

SMEC

# **Integrating science and soul in education**

The lived experience of a science educator  
bringing Holistic and Integral perspectives to the  
transformation of science teaching

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This thesis contains no material which has been accepted for award of any other degree or diploma in any university. To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

# Abstract

**Integrating science and soul in education:** The lived experience of a science educator bringing Holistic and Integral perspectives to the transformation of science teaching

This is an auto-ethnographic study into the lived experience of a science teacher as she attempts to transform her science teaching practice and the practice of other science teachers over a period of 15 years. In exploring what it means to be a holistic educator she is faced with disorienting dilemmas which cause her to question underpinning assumptions, values and curriculum frameworks which inform traditional science teaching practice and culture. In trying to reconcile science and soul in the pedagogical space of a physics classroom her journey requires a deep investigation of self in various cultures - science culture, educational culture, modernist and postmodernist cultures.

Part 1 of the study introduces the key referents of Integral Theory, Holistic Education and Spirituality which she used to inform her changing education practice. Part 2 reflects on her journey from a traditional constructivist classroom, into ones which explore meaning, questioning, significance, discourse, ethics and enabling frameworks.

Part 3 concludes with an attempt to integrate science and soul into a vision for science educators. This includes a model which suggests that science has various development stages or cultures and that science teaching can be strategically aligned to facilitate the growth of human consciousness.

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# Foreword

Welcome to my narrative study where I look at *what it means to integrate science and soul in education*.

Just the question *what does it mean?* opens up to rich possibilities... what techniques do you use, how do you think about it, what does it look like, what are the implications, dilemmas, what happens to the teachers and students in the process of doing it, what can it lead to?

There is no right answer, yet the question suggests that a key way to answer it is perhaps through real experience.

So that is what I have done - I have explored (and am still exploring) this question through my lived experience as a teacher, curriculum planner, leader of professional learning, and co-establisher of the Holistic Education Network of Tasmania.

This then is the story of my own transformative journey (my lived experience) as I try to resolve my big 'disorienting dilemma': *what does it mean to integrate soul in my teaching of science?*

This written study aims to capture the process of my journey - the dilemmas which challenged and perturbed me to new levels of perception and my continuing development of tentative 'living educational theories'. In addition, the writing itself was a journey. So, as I write and reflect on my experiences using Integral Theory as an interpretive lens, I am challenged again to revise my understandings; seeing new potentials and assisting in my own integration

This is an auto-ethnographical study. I am the subject. Yet I hope it has more value than mere navel gazing. That my dilemmas, processes and emergent theories might speak to others. That in layering this study with rich meaning and authentic experience I am able to create a praxis and reflectivity in others.

My journey is an effort to synthesize - to find emergent wholes. So, I conclude this study with a possible way of thinking about Integral Science and Integral Science Education which can be generalizable in the meaning that Whitehead (1998) gives it - able to be shared and promoting dialogue with others. I am hoping to initiate a conversation with science educators and teachers. What vision of science and science education would we like to have which can support the sustainable future of the world and assist in the evolution of consciousness?

### **The journey wasn't necessarily a straight one**

At the core of me I am a scientist; someone who likes to question and inquire, to explore the nature of reality and come up with possible answers. I spent four years working as a scientist and another three working in economic research before I started teaching. Yet at the core of me is also this spiritual self - someone who has been very keen to discover the meaning of life and someone who was disillusioned with science as a means of determining that.

Now in 1990 I find myself in my first year of teaching in a Year 11/12 class where I have to teach physics. Can I compartmentalize these two aspects of myself, these two very different cultures? Or is there a way I can find wholeness and integration? I have 10 years to find out.

Yes, put very simply, this is my disorienting dilemma. I can name it now with the benefit of hindsight. But back in 1990 when I started teaching it was pretty messy. So what conditions can fertilize this journey of mine?

**Condition 1:** Put me in a Year 11/12 Tasmanian college which is brand new and make me part of the visioning process of what education should be like. Put me in a supportive environment where collaborative action research between teachers is a way of life. Let me learn from some of the most forward thinking, experimental, pedagogically thoughtful teachers in the state as we create an Australian 'lighthouse' school.

**Condition 2:** Allow the state education system to revision itself and change curriculum metaphors and let me be a player in designing and implementing facets of this. Introduce ideas of constructivism and 'girls in physics' to science teachers in the state, taking us on a journey of rethinking the way we teach science.

**Condition 3:** Introduce me to ideas of Holistic Education and Ken Wilber. Open me up to well articulated theories and pedagogies based on a spiritual paradigm and let me experiment with these in my classes. Let me tentatively start to bring soul into science and to discover what it might be like trying to be a holistic teacher.

