrams drawn in this activity, what can you say about the degree of ionisation of hydrochloric acid and sulfuric acid in water? Hence, how would you classify the two acids?

Both acids were ionised completely, Hydrochloric acid and sulfuric acid are strong acid.

Figure 9. Students leveraging on knowledge at the submicroscopic level to explain their observations for hydrochloric and sulfuric acids

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 Based on your comparison of results in 3(b), complete the diagram below to show the ionisation of ethanoic acid in water. Make use of the symbols given in the diagram.



Note that water molecules are not drawn.

5. Suggest a reason why the rate of bubbles produced in the reaction between ethanoic acid and magnesium is different from that of hydrochloric acid and magnesium. There is a fewer number of hydrogen ions, per unit volume of water. Hence, the reaction was much share

than that of hydrochloric acid.

.....

6. Compare the diagrams drawn in both Activity 1 and Activity 2. What can you say about the degree of ionisation of ethanoic acid in water? Hence, how would you classify ethanoic acid? Ethanoic acid was not verified completely. Ethanoic acid is a weak acid.

Figure 10. Students leveraging on knowledge at the submicroscopic level to explain their observations for ethanoic acid

The initial framework is a concerted effort by us to provide a guide for educators to link concepts at the three conceptual levels effectively. Though the individual embedded strategies incorporated are backed by significant work from independent researchers over the years, we recognised that, for the newly designed framework to be functional, data and feedback gathered through practice are essential. Hence, in the acting and observing stages of this cycle, we closely evaluated

- 1. the feedback from teacher observers
- 2. our personal experience as lesson designers

3. whether lesson ideas and activities generated through this framework were able to yield positive impact on the learning of students.

The lesson was implemented in the authors' classes and four teacher observers were invited to take note of qualitative responses from students and to identify areas for improvement for the designed lesson. At the end of the lesson, we evaluated the impact on the learning of students through formative assessment strategies such as concept cartoons and two-tier multiple-choice questions.

Evaluation of the first cycle

In terms of the learning outcome of students, substantial quantitative data was available to validate the effectiveness of our initial framework and strategies. A concept cartoon (Figure 11) was given to the students to complete at the end of the lesson. In this activity, students were required to identify the correct statement in the concept cartoon and write their reasons clearly on the given worksheet. In this formative assessment, the majority of the students (84.06%) were able to recognise that both dilute hydrochloric acid and dilute sulfuric acid were strong acids (Table 2). More importantly, they could articulate that they chose the answer because of the fact that both acids underwent complete ionisation in water. It is, however, still a concern that there were close to 15% of students who identified sulfuric acid as the stronger acid. These students claimed that more ions were produced when sulfuric acid molecules ionised.

	А	В	С
%	1.45	14.49	84.06

Table 2. Students' responses to the concept cartoon



Figure 11. Concept cartoon on strength of acids

To further evaluate students' understanding of the concept of the strength of acids in relation to the degree of ionisation at the submicroscopic level, a quiz consisting of two-tier multiple-choice questions was administered in class. Table 3 summarises the students' responses in the quiz.

The results revealed that the majority of the students were able to understand the concept of a strong acid in terms of its complete ionisation in water. This is shown by 94.87% and 83.33% of the students who selected the correct answers for Questions 1 and 2 of the quiz respectively. These values triangulate with our results in the concept cartoon.

Besides students' learning outcome, a key objective of our project is to provide an effective pedagogical model for educators. The level of acceptance by teachers would influence our action in the next cycle. We collected feedback from the teacher observers. These data together with our own personal reflections made up the qualitative data that informed our practices and guided us in enhancing our framework for the next cycle of implementation.

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Question No.	Option	%
	A1	0
Question 1	A2	0
	A3	0
	A4	1.28
	B1	0
	B2	3.85
	B3 *	94.87
	B4	0
Question 2	A1	0
	A2	0
	A3	0
	A4	0
	B1	1.28
	B2	2.56
	B3	0
	B4	12.82
	C1	0
	C2	0
	C3 *	83.33
	C4	0

* Correct answer

Table 3. Students' responses to the two-tier multiple-choice quiz questions on the strength of acids

As reflective practitioners, we continually leveraged on our findings, especially disconfirming evidences, to enhance and revise our proposed framework.

As the designer of the initial framework and lesson, we acknowledged that the availability of a framework greatly helped us in structuring our thoughts and encouraged us to rationalise the suitability of our choices of approaches. The framework did ease the lesson design process for us to craft a lesson that helped to achieve understanding at the three conceptual levels. However, we also acknowledged that refinements were necessary. Notably, teacher observers who joined us in the lesson enactment highlighted to us that the delivery of concepts at the submicroscopic level could be improved. In particular, there was a need for detailed strategies and guidance in the framework to deliver the concepts at the sub-microscopic level effectively. This level of understanding was proven to be the most difficult level for students, as observed during the students' think-pair-share discussions, as it involves the visualisation of particles and their interactions which are intangible. We gathered that it is imperative to ensure a very strong visualisation of particles at the submicroscopic level in order for students to be able to link their understanding at this level to the other levels. Tools and strategies to support this enhancement, such as suitable manipulatives, were thus explored and incorporated into the existing framework for a second cycle of study.

The second cycle

Building on the direct feedback from the first cycle, we tried to improve on our initial framework to make it a more comprehensive one. The enhanced lesson design framework, herein referred to as the 'Chemistry Triplet Framework for Lesson Design', is shown in Figure 12.

In an attempt to widen the repertoire of strategies at the submicroscopic level, we included suggestions of tools that aid in the visualisation of particles. Apart from the conventional diagrammatic representation of particles, magnetic buttons of different colours are increasingly common in the teaching and learning of science. More than just a tool for illustration during the teacher's explanations, we strongly recommend the use of the tools to facilitate and enrich group discussions among students, which

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we will exemplify in the later part of this section. The effective use of information and communication technology (ICT) is a major feature in today's classroom. Educators can thus leverage on the available applets or even develop their own animations to illustrate movements of particles at the sub-microscopic level.



Teaching Chemistry at the Three Conceptual Levels of Understanding

Figure 12. Chemistry Triplet Framework for Lesson Design

To provide a clearer guide for teachers, we included a nonexhaustive list of items to help them recognise what constitutes to the symbolic level in the framework. In addition, the links between the sub-microscopic and symbolic levels, and between the symbolic and macroscopic levels, were made more explicit to users of the framework. When translating from the sub-microscopic to the symbolic levels, the essential skill that learners should develop is the ability to represent their understanding of particles in an appropriate way which allows them to communicate to another person scientifically. When a concept is represented at the

symbolic level, students should be able to interpret it and relate it back to observable phenomena at the macroscopic level. A way to do so is to validate their expected observations through experimentations.

With the improved framework ready, we then attempted to plan and enact a lesson on the precipitation of salts, another concept which required students to view science at the particulate level for understanding. An outline of our planning process and discussion is shown in Figure 13.

Step 1 – Macroscopic		Step 2 – Sub-microscopic	$\left(\right)$	Step 3 – Symbolic	
Approach: Laboratory		Tool: Magnetic buttons)	With the aid of	
work		Approach: Group	/	magnetic buttons	
Predict: Discuss the	1	discussion		and based on their	
possible products that		Explain: Students		group discussions,	
can be formed when		manipulate magnetic		students will	
aqueous potassium		buttons (used as models of		complete the	
chloride is added to		ions) to discuss how the		chemical and ionic	
aqueous silver nitrate.		ions interact. Student will		equations for the	
Observe: Observe the		then consider the solubility		reaction between	
product that is formed		of salts to delineate the		the two solutions.	
when the two		reasons for their		└──────────────────	
solutions are added		observation at the			
together.		macroscopic level.			

Step 4 - Formative Assessment

Aim: To assess if students are able to apply the strategy taught in the lesson to other given solutions. Sub-microscopic: Students are to complete a diagram to represent what happens when two other aqueous salt solutions are added together. (To give two reactants that produces no solid product.)

Figure 13. Lesson design to teach the concept of precipitation of salts

In designing the instructional materials for this topic (sample materials are shown in Figures 15 & 16), the three conceptual levels of understanding chemistry were explicitly stated in contrast to the previous lesson on the strength of acids. A brief overview of

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the framework was also shared with the students at the start of the lesson. The reason for doing so was to allow students to appreciate the work which we were embarking on. This attempt to make the research student-inclusive served to encourage students to be mindful of their participation in the lesson activities which would lead to a stronger and more meaningful engagement in the postlesson discussions.