**Condition 4:** Now in 1996 put me in a new school which is coming from a traditional schooling paradigm with disempowering operating structures where there is little educational dialogue. Let my need for dialogue and my own continued learning push me into joining the newly formed Curtin doctorate group in Tasmania and introduce me to academic approaches to postmodernism and the social sciences.

**Condition 5:** Now let me engage in an intense action inquiry process of my own lived experience as a physics and journalism teacher for four years. Let me deconstruct myself and my underpinning values and then try to pick up the pieces, integrating old with new, trying on new roles. Let this school act as another 'disorienting dilemma' which pushes me to look for power relations and underpinning structures, cultures and curriculum metaphors which shape the way the system operates.

**Condition 6:** Now in 1999 invite me to work with the university physics department in coordinating a year long action research project with physics lecturers to improve physics teaching. Let me be exposed to the issues of adult transformation which opens the door to my later interest in transformative learning.

**Condition 7:** Now, let me get diagnosed with Chronic Fatigue, requiring me to take a three year break from teaching - finding a new quiet space to be, a deeper, more mindful experience of spirituality and a greater sensitivity and attunement. In this space I discover the artist who might also be at the core of me ... who has been patiently waiting to be expressed through clay.

**Condition 8:** Now let me tentatively start teaching again with this new sensitivity but with little resilience. Give me a class of very needy, at risk students who challenge my notions of what it means to be a holistic teacher and who force me to look deep into myself, as I try to look deep into them.

**Condition 9:** Now in 2004, bring on a major review of Tasmanian curriculum and invite me to be a critical friend to that process. Stir me up. Remind me of my passion for education. Stimulate in me the need to revisit my doctoral studies, to get them out of the closet and dust them off. Stimulate me to read the latest on Integral theory, to get excited, to join international discussions on

how this might be articulated into educational practice. Let me see the potential for this to assist in the curriculum visioning process.

Perhaps at the core of me I am really an activist and a change agent, just wanting to change the world, whether through my writing or actions. It is ironic that in trying to change the world that I change myself, and maybe, just maybe, in the process the world changes as well.

So these are the conditions for growth, but what emerges? What deep insights about students, education, learning, science and spirituality can emerge from these conditions? Want to find out?

In this writing inquiry about my lived experience I will try to bring to the process various lenses or inquiry modes which I introduce below. But perhaps more importantly is the state of being that I bring. Why come on such a personal journey with me if we can't together be playful, light of heart, yet deep of soul? So I promise a different style of writing. One that might at times be surprising, poignant, imaginative, adventurous as well as thoughtful, authentic, constructive, deconstructive and compassionate.

In inquiring into the integration of science and soul I am really searching for wholeness - and I wish to bring to this inquiry process all the elements of wholeness. Naturally I will not succeed! After all this is just a piece of paper and these are just words... no matter how much they might come from the heart or soul of me. But perhaps in the space between the author and the reader these words might take on their own life and their own wholeness... I invite you then to come with me on my journey and open yourself to what possibilities may emerge.

## **My epistemology**

My study is loosely situated in the auto-ethnography genre where I examine self and culture through narrative. I am examining the evolution of my teaching of Year 11/12 physics from 1990-1999 within the mainstream education system in Tasmania. And in doing so I am asking questions such as who is this person who is teaching and what informs her practice, her values and her thinking about herself? What culture is she in? How does she construct her notions of learning and what it means to be an effective teacher?

During the time period of 1990-99 I was engaged in action research and action inquiry processes (situated in the lived experience research genre) with the purpose of evolving my teaching practice. This process was informed by constructivist, holistic and integral theories of teaching. My specific questions during that time were:

- What does it mean to be a human being?
- What is the purpose of education?
- How can I help my students to learn, do, be, become?
- What might education based on holistic and integral ideals look like?
- What does it mean to be a holistic teacher?
- What is spirituality?
- How can I make my teaching more meaningful, significant, empowering?
- How can I integrate soul in my teaching of science?
- What is the nature of science?
- What is the purpose of science education?

This written study now examines that experience, eliciting key themes, and applying integral lenses to explain the experiences. It then becomes a study not

just of evolving practice but also of my process of transformation and efforts to transform others.

Central to my inquiry is my need to synthesize - to look for emergent wholes. I am looking for a grand narrative which can marry together science and soul in education as well as explain my own journey. I find Integral Theory is a key tool in assisting me in this integrative process. So while on the one hand I am 'unpacking' and seeking meaning in my experience, on the other hand I am 'packing together'- using mapping tools of integral theory as well as key processes such as *transcend* and *include*.