Macroscopic level: The first part of the lesson required students to perform a simple reaction by adding aqueous potassium chloride and aqueous silver nitrate together. Students were tasked to describe their observations and what they understood by the term 'precipitate'.

Sub-microscopic level: Students were given diagrams which represent simplified ionic lattice structures of the two compounds. They were required to elicit their prior knowledge from the topic of ionic bonding to represent how the ions of the compounds were arranged when the compounds were dissolved in water. In groups of four, students used the magnetic buttons provided to discuss how the ions interacted with one another (Figure 14). Through the discussion, students were expected to be able to explain the



Figure 14. Arrangement of magnetic buttons by students



precipitation of salt observed at the macroscopic level, in terms of the behaviour and interaction of ions at the sub-microscopic level (Figure 15).



Make use of the magnets provided to explain what happens to the ions during the precipitation reaction.

Solid potassium chloride and silver nitrate are compounds with giant ionic structure. Their ions are arranged in giant ionic lattice structures as shown in the **simplified** diagram below.



Figure 15. Sample of students' work



Symbolic level: The last part of the activity required students to make use of their discussion at the sub-microscopic level to identify the spectator ions, leading them to complete an ionic equation to represent the reaction they observed earlier (Figure 16).

Symbolic Level 1. Spectator ions are ions that do not undergo any change during a chemical reaction. Based on what you have drawn in Fig. 4, identify the spectator ions for the reaction between aqueous potassium chloride and silver nitrate. Potassium and nitrate ions. 2. An ionic equation can be used to represent the precipitation reaction. In an ionic equation, spectator ions are excluded. Give this a try, please.. Write an ionic equation, with state symbols, to represent the precipitation reaction that you observed between solutions of potassium chloride and silver nitrate. Use what you have drawn in Fig. 4 to help you. KC2 + AgNO3 → AgC22 Ag+ + C2 (aq) → AgC2 (S)

Figure 16. Students' work at the symbolic level

Evaluation of the second cycle

A formative assessment was necessary for us to assess if the students understood the concept of the precipitation and solubility of salts. Students were given about 10 minutes to complete a short quiz (Figure 17) individually at the end of the lesson to evaluate the effectiveness of our intervention. The quiz required students to illustrate what happened at the sub-microscopic level when aqueous potassium chloride and aqueous sodium nitrate were added together.

Based on the quiz, 88% of the students were able to correctly recognise the solubility of both products in water and delineate the reason for the absence of an ionic equation to the fact that no precipitate was formed. This positive result reassured us that our

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approach to the teaching of the topic of precipitation of salts at the three conceptual levels was effective.



- 1. In another reaction, aqueous potassium chloride is reacted with aqueous sodium nitrate.
 - (a) Draw diagrams similar to Fig. 3 and Fig. 4 to show what happens when these two solutions are mixed together.

You may use the magnets to help you.



Figure 17. Sample of a student's response in the quiz

In addition to the formative assessment, detailed post-lesson discussions with individual students were also conducted to

identify the strengths and drawbacks of our approach. In particular, students were asked to identify noticeable differences in the way the lesson was structured as compared to lessons which were not designed using the lesson design framework.

The framework that we designed was proven to be applicable to teaching and learning. Students, in particular, highlighted that after going through the designed lessons, they were able to visualise how the interactions of particles at the sub-microscopic level explain the phenomena they observed at the macroscopic level. We also leveraged on the interviews with students to gather some feedback on our approach. For instance, the following question was asked:

The teachers were explicit in teaching concepts in chemistry at the three conceptual levels (macroscopic, sub-microscopic and symbolic). In what way has this been helpful in your learning?

Some interesting comments for this question which demonstrated the relevance of our approach include:

- 1. "When the teacher teaches us concepts at the three levels, we are able to 'break things down' and understand things easily."
- 2. "Because the sub-microscopic level was emphasised, I am able to see how particles 'look like' after ionisation and during precipitation. I am able to see the particles 'moving in my mind' now."

When asked if they preferred the framework of the three conceptual levels to be made explicit to them in class, all of the interviewees responded that they preferred so. One of the students mentioned that if he was not told the levels to focus on, he would not be confident about what he needed to visualise and look out for. Another student also highlighted that, when the links between the three levels of conceptual understanding were made explicit to her in the teaching of the precipitation of salts, she was able to apply them easily when solutions of other compounds were given,

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and it certainly enabled her to derive the ionic equations for other precipitation reactions on her own. Our students' preference validated what Wong & Wong (2013) mentioned as described in the literature review that we have done earlier.

The third cycle

In addition to the use of the framework as a lesson design tool for educators, we envisage that it may also be used by learners as a guide to structure their thoughts and achieve independent learning. To encourage students' participation in our study, we modified the framework to provide learners with a model to break down concepts in other topics, namely the reactions of bases, at the three conceptual levels independently (Figure 18). The purpose of this activity was to evaluate their ability to extend and generalise their understanding of the three conceptual levels of understanding to other topics on their own through the use of the framework.



Figure 18. Sample of student's work

Analysis of our students' work showed that, in general, they were able to identify and discern the different levels of understanding. They were able to write what they had learnt in the macroscopic and symbolic levels with sufficient details. However, details in the

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sub-microscopic level were lacking. Most students were not able to represent what they understood in terms of particles. This showed us that students' understanding on this abstract level could still be lacking or that students were not yet able to relate intuitively to this level of understanding. These findings were not surprising because we believe that our students needed time and exposure to be able to develop this ability.

We intentionally designed our lessons to provide learning experiences at the three conceptual levels of understanding and demonstrated what these levels of understanding were. Ideally, our students should be able to recognise that the learning of science involves understanding of concepts at the sub-microscopic level. Without prompting, they should exhibit the ability to ask questions about the behaviour and interaction of particles related to a given topic that has not been taught before. With this in mind, interviews were conducted with six students of varying ability. The set of interview questions is included in Annex 1.

In the interview, students were given the following scenario:

You are required to learn the topic, 'Speed of Reaction', on your own.

You found out that the higher the temperature, the faster the speed of the reaction. For example, at a higher temperature, dilute hydrochloric acid reacts at a faster rate with magnesium.

Questions were then asked to gain insights into students' thoughts at the macroscopic and sub-microscopic levels. We found out that all students were able to articulate the need for a laboratory experiment or video to be able to experience and 'see' the phenomenon described. This showed that students were able to direct themselves to search for answers at the macroscopic level.

However, when asked what more they needed to find out to understand the concept of the effect of temperature on the speed of reaction, only two higher-ability students were able to think deeper to seek explanations at the sub-microscopic level. This is evident from the answers to Question 2 of the interview, where

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they suggested the following questions that they would ask themselves:

- 1. Could there be some changes to the particles of the acid or magnesium at different temperatures?
- 2. Is the reaction faster because molecules move faster?

The majority of the students were not able to move beyond the macroscopic level. Nevertheless, upon further prompting to look 'deeper' into the concepts, another three of them were able to shift their scope of understanding to the sub-microscopic level. In particular, one of the students actually queried if he should relate the concept to the movement of particles as he had learnt in the chapter on the Kinetic Particle Theory. This revealed to us that a more concerted effort is necessary in order to inculcate the habit of looking at the behaviour and interaction of particles at the sub-microscopic level for explanations.

Conclusions

Through our action research cycles, we have developed a lesson design framework that encompasses approaches, strategies and tools to guide educators to teach concepts at the three conceptual levels of understanding. We have also suggested where strategies such as inquiry learning involving laboratory work and formative assessment could be incorporated into the framework. The framework was proven effective as evident from the feedback garnered as well as the positive teaching outcome. In addition, students also demonstrated the ability to use the framework to break down and understand given topics at the three conceptual levels of understanding. We, however, acknowledge that we should further explore the deepening of students' ability to seek scientific explanation at the sub-microscopic level without prompting. We believe that such an endeavour would instil an inherent capability for students to acquire conceptual content knowledge in fields such as quantum physics and microbiology as they advance into tertiary education. Certainly, we envision that the framework that we designed is transferrable and would bring

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about advancement in the teaching and learning of fields beyond the sciences.

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Biography

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Annex 1

Interview Questions

Students' Intuitive Application of the Three Conceptual Levels

You are required to learn the topic, 'Speed of Reaction', on your own.

You found out that the higher the temperature, the faster the speed of the reaction. For example, at a higher temperature, dilute hydrochloric acid reacts at a faster rate with magnesium.

1. What do you think you need to do, experience or see in order to understand the speed of reaction better?

Expected answer:

How do I know that this is the case?

Can I see this?

Can I do an experiment on this?

2. What do you need to find out more about in order to understand the speed of reaction better? What question would you ask to find out more?

Expected answer:

How do you explain why the speed of reaction is faster when the temperature is higher?

Can I explain this using particles?

Has it got to do with the energy level of the particles?

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Distancing when undertaking first person action inquiry: Two devices

David Collins

Abstract

Action Inquiry is a methodology with the desired outcome of research action producing systemic change. In the context of a doctoral study seeking to explore how art-based pedagogies may empower educational practice, Action Inquiry was an obvious choice where empowerment involves social work practitioners *exploring this question together.* As part of a participatory approach, a process of self-examination is integral to the author's inquiry as a means of contextualising professional practice in terms of social, cultural and political dynamics, and as a means to appreciate the journeys of participants in the author's inquiry. In this article, the author discusses distancing, a process of estrangement, as a means of exploring and analysing personally generated data. Two devices are developed to enhance distancing in self-inquiry, particularly when the data is challenging because it is 'too close' to the inquirer. The first is a visual Johari Window (Luft and Ingham 1955), involving a series of self-portraits and collaged images related to the author's educational journey in life. *The second is a dramatic device inspired by the work of Dorothy* Heathcote (Heathcote and Bolton 1995) that involves the development of a fictitious character who presents the work of the author and provides opportunities for transformative reflection. The character of William Loveday is developed during a number of educational events using an iterative spiral of planning, performance, evaluation and further performance. The inquiry shows how visual art and drama can provided potent possibilities to critique and reappraise both doctoral work and practice education through a process of distancing. The author highlights how these devices can be adapted to numerous practice situations

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involving self-inquiry and participatory inquiry and to empower educational practice.

Key words: distancing; drama; first person action inquiry; visual autoethnography

William Loveday (William is standing in front of an art installation containing a drawing/collage):

'Notice the quick hatched pencil marks feeling their way, exploring the contours of the artist's face. Is the restless drawing betraying an uncertainty? Four portraits in one, all drawn from a side view, each one different. The eyes are not making direct contact, which you would usually expect from an artist's gaze in a mirror. What impression do you have from the artist's expression?'

I have created William Loveday. He has spoken at a number of conferences and educational events to explain and critique aspects of research work that I was finding difficult to articulate as an artist, social work educator and inquirer. In this excerpt he is discussing a drawing/collage I had been making, presented as part of an art installation exhibited at the United Kingdom Council for Graduate Education (UKCGE) 'Creative Doctorates' symposium in 2018. The art installation is a piece of visual autoethnography based on self-examination and reflections of my educational journey through life. Why is self-inquiry so important in my doctoral journey and what voice does William bring to my inquiry that necessitates his presence?

In this article, I discuss the interconnecting relationship between first-person action inquiry and visual autoethnography. I was concerned I might be too close to my data, thus posing a risk to the trustworthiness of my inquiry. To provide distance between myself and my doctoral work, I developed two artistic/performative devices, a visual Johari Window (Luft and Ingham, 1955) and the creation of an alter ego based on a dramatic convention originated by Dorothy Heathcote (Heathcote, 2000). I used the action planning cycle/spiral developed by Kurt Lewin (1946) to develop the latter. Although the notion of 'distancing' will unfold throughout the article, I use Stig Eriksson's

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presentation of this concept as a poetic and pedagogical strategy involving a process of 'making strange' or 'estrangement' as a means to reflection and learning (Eriksson, 2014, pp. 3-4).

My doctorate study is an inquiry into how art-based pedagogies might empower critical social work practice education. The term 'practice educator' is used to describe those professionals who are responsible for facilitating and assessing the students' practice learning during their placements. The intended inquiry impact is to show how practice educators may develop their teaching and extend their repertoire of approaches by using art-based teaching methods to support student learning and assessment during social work placements. In particular, I hope there will be an impact on how practice educators empower their students in the development of their critical understanding and skills by developing art-based approaches.

A key opportunity for my development has been my participation in a faculty learning group at Birmingham City University UK, a community of practice involving academics who are interested in performative modes of inquiry and inquiry dissemination. This has been a nurturing and enabling forum, with opportunities for individual and collective creative voices to be heard at conferences, symposiums, workshops and in publications. I contributed to a collective sculpture that toured a number of educational events, including 'Disrupting Inquiry Practices' at Coventry University, and 'Creative Caring' at the Centre for Social Care, Health and Related Research conference at Birmingham City University, both in 2018. This took the form of an art installation and the aforementioned drawing/collage.



Figure 1. Art Studio - installation at 'Creative Caring' conference, Birmingham City University 2018.

The metaphor of the art studio referenced the apprenticed artist in Renaissance Europe, who was dependent upon using materials discarded by the master to produce apprenticed work as part of his journey towards being a professional artist. This metaphor resonated for me, as I considered myself an apprentice inquirer learning my craft. The installation was put together using materials from my own studio and old jars and bottles acquired from local antique stores and junk shops, filled with powdered pigments.

While putting together and showing the installation I encountered two particular challenges. First, I found it difficult to articulate some of the ideas behind my inquiry that positioned creative outcomes as prominent without being heavily dependent upon a written explanation. Second, I felt I was too close to my material to differentiate the objective and subjective aspects of my autoethnographical work.

Inquirers need to be aware how their identity and beliefs impact on every aspect of their inquiry (McNiff and Whitehead, 2010). I

position myself as a critical qualitative and participatory inquirer, where the presence of the self as inquirer is essential, impacting upon all stages of the inquiry process (Denzin and Lincoln, 2011). From the planning stage, the interaction with participants, the analysis of data and how inquiry is presented, all involve human interaction to some degree or another. Heron (2001) argues that beliefs about the world and how it is experienced are revealed in inquiry by ontological questions about the nature of reality; epistemologically by the extent of our knowledge and the relationship between the knower and reality; and methodologically by the way the inquirer can find out about reality through increasingly evolving belief systems constructed between communities of knowers.

This leads to the discourse on objectivity, where reality is external, waiting to be discovered, and subjectivity, where knowledge is constructed and contingent. The hegemony of objectivism found within the positivist paradigm has long been challenged, with the overarching criticism being that external phenomena cannot be entirely independent from the mind of the inquirer (Guba and Lincoln, 1982; Reason, 1994; Heron, 2001; Marshall, 2016). Any findings are shaped by the inquirer in the interaction with the world. Statements of fact are theory-laden, formulated within a set of pre-existing theoretical assumptions, and value-laden. There is selectiveness within the values implicit in the set of theoretical assumptions in preference to the values represented by rejected theoretical assumptions (Heron, 2001). In traditional terms, the researcher is distanced from the research, a neutral observer objectively examining human phenomena (Reason, 1994). But this is a different kind of distancing from that concerning this article, where subjectivity is openly acknowledged and embraced, and where objectivity/subjectivity are not seen as binary opposites but more nuanced (Heron, 2001).

Consideration of professional identity has been evident in my career as a social worker. In my professional development, it has been essential to be critically aware of my identity, values, and belief systems, and to engage in critical reflective practice in order

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to avoid discrimination. My self-awareness project has been situated within social and political contexts and has engaged in an understanding and commitment to challenge organisational, cultural and structural oppression (Thompson, 2012). A similar journey of exploration is a key area of development for students during their practice placements and the critical self-awareness of practice educators is vital to empower this process. However, it is a continuous one due to the insidious nature of oppressive practice. Thompson (2012, p. 192) states that if we become complacent by failing to check we are carrying through an anti-oppressive stance, 'discriminatory ideologies can subtly re-establish themselves in our thoughts and actions'. I consider there is a clear symbiosis between the critical self-awareness required to be an effective social worker and inquirer, which is crucial to the humanitarian ambitions espoused by the social work profession such as social justice, human rights, collective responsibility, respect for diversities, empowerment and liberation (IASSW/IFSW, 2014).

The link between visual autoethnography and action inquiry

By considering how art-based approaches might complement the work of social work practice educators in enabling their students' learning, I set out to understand my own educational journey as a means of appreciating the social, cultural and political contexts that influence my professional identity. In doing so, I hoped to be more appreciative of how such factors influence other practitioners, and to contextualise how professional practice can be understood and undertaken.