This synthesizing process is one of competing needs - seeing enough of the parts and the environment to see the shape of the whole, and going deep enough into a part to give it texture and pattern. I am wary of all that I missed out in seeing the detail as I am involved in this systemic process.

During my process of action inquiry I went deep into aspects of my own experience and questions but I have not included them here for the sake of being able to paint the bigger picture. And in doing that there is the danger of being too shallow. So while an ethnographer might explore one key experience deeply, I am more in the category of a structural analyst - looking for patterns - and in doing this I am bringing in my experiences with other science educators and the Tasmanian education system.

### **Writing as Inquiry**

In the writing process I am both discoverer of meaning for myself and also constructor of meaning for the reader. I try to be playful and holistic in the artful construction of the study, not just for the benefit of the reader, but also in stimulating my own understanding. I try to enter different writing

places, some storytelling, some impressionistic, some very reflective and peaceful, some with more of an academic voice, some speculative and tentative. I often use dialogue as a way of enabling contradictions to play with each other, thus enabling emergence of greater insight, rather than being trapped in dualities. And I like using metaphor - I believe it has the capacity to speak to something deeper in ourselves and lingers on long after the words have disappeared.

This style of writing is consistent with auto-ethnographical (Ellis & Bochner, 2000) and 'writing as inquiry' methodology (Richardson 2000) where there is a movement away from an academic voice disseminating endpoint understandings, to writing which enables co-existence of multiple perspectives and emergent meanings (crystallization). I am wary though of competing needs to be coherent, to provide sufficient contexts, to document my journey, to be complete and whole, to support my own process of reflection as well as giving appropriate experiences for the reader's own journey. I am not sure that I succeed in balancing all this.

In my own inquiry process I rely on a holistic approach. That is, I am trying to integrate *eye of the mind* (interpretation, analysis and modeling) with *eye of the senses* (empirical data) and *eye of the spirit* (meditative practice) (Wilber 1980). I am using the seven modes of inquiry of Henderson and Kesson (2004) to help me create in myself different spaces in which to explore my key themes.

I tease out my epistemology further at the beginning of Part 2 when I start my reflective inquiry which examines my journey of evolving physics teaching. I use epistemological pauses throughout Part 2 as a way of stepping back from my writing and bringing a more critical eye to the processes I am using as I make sense of my past experiences.

Part 1 introduces my key referents - Holistic Education, Integral Theory, Spirituality and Transformative Learning. While these chapters function as establishing the lenses for my inquiry I have also used them as an opportunity to introduce my classes and experiences so that my canvassing of the fields are seen in the context of my own dilemmas. I have not gone as deeply into the meaning behind things as I would like, but rather have tried to give an overview. I hope that enough of the essences come through. Chapter 1 gives a holographic taste of this journey I have been on, setting the stage for my exploration.

I wrote Part 1 in 2005 in a very different space to the one I am in now - it was much more 'a writing in the dark' (van Maanen 2003), as I explored self in an iterative and deeply reflective way. I have since gone back and removed much of that reflection and emergence in order to 'keep it tight'. I am a little sad about this as the process itself revealed some of what I mean about inquiry with *eye of the spirit*. However, this process lives within me and I hope I can bring the insights I gained from my writing journey of 2005 to Part 2 of the study which I have been engaged upon in 2006 - which explores my physics journey.

## **Validity**

I am blurring the genres in my research and it may be hard at different times for you, the reader, to know where I am situated and what standards should be applied in judging the academic rigor of the work.

In Appendix 1, I explicate my research process, discussing the various research methodologies which have influenced my approach, some of which are quite invisible in this final product. As I have grown along my journey, I have drawn on different methods which have suited the stage I was at and so have been on

a journey through different ways of thinking about research which is delineated by Taylor (2006). (Research methods have included: lived experience/action research, fictional writing (exploring issues through fictional characters), writing as inquiry, structuring/modeling, auto-ethnography and then back to lived experience as a way of structuring the writing). This has created quite a few tensions in trying to balance the competing needs of different genres. I discuss these tensions in Appendix 1.

A key tension is between my need to synthesize and create grand narratives and between my need to explore the plurality of meanings of an experience. So one process may seem to situate me in the modernist camp, while the other in the postmodernist camp. I wonder if I can solve this by claiming to be in the Integral one (which aims to integrate all inquiry modes and all levels of the Spiral.)

What standards might you then apply to Integral research? Coverage? While I might claim to have immersed myself in the action inquiry/lived experience mode, others were more a short dip... and some shorter than others because the water was too cold. Perhaps then rigor lies in an awareness of what mode one might be in? Or the ability to dance and weave between many?

I am not sure that I have achieved that level of critical epistemological awareness, but it is a learning journey. Yes, it certainly is easier to select one mode and stick