The use of visual autoethnography and first person action inquiry seemed relevant choices, but how well would they function and how might the arts relate to these two approaches? Both can provide a systematic inquiry approach to help the practitionerinquirer investigate and analyse practice related problems or challenges by making sense of her/his own position and professional behaviour, together with those of others, within the context of work cultures (Denzin and Lincoln, 2011). Marshall

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(2016, p. 8) describes first person action inquiry and autoethnography as 'cousins' 'with many similar intentions of reflexivity' but emerging from different heritages.

As socially orientated inquiry, Whitehead (2002) positions ethnography as a predominantly qualitative approach. The 'auto' or 'self' denotes the inquirer or ethnographer being the source of the data. Chang (2008, p. 51) states that autoethnography is a powerful tool for inquirers and practitioners who deal with human relations in multicultural settings, specifically citing social work. Rather than being a descriptive self-indulgent introspective process, Chang supports the inquiry integrity of autoethnography with its provenance in empirical anthropology and social ethnographical inquiry. Defined as a combination of self-situated cultural analysis and interpretation with 'narrative details', Chang maintains that vigorous methods of data collection and analysis can result in a social scientific approach to inquiry (Chang, 2008, p. 46).

Pink (2013) develops this approach by engaging with visual material in inquiry as the central data component, this being typically generated by the inquirer. A criticism of visual autoethnography is that of image interpretation. The viewer may see the image very different from the image producer; things not intended or envisioned. Pink (2013, p. 23) states that: '[a]ny experience, action, artefact, image or idea is never definitively just one thing but may be redefined differently in different situations, by different individuals and in terms of different discourses'. Similar to my art practice and how people view my artwork, I find the participatory and interpretive engagement in critically orientated artistic endeavour a desired aspect of the process. Just as the narrative might change every time it is told, so too an image is contingent upon how it is situated, the meanings it evokes, the knowledge it conveys and how it is interpreted (Rose, 2016). The centrality of the visual within an autoethnographical inquiry seemed natural given the nature of my inquiry interest.

In seeking to explore how art-based pedagogies may empower educational practice, the desired outcome of action and change

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involving practitioners within a specific professional context made action inquiry a clear choice. The systematic, transparent and replicable qualities of action inquiry lend themselves well to the ambitions of my inquiry in extending and developing innovative practice education. A framework involving different levels of plurality outlined by Reason and Bradbury (2001) provides further mutual symbiosis with autoethnography and beyond. First person action inquiry addresses the ability of individual inquirers to act with awareness and meaningfulness when examining and living in the external world. This is not simply an introspective process but is developed by critical feedback from relevant others (Marshall, 2016). Such opportunities as supervision sessions with my inquiry supervisor, presenting at conferences, symposiums and workshops, and sharing reflective drawing/writing with others, have enabled me to develop a deeper critical understanding of my work. Second person action inquiry involves making co-operative inquiries with others into issues of mutual concern, beginning with a pilot study I undertook with practice educators and to be followed by future iterative cycles of participatory inquiry (Reason and Bradbury, 2001). Furthermore, my engagement with fellow academics in the faculty learning group and the shared experience of the collective sculpture are examples of second person action inquiry. Third person action inquiry involves creating a wider community of inquiry and larger scale dialogue, achieved for example by presenting at conferences, engaging in professional media sites and publication.

Acosta, Goltz and Goodson (2015) identify individual autoethnography as an initial and inductive stage in collaborative action inquiry, each participant then sharing their narratives in order to explore and evaluate the structural, cultural, and behavioural perspectives related to their practice. Although broader, this resonates with the idea of reconnaissance, an appraisal of where the practitioner-inquirer is currently positioned in relation to the inquiry, the desired achievements of the inquiry, and the relevant methods to realise it (McNiff and Whitehead, 2010). Developed further by Dillon (2008) reconnaissance involves both self-reconnaissance (an exploration of the inquirer's beliefs

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and professional behaviours within a particular inquiry context) and situational reconnaissance (an exploration of the practice context related to the inquiry from an insider viewpoint). Acknowledging that both these forms of reconnaissance often occur throughout the inquiry process, Dillon considers living inquiry as a relevant approach, where beliefs, strategies and ways of behaving are treated as fluid, not fixed, unfinished, and not clear-cut. This requires a continual process of adjusting, observing what emerges, and bringing things into question (Marshall, 1999; Marshall, 2016). Hill builds upon this embodied approach by stating that the practice of reconnaissance is 'not restricted to a place and time but continues in a haphazard way throughout the duration of the action inquiry process' (Hill, 2008, p. 29). The question 'how far back do you go?' is posed as a rhetorical one (Dillon, 2007; Hill, 2008), but in terms of the knowledge generated by exploring historical and cultural situational experience, this needs to be related to the inquiry project. In my case, this goes back to childhood to evaluate how experiences, both positive and troubled, have informed my educational beliefs and practice, uncovering strengths and baggage. In previous praxis as a practice educator, I lacked confidence in using my identity as an artist to enrich student learning, because my multiple identities as artistpractitioner-educator-inquirer had not come together sufficiently. Art-based practice was not something that was explicitly related to social work practice, even though social workers are encouraged to be creative (Burgess and Laurance, 2007). By taking an autoethnographical approach and exploring factors that had influenced me, inspired me, troubled me and even held me back in the past, I hoped I would appreciate the journeys of other participants in my inquiry, and a desire that valuable insights may be applicable beyond my inquiry.

A visual Johari Window

The idea of using Johari Window came from a pilot study workshop I ran with social work practice educators in 2017. The aim was to conclude the workshop by jointly working upon some form of artefact that summed up participant experience and

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learning, but we ran out of time. Based upon an in-depth case discussion, the group decided they would have worked on a collage using Johari Window, had there been sufficient time. Johari Window is a heuristic model of interpersonal awareness developed by American psychologists Joseph Luft and Ingham Ingram, and is a popular model in social work education in the UK (Luft and Ingham, 1955). The name Johari is a conflation of their first names - Joe and Harrington. It can be used individually or on a team and organisational basis. The window is divided into four panes. The first is the open self, where one is aware of oneself and others are also aware. The second is the hidden self, things one is aware of but others are not. The third is the blind self, where one is not aware of aspects of one's identity whilst others are. And the fourth is the unknown self, where one is not aware of oneself and others are also unaware. Usually, through an exchange of adjectives, things are shared that may increase awareness in these four areas leading to greater self-consciousness. The window is often pictorially depicted as four equal sized panes, but the aim is to increase the open self and decrease the hidden, blind and unknown selves.

Developing the idea as a visual autoethnographical exercise to explore how my educational journey through life had informed my ideas and beliefs about education, I drew four self-portraits from a side view, one for each pane of the Johari Window. Each one was drawn in pencil from a photograph, which helped me to treat myself as an object, a piece of data. Each one had a differing degree of clarity created by a hatching effect, to mirror the degree of clarity denoted by the four characteristics of the Johari Window. I became conscious of avoiding self-flattery and attempted to draw with candour, including the tell-tale signs of ageing.

Open Self

Hidden Self



Blind Self

Unknown Self

Figure 2. Visual Johari Window (drawing and collage)

Onto the drawings, I collaged images that evoked responses to the different selves within the window. Each image contained a narrative related to my educational journey. Sometimes images were evocative, stimulating memories and reflections. A painting from a series called 'Bacchus, Psilax, Mainomenos' by the American abstract painter Cy Twombly conjured up childhood memories and represented an early example of my reaction against authoritarian educational approaches. I'll let William comment on the connection:

William Loveday (making a comment about the hidden-self section of the Johari Window drawing/collage)

'Scribble, indecipherably calligraphic and graffiti-like mark making, euphoric loops that soar upwards and red floods of paint that drip, ooze and cascade down the canvas paying homage to gravity. Twombly captures the spontaneous

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experiential expression of discovery found in young children's art. Inspired by Homer's Iliad the series references the dual and almost schizophrenic nature of the god Bacchus (also known as Dionysus), oscillating between pleasure and sensual release (psilax), and debauchery bordering on the nihilistic (mainomenos) (Cullinan, 2011). These paintings resonate with David for a number of reasons. He had acute difficulties with reading and writing as a child, and only became confident from the age of eleven. The sweeping, swirling painterly gesticulations of Twombly signify his earliest joy of drawing and painting as a child, where the visual was a primary means of articulating his feelings. David recalls being chastised by a stern and intimidating priest at Sunday school for doodling while he was in full flow of indoctrination. 'Drawing belongs to the Devil' he was told, the priest's face thrust within inches of David's. Like the theme of Twombly's painting, David took a Bacchanalian-like pleasure in obstinately continuing with his doodling, much to the priest's intense annoyance. The priest told his father after class, but fortunately being someone who had a complete distain for pompous authoritarianism, his father took no notice'.

Furthermore, I consciously selected images as representations of my experiences or aspects of my identity. For example, also in the hidden-self section of the window is an image of both a trade union banner and that of Karl Marx, which referenced my father's trade unionism. I recalled the lively debates I witnessed as a child between my father who was a socialist and political activist, and my uncle who was a member of the Communist Party. Through my autoethnographical reflections, these memories emerged as influential experiences that later informed my choice of social work as a profession. Other images were evoked from experiences during my current doctoral journey. The elegant calligraphy in the blind-self section of my window represents a comment made at my approval panel presentation for my doctoral inquiry about the quality of my writing, something that had significant meaning given my difficulties earlier in my life. Situated in my unknown section, I included a photograph of myself enacting William

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Loveday at a conference. This experience presented me with an opportunity to discover something new about myself, which I expand upon in this paper.

Using visual images as part of a research project and making these publicly visible in conferences and publications raises a number of ethical issues. In self-narrative inquiry, the identity of the researcher is already disclosed, and the identities of others may be discernible by association. When aiming for inclusivity in selfnarrative work, it is useful to ponder the question of ownership posed by Clandinin and Connelly (2000): Does the narrator own the story simply by telling of it?

Ethical practice in visual base research is not straightforward (Rose, 2016). The continuous and rapid development of information technology and social media have challenged traditional understanding of consent and copyright laws. Images are uploaded on and downloaded from the internet at a phenomenal rate on a daily basis. Kress (2010) argues that image-making, circulation, sharing and mashing are profligate features of contemporary visual culture, and in many situations, privacy, consent and copyright have become irrelevant to many people. Furthermore, Sturken and Cartwright (2009, p. 212) state that contemporary art practice engaging with digital images problematise our understanding of originality, authenticity and ownership, raising 'questions of reproduction and copyright to new levels of intensity'.

The use of found images in my drawing/collage have been reconstituted and re-contextualised in relation to other images in an attempt to establish new meaning, thus posing questions of authorship. Most of the images have been produced by myself. I have gained consent from my daughter to include images of my granddaughters, together with their consent obtained in an ageappropriate way, to illustrate the issue of work/life balance and my incalculable educational journey as a parent and grandfather. Wherever possible I have obtained permission to use other images, for example, I contacted my late father's trade union to gain permission to use the image of their trade union banner. Although

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guided by ethical statements and practice guidelines regarding visual methodologies, such as the Code of Practice outlined by the International Visual Sociological Association (Papademus and International Visual Sociological Association, 2009), I have found variations that possibly reflect the complex and emergent development of visual based inquiry. Pink (2013) makes the point that different people, contexts and cultures have different notions of ethical practice and this challenges the idea that there is one set of ethical rules when undertaking ethnographical research. Rose states that current discourse on visual-based research ethics is often framed in terms of rights and the 'institutional imperative of ethics review boards' (Rose, 2016, p. 371). In addition, my reflexive practice is essential in order to be continually aware of the power relations between myself and participants throughout the whole inquiry process.

What have I learned from making a visual Johari Window? That autoethnography and first person action inquiry is not about focusing on myself alone but involves understanding others. Everyone has their unique journeys that inform their beliefs and current practice, and we are socially situated in developing our awareness of ourselves. Understanding my own journey has increased my appreciation of others' journeys, and how these are culturally framed. Furthermore, working with visual images has enabled a more penetrating inquiry into my own memories, experiences, and the cultural contexts in which these are situated. They have enabled me to identify and examine critical incidents related to the development of my educational practice, and to a degree has helped me to objectify these experiences, a kind of distancing from the emotional attachments associated with my past narratives. Perhaps it has provided a temporary dispassionateness in order to see these narratives slightly anew. I have stopped taking some of these memories for granted, the familiar has begun to look a little strange. As an educator, such insights have led me to delve more deeply into previously unexplored spaces in my relationship to subjective and objective experience, extending the understanding of my own epistemology

and ontology. What about future development of this work? Perhaps William's critique offers some ideas about this:

> William Loveday (William is commenting at a faculty learning group seminar on using drama in research dissemination 2018):

'The drawing/collage begins to stir David's memories and to loosen fragments of habituated past narratives into a visual structure. It has been through exhibition that he has been able to unpack these images for viewers, engaging him and others in interconnected conversations and shared dialogue. Cultural interpretations have begun to develop. Unconscious matter has been uncovered. Although the process of self-inquiry is not a linear one, as one memory generates more narratives, moving backwards and forwards, not necessarily in chronological order, a more systematic self-observation and reflection is required (Rodriguez and Ryave, 2002). I hope to see David develop more works, perhaps focusing on different points of his educational journey'.

Enter stage right

Faced with the daunting problem of being able to disseminate my own work and ideas in a critical way, and encouraged by my inquiry supervisor, I considered a dramatic device to present my art installation at a number of conferences and educational events. I had not participated in drama since a number of embarrassing performances in school productions as a child and was clearly out of my comfort zone and pushing the boundaries of my own learning. In order to provide an element of distancing from my inquiry I chose an educational drama convention devised by the English drama teacher and academic Dorothy Heathcote. This involved the development of a fictitious character that would present and critically comment upon my work.

Despite showing talent at drama school, Dorothy Heathcote was subject to discrimination by being told she had no future on the stage because of her size and stature. She began teaching in schools in Yorkshire and immediately developed an unorthodox approach

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in the way children were engaged as full participants in drama. In the 1950s, she began a long academic career, firstly at Durham University, and later Newcastle University, making a significant contribution to drama educational theory. A particular focus of her work was using drama as a means of engaging students in inquiry and reflective learning. By developing theatrical strategies such as 'Teacher in Role' (Johnson and O'Neill, 1984), 'Mantle of the Expert' (Heathcote and Bolton, 1995) and 'Rolling Role' (Heathcote, 2000) she examined the teacher/student relationship and how to empower students to engage in critical thinking about their lives and society.

The presence of Heathcote's work in contemporary debates and practice which involves showcasing the student voice, power and control in the teacher/student relationship, and the development of critical thinking and inquiry, shows her lasting legacy to drama education (Booth, 2012). Eriksson (2014) highlights the central importance of distancing in Heathcote's pedagogy. Whether used as an aesthetic principle in developing fiction, a protective factor in dealing with sensitive subjects, or a poetic device to facilitate creativity and learning, Erikson maintains that distancing is 'foundational' in a process that combines art and pedagogy (Erikson 2014:4). Through strategies of detachment, Heathcote's aim was to make something strange in order to examine it anew.

Erikson (2014) draws parallels between Heathcote's ideas about distancing and those of a number of writers and dramatists, including the Russian writer and literary theorist Victor Shklovsky and the German playwright and theatre practitioner Bertolt Brecht. Shklovsky (1917) considered the habitualness of perception stemmed from the lethargic effect that results from processing experience and phenomenon for practical action. Things are only recognised and no longer seen, events are computed and categorised but not fully experienced. Shklovsky counteracted this through poetic language, having the potential to move beyond the prosaic language of everyday life and creating fresh powers of perception. In doing so he developed the concept of 'Ostranenie' which means 'making strange'. By a process of estrangement and

de-familiarization, routine and automatic responses can be circumvented.

For Brecht, things and experiences that seemed 'the most obvious thing in the world' equated to giving up on our attempts to understand life and the cosmos (Brecht, [1936] 2001, p. 71). In his use of theatre as a means of critical reflection, he developed the concept of 'Verfremdung', which is usually translated as 'alienation'. Willet has pointed out the ambiguous and problematic nature of this translation due to negative connotations of imposed separation and discrimination, but Brecht's concept had been too firmly established in dramaturgical circles to change (Willet, 1984). By alienation he meant an artistic approach to detachment that transforms the familiar and the habitual into something 'amazing' (Brecht, [1936] 1963, p. 196). To clarify his concept of Verfremdung, Brecht (1963, p. 101) stated: 'Estranging an event or a character means first of all stripping the event of its self-evident, familiar, obvious quality and creating a sense of astonishment and curiosity about them'.

Eriksson (2014, p. 8) not only draws comparisons between Heathcote, Shklovsky and Brecht, but also states that Heathcote made specific references to them in her writing, which represents a similarity of direction. Drawing from the spirit of this philosophical approach and Heathcote's concepts of distancing and estrangement, I developed the fictitious character of William Loveday, an independent art critic and curator. The name William came from my grandfather, who died when I was a child, but his loving and generous nature has always remained with me. The surname came from the fact I was born in Loveday Street Hospital in Birmingham, long since demolished to make way for urban development.

To achieve a systematic approach to evaluating the usefulness of this distancing strategy, and because I had the opportunity of developing William over a number of educational events, I considered the process of iteration which was originally conceptualised by Kurt Lewin (1946, p. 206), cycles or spirals of 'planning, action, fact-finding, and evaluation'. I thought there was

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scope to modify the original idea and applying it to the performance, giving my inquiry robustness and rigour by having more than one 'event' in one 'situation' (Howell, 2004, p. 356). Each of the iterations would be followed by reflective writing for analysis, and my inquiry supervisor would be present for two of the iterations and offered to observe and give feedback.



Figure 3. The author enacting William Loveday at UKCGE workshop 'Doing the doctorate differently' 2018

Cycle 1: William's first appearance was at a UK Council for Graduate Education (UKCGE) all day workshop called 'Doing the doctorate differently; creative methodologies and pedagogies' held in 2018. I had set up my art studio installation in the main room of the symposium during lunch and some of the participants were already curiously exploring the art materials before I began. I had not fully scripted the session but intended to guide the participants through the installation using a detailed sequential structure to ensure that no important information or issues were omitted. Prior to the event, I had a few awkward unwitnessed rehearsals and was still feeling apprehensive. When the symposium restarted, and in accordance with Heathcote's technique, I informed the participants

I would be leaving the room and return as William, to explain my work and ideas. I returned wearing a bowtie as a simple prop to both signify my change of role and help me switch into the character of William. I was aware that participants may be suffering some after lunch lethargy, so I asked everyone to suspend their disbelief and pretend they were in an art gallery, to get up, and to engage with the installation. Everyone obliged and quite a number of participants picked up some art materials, paintbrushes, jars of powered pigments, and unscrewed paint tubes to smell the oil paint. I overheard evocative memories being exchanged, and playfulness was evident from some of the participants. William started his talk as participants in the drama started to return to their chairs. The talk went well. I made only one small slip-up during the twenty-minute dialogue and I was surprised how easy I had slipped into the role. William thanked the participants at the end of his talk and announced that he would be leaving the room, returning as David Collins to answer questions. I returned minus the bowtie, formally signifying that I was now out of role and was again myself. This was followed by some useful questions and feedback, which showed that the installation and performance had been positively received.

Reflecting after the event and taking on board feedback from my supervisor, I considered that Heathcote's technique worked well. By formally announcing I was going in and out of role, the strategy had the effect of engaging the participants in the process and valuing their involvement. In keeping with the Heathcote approach, the smallest of props was needed to effectively signify going into role and maintaining this throughout the performance. It did feel strange being someone else talking about my work, but in a positive way. It shifted my focus and perspective, creating the effect that I was conveying my work less directly. It felt like I was coming to the performance from the side, rather than head-on (enter stage right). I identified a number of areas to develop for the next iteration. I found it difficult to cover all my intended content due to the time being taken with participants viewing the installation. My pace was quicker than I preferred and I needed to review my material. Perhaps most importantly, I had placed

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expectations upon William to explain my work, but there was scope to move beyond explanation and for William to articulate and develop some of the key arguments related to the installation and my doctoral work.

Cycle 2: William's next performance was a few days later to a group of students at the beginning of their doctoral studies from Birmingham City University, at a symposium to demonstrate creative approaches to inquiry. Because the art studio was labour intensive to transport and set up, I made a video of the installation. I scripted the talk in much more detail than the first iteration, with carefully timed changes of images synchronised with changes in spoken content. Based upon my reflections of the previous iteration, I condensed some of the content and elaborated on others, to give William the opportunity to develop some key arguments.

I felt there was a positive level of engagement from the participants, and although they were considering a diverse range of ideas in their own doctoral work, the performance was successful in modelling how creative approaches have value. Furthermore, such approaches can have a philosophical and epistemological basis, and can develop defendable practice. The video recording did not work so well. It did not have the same level of participation as the actual installation, where participants could physically engage with the materials. The timing was problematic as the images in the video were advancing too quickly and became out of synchronisation when William was developing key arguments. One feedback comment suggested that a higher level of understanding would be conveyed to participants if more explanation and context were made before William came into the room. This feedback led to further reflections to inform the next iteration and to change and refine the performance.

Cycle 3: The next iteration was a seminar entitled: 'Using drama methods to articulate inquiry', which was held at the faculty learning group at Birmingham City University. This was one of a series of themed seminars looking at different aspects of performative and creative modes of inquiry and inquiry

dissemination, and was done in collaboration with doctoral students and post-doctoral academics who had engaged with drama in their inquiry methodologies. For practical reasons, I was unable to set up my installation and therefore used a revised version of the video. The video now contained only static images, but with fade-in transitions, tracking and zooming in/out to give a sense of movement. I consciously intended to freeze-frame images at times so that William could be a little more spontaneous and have space to develop arguments. I spent a little more time giving context before William began his performance. The synchronisation of images and spoken delivery worked more effectively, but it still did not have the same gravitas as the live installation. I was feeling more confident and was able to articulate arguments more clearly as William. I felt that William was beginning to develop his character more fully. The questions and discussion that followed indicated the audience were actively engaged in the performance. For example, one comment touched on the critical potential of William's voice and how this could be extended beyond my own work to include the advantages and tensions of working within different research paradigms and methodologies. Another participant thought there were traces of witticism and provocativeness in William's delivery, and considered the potential to develop this further to engage the audience in more debate. This has encouraged me to develop a wider criticality and to develop William's character further.

A key reflection from all the performative iterations was that Heathcote's method produced not only an interesting way to disseminate inquiry ideas and activities but was successful in providing new and transformative ways of considering my work through distancing. My experience is attuned to what Eriksson (2014:11) terms 'poetic distortion', derived from Heathcote's own writing. By this he means distortion in a positive context, from the real world to a poetic world in order to see it in a different light. Heathcote made this explicit by saying: 'The arts are metaphoric and analogous, and we can be spectators of ourselves in ways often denied in a life, because we can distort time to give
opportunity for reflection to be encountered' (Heathcote and Hovda, 1980, p. 5).

In my experience of enacting William Loveday, I did feel a degree of estrangement from being myself. This helped me experience my ideas and work differently. The distancing effect supported a deeper analysis by stepping outside my familiar frames of reference, looking from a different perspective, and engaging the reactions and reflections of others in the process. There was value in the preparation of each iterative cycle by considering the core of my ideas and theoretical understanding, and by the need to communicate these in a clear, succinct and engaging way as someone other than myself. This was enabled by the need to develop a different relationship to participants when speaking about my work and ideas, than in a more traditional didactic way. Furthermore, in the dualistic interaction between self and alter ego, where space was created for similarities and differences to be played out, I found myself less defensive and more open to critical feedback. Without generating some of these benefits of distancing, it is doubtful that I would achieve such new insights.

Another key reflection was that the process of inquiry inspired by Lewin (1946) helped me to develop the strategy and role of William in a more systematic and planned way. The spiral of planning, action, fact-finding, and evaluation supported my efforts to adjust, adapt, and refine in order to improve the strategy. Because the context of the performance changed every time, I recognised that this process was an on-going one. The process of reconnaissance went beyond the fact-finding process, to include how I situated myself in the inquiry and to question my own professional identity. William has become an alter ego, a part of myself I was finding difficult to articulate. Engaging participants in the process, maximised most fully in the first iterative performance, has enabled both a self-reflective and a collaborativereflective inquiry, and has further potential for development. It seems fitting for William to have the last word, which he articulated at the faculty learning group seminar:

William Loveday (William is speaking at the faculty learning group seminar on using drama in research dissemination 2018):

'By weaving together strands of poetic and dramatic practice from modernists such as Shklovsky, Brecht and Heathcote, pulling these together to underpin inquiry, and valuing the spaces and openings for collaborative dialogue, David has not only created my character to articulate his doctoral work, but he has managed to combine education, art and inquiry in such a way that the aesthetic quality of inquiry dissemination has taken centre stage. By doing so he is saying that, not only should inquiry be aimed at improving the human condition, but the aesthetic qualities of our practice are important too'.

Conclusion

The process of self-examination common to both first person action inquiry and autoethnography is reliant upon interaction with others, and in gaining feedback within a framework of systematic inquiry to provide rigour. This has been enhanced by developing the two devices inspired by Luft and Ingham, and Heathcote, providing further opportunities for dialogue and critical analysis through exhibition and performance. The use of visual art and drama has provided potent possibilities to critique and reappraise my doctoral work through a process of distancing. They have also offered an additional benefit by providing creative ways to disseminate inquiry ideas and findings. Furthermore, such work is congruent with a broader and emergent agenda involving performative inquiry and research dissemination, strengthened by the Frascati Manual in 2002 (Organisation for Economic Cooperation and Development, 2015) and exemplified by the work of Haseman (2006), Peterson and Langellier (2006), and Gergen and Gergen (2014).

Although undertaken in the context of inquiry into social work practice education, I believe these devices can be adapted to numerous situations involving self-reflection and participatory inquiry. In particular, drawing ability is not necessary when

making a visual Johari Window, photographs and other images for collaging purposes are just as relevant. It can be an engaging way of developing relationship building, mutual understanding and coparticipatory assessment involving a student and practice educator, and be revisited and developed at several points during a placement. Heathcote's device could be used by a student as a self-reflexive exercise and part of identity work when developing anti-discriminatory and anti-oppressive practice.

In terms of research methodology, the value of such work in exploring deeper levels of self-awareness is important when moving beyond first person action inquiry to second and third person action inquiry or from autoethnography to more collective forms of ethnography (Chang 2008). This has supported a greater awareness of my positionality in terms of being a social work educational practitioner and inquirer, my impact on other participants, and upon the inquiry methodology. Methods that achieve a distancing effect within the spirit of qualitative inquiry can support the process where the self is seen as a subject of inquiry, and by providing lenses through which to explore and gain more societal and cultural insights. Both the visual Johari Window and the enactment of William Loveday have engendered moments of estrangement, stepping into unfamiliar places, and encountering the reaction and responses of others. Unconscious, elusive and emotional personal experiences have surfaced, held within intentional and systematic inquiry. Things have emerged that I had taken for granted.

I intend to develop both devices further and to include them in my doctoral thesis, which will take the form of an assemblage including an art installation, performance, and publication of this paper, accompanied by a richly contextualised written exegesis. I am currently working on the idea of developing a soliloquy involving William interviewing myself, which would be an interesting way to get some of the inquiry context and even methodology across. Such approaches continue to provide new perspectives of self-discovery and to develop my practice as a critical thinking educationalist.

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Biography

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David Collins is an EdD Candidate at Birmingham City University in the UK. He is a senior lecturer in social work at the same university and previously had nearly 30 years' experience as a social worker and practice educator. David is a practicing artist in the field of painting and print-making. His doctorate involves developing a conceptual framework for using art-informed educational practice in the field of social work practice education. His methodology involves a Bricolage of visual authoethnography, action inquiry, and art-informed approaches.

Action learning, action research: Towards greater collaboration amongst networks¹ Colin Bradley

Recent conversations with a variety of action learning and action research practitioners around the world have identified a growing desire for collaboration between networks. "Collaboration" in these cases could mean a variety of arrangements, including sponsorship, joint activities and formal agreements about development activities. Effective collaboration amongst action learning and action research networks may well be the idea whose time has finally come.

Developing collaboration

There have been many discussions over the years about collaboration between networks. ALARA's first World Congress, for example, was a collaboration with the Australian Institute of Training and Development and other organisations. Most ALARA events since (see https://www.alarassociation.org/about-us/conferences-and-congresses/conferences-and-congresses/conferences-and-congresses/conferences-and-congresses/world-congresses/ have been conducted in collaboration with a wide range of organisations.

Recent events reflect an increasing desire for collaboration. The 2017 conference organised by the Action Research Network of the Americas (ARNA) in Cartagena, with financial support and

¹ The opinions expressed are those of the author and not the views of Action Learning, Action Research Association Ltd.

involvement of many networks, including ALARA, the Collaborative Action Research Network (CARN) and the Pedagogy, Education and Praxis network (PEP), is a good example of bringing practitioners from many networks together. ALARA is working with CARN to co-host a conference in Croatia in October 2019 with a similar intent – allowing practitioners from different networks to meet and stimulate new conversations and learning.

Collaboration in conducting events is an excellent step on the path of greater collaboration, but further steps have also commenced. ARNA's initiative of the Global Assembly for Knowledge Democracy (see <u>https://knowledgedemocracy.org/</u>) brings together practitioners and networks to discuss the extent to which epistemological, ideological and political differences can be reconciled in the interest of a sustainable and socially just world.

ALARA has entered into an agreement with the Global Centre for Work-Applied Learning (GCWAL) for the development of practitioners of change management, using work-applied learning (which combines action learning and action research) – see <u>https://www.alarassociation.org/education/icp_programme</u>. Other networks and entities offer education and development opportunities, utilising or working with universities and other organisations. One reason for ALARA's recent conversion from an Incorporated Association to a Company Limited by Guarantee was to create a sound legal base from which it could enter into more of these collaborative arrangements.

A further step in the collaboration journey is affiliation between networks. Several networks have become affiliate members of ALARA, with the members of these affiliate networks able to become members of ALARA at a reduced cost to the individual (or group arrangement for the entity). Other networks, such a CARN, have similar arrangements. A future step, one asked of me on several occasions, is the cross-membership of networks. That arrangement allows a practitioner, by joining one network, to become a member of a second network (or several networks).

A step too far?

This additional step touches on the primary area of concern of collaboration, one, in my view, that has held back greater collaboration. All networks (with few exceptions) rely heavily on both volunteer members undertaking a large part of the work required to operate the network, and the income from membership to pay for those parts of the operations that volunteers cannot perform. If a practitioner who currently is a member of two or three networks becomes a member of all of these networks by joining and paying membership of only one network, the other networks lose income and potentially volunteer hours.

The reduction in volunteer hours is unlikely to occur. Those who are active in more than one network frequently volunteer freely and are supportive of those networks that need and value their contribution. That situation will not change if membership of one network produced membership in other networks for no additional subscription fee. For example, I know of several ALARA members who are members of ARNA and CARN, who are active at different times in each network (and often, as well, in a local network of practitioners, who may or may not be members of any of those three networks). These members are unlikely to change their efforts of support and assistance if they were to gain membership in all of the networks on renewing with only one network.

The reduction in cost to the individual practitioner produced by joint membership would be small (although probably welcomed by the individuals). The impact to the networks would be larger, however, with a substantial part of each network's budget removed. The reduction may even affect the viability of some of those networks. The concern about this reduction in income has probably helped produced reluctance to discuss this joint membership arrangement.

So, should networks consider combining / joining? There are likely to be instances where two networks could join to build their membership and finances. Greater numbers in both membership

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and the financial standing would help the combined networks achieve their missions. I know of no examples where such mergers would be possible, but I would welcome such moves if it will help produce a more effective combined network.

The initiators of most of the existing networks, however, commenced those networks to meet specific needs. While there is much overlap across the networks, the specific needs, in most cases, still exist and are different enough to justify the continuing separation of networks. For example, local networks, intended to create direct communication between practitioners (face-to-face networking), will continue while local practitioners want to meet under a single roof. ALARA exists because it is the sole network for both action learning and action research (and it accepts all variations of both disciplines). Other networks bring together action research or action learning practitioners (sometimes with practitioners of the other main strand) with a focus on one or several areas. The diversity of professions and interests that practitioners have is increasingly seeing a growth in diversity of the fields in which each network embraces. The implication is that, in the longer term, the differences between networks are likely to diminish, and mergers may arise over time.

Collaboration in the immediate future

If joint membership creates potential financial problems, and differences in primary purpose will exist for some years, what opportunities exist for collaboration between the networks?

In addition to those efforts already underway, such as events, networks could look at their intent / primary purpose and ask, "Which other network is likely to be interested in joining with us to achieve a specific goal that helps us advance both our purpose and their purpose?" The aim would be to enter into a formal or semi-formal arrangement with another network or organisation to achieve a common desired outcome. ARNA's initiative of the Global Assembly for Knowledge Democracy and the ALARA / GCWAL agreement on practitioner development are two examples of this collaboration for mutual benefit.

Another area of collaboration that is emerging is the publication of high-standard journals. Several action research / action learning networks produce or support journals, including ALARA with this journal. There are not enough high-quality journals in this field, so further development in quality and number is desirable.

Some of the networks are developing Editorial Boards to help guide the development and growth in quality of these journals (and hopefully the number of quality journals). Those networks are recognising the benefit of having representatives from other journals (and therefore, from other networks) on their Editorial Boards. As indicated in the last issue of the *ALARj*, *ALARA* is creating an International Editorial Board, and we have invited practitioners from beyond ALARA's membership to assist on that Board. Similar requests have come from other networks to ALARA. The resulting cross-pollination and collaboration is likely to see even greater growth in the quality of action learning / action research journals generally.

An area that could benefit from further collaboration is the development of practical outcomes through action learning and action research projects. Many organisations use forms of action learning and action research to achieve great outcomes, but there are too few articles published about this work. Networks could be helping each other identify these organisations and encourage them to promote themselves and their work in these areas. This work has the additional benefit of helping to promote the outcomes achieved by action learning and action research, and may encourage organisations having success with these approaches to further embrace both the approaches and the networks.

An extension of promoting these practical outcomes is creating the means by which people and organisations can produce outcomes. Networks could work together to develop scholarships for doctoral students and research funds. In addition, networks could bring organisations together that would create the means to produce outcomes. For example, the networks working together may introduce a funding organisation, which would fund an

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action research project in a community, and the community that needs an improvement developed and implemented by the community members themselves, but does not have the funds to start the project. ALARA has received a couple of inquiries in this direction, and I believe, there is more that could be done to encourage this type of development of communication between individuals and organisations.

An invitation

This article is my conclusions, noting the activities in the action learning and action research communities over the last decade. I am exposed only to a small part of the total picture. I, therefore, would welcome comments and suggestions about my statements in this article. I believe that I have only touched the tip of the iceberg in this area, and that readers will have many other suggestions for collaboration between the action learning and action research networks. I would be pleased to have conversation, via email, teleconference or in person, with anyone interested in exploring this matter.

ALARA membership information and article submissions

ALARA membership categories

Membership of Action Learning, Action Research Association Ltd (ALARA) takes two forms: individual and organisational.

ALARA individual membership

Members of ALARA obtain access to all issues of the *Action Learning and Action Research Journal* (*ALARj*) twelve months before it becomes available to the public.

ALARA members receive regular emailed Action Learning and Action Research updates and access to web-based networks, discounts on conference/seminar registrations, and an on-line membership directory. The directory has details of members with information about interests as well as the ability to contact them.

ALARA organisational membership

ALARA is keen to make connections between people and activities in all strands, streams and variants associated with our paradigm. Areas include Action Learning, Action Research, process management, collaborative inquiry facilitation, systems thinking, Indigenous research and organisational learning and development. ALARA may appeal to people working at all levels in any kind of organisational, community, workplace or other practice setting.

ALARA invites organisational memberships with university schools, public sector units, corporate and Medium to Small Business, and community organisations. Such memberships include Affiliates. Details are on our membership link on our website (https://alarassociation.org/membership/Affiliates).

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Become a member of ALARA

An individual Membership Application Form is on the last page of this Journal. Please see ALARA's web site for an organisational membership application form.

For more information on ALARA activities and to join Please visit our web page: <u>https://www.alarassociation.org/user/register</u> or email <u>secretary@alarassociation.org</u>

Journal submissions criteria and review process

The *ALARj* contains substantial articles, project reports, information about activities, creative works from the Action Learning and Action Research field, reflections on seminars and conferences, short articles related to the theory and practice of Action Learning, Action Research and process management, and reviews of recent publications. *ALARj* also advertises practitioners' services for a fee.

The *ALARj* aims to be of the highest standard of writing from the field in order to extend the boundaries of theorisation of the practice, as well as the boundaries of its application.

ALARA aims *ALARj* to be accessible for readers and contributors while not compromising the need for sophistication that complex situations require. We encourage experienced practitioners and scholars to contribute, while being willing to publish new practitioners as a way of developing the field, and introduce novice practitioners presenting creative and insightful work

We will only receive articles that have been proof read, comply with the submission guidelines as identified on *ALARj*'s website, and that meet the criteria that the reviewers use. We are unlikely to publish an article that describes a project simply because its methodology is drawn from our field.

ALARA intends *ALARj* to provide high quality works for practitioners and funding bodies to use in the commissioning of works, and the progression of and inclusion of action research and action learning concepts and practices in policy and operations.

ALARj has a substantial international panel of experienced Action Learning and Action Research scholars and practitioners who offer double blind and transparent reviews at the request of the author. The list of these reviewers appears as the Editorial Advisory Board pages in the first part of this issue.

Making your submission and developing your paper

Please send all contributions in Microsoft Word format to the Open Journal Systems (OJS) access portal: <u>http://journal.alara.net.au</u>

You must register as an author to upload your document and work through the four electronic pages of requirements to make your submission. ALARA's Editor-in-Chief or Issue Editor will contact you and you can track progress of your paper on the OJS page.

If you have any difficulties or inquiries about submission or any other matters to do with ALARA publications contact the Editorin-Chief on <u>editor@alarassociation.org</u>.

For the full details of submitting to the *ALAR Journal*, please see the submission guidelines on ALARA's web site <u>https://alarassociation.org/publications/submission-guidelines/alarj-submission-guidelines</u>

Guidelines

ALARj is devoted to the communication of the theory and practice of Action Learning, Action Research and related methodologies generally. As with all ALARA activities, all streams of work across all disciplines are welcome. These areas include Action Learning, Action Research, Participatory Action Research, systems thinking, inquiry process-facilitation, process management, and all the associated post-modern epistemologies and methods such as rural self-appraisal, auto-ethnography, appreciative inquiry, most significant change, open space technology, etc.

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In reviewing submitted papers, our reviewers use the following criteria, which are important for authors to consider:

- Criterion 1: How well are the paper and its focus both aimed at and/or grounded in the world of practice?
- Criterion 2: How well are the paper and/or its subject explicitly and actively participative: research with, for and by people rather than on people?
- Criterion 3: How well do the paper and/or its subject draw on a wide range of ways of knowing (including intuitive, experiential, presentational as well as conceptual) and link these appropriately to form theory of and in practices (praxis)?
- Criterion 4: How well does the paper address questions that are of significance to the flourishing of human community and the more-than-human world as related to the foreseeable future?
- Criterion 5: How well does the paper consider the ethics of research practice for this and multiple generations?
- Criterion 6: How well does the paper and/or its subject aim to leave some lasting capacity amongst those involved, encompassing first, second and third person perspectives?
- Criterion 7: How well do the paper and its subject offer critical insights into and critical reflections on the research and inquiry process?
- Criteria 8: How well does the paper openly acknowledge there are culturally distinctive approaches to Action Research and Action Learning and seek to make explicit their own assumptions about non-Western/ Indigenous and Western approaches to Action Research and Action Learning
- Criteria 9: How well does the paper engage the context of research with systemic thinking and practices

Criterion 10: How well do the paper and/or its subject progress AR and AL in the field (research, community, business, education or otherwise)?

Criterion 11: How well is the paper written?

Article preparation

ALARj submissions must be original and unpublished work suitable for an international audience and not under review by any other publisher or journal. No payment is associated with submissions. Copyright of published works remains with the author(s) shared with ALARA Ltd.

While *ALARj* promotes established practice and related discourse *ALARj* also encourages unconventional approaches to reflecting on practice including poetry, artworks and other forms of creative expression that can in some instances progress the field more appropriately than academic forms of writing.

Submissions are uploaded to our Open Journal System (OJS) editing and publication site.

The reviewers use the OJS system to send you feedback within a 2-3 month period. You will receive emails at each stage of the process with feedback, and if needed, instructions included in the email about how to make revisions and resubmit.

Access to the journal

The journal is published electronically on the OJS website.

EBSCO and InformIT also publish the journal commercially for worldwide access, and pdf or printed versions can be purchased.

For further information about the *ALAR Journal* and other ALARA publications, please see ALARA's web site <u>http://www.alarassociation.org/publications</u>.

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Action Learning, Action Research Ltd (ALARA) is a global network of programs, institutions, professionals, and people interested in using action learning and action research to generate collaborative learning, training, research and action to transform workplaces, schools, colleges, universities, communities, voluntary organisations, governments and businesses.

ALARA's vision is that action learning and action research will be widely used and publicly shared by individuals and groups creating local and global change for the achievement of a more equitable, just, joyful, productive, peaceful and sustainable society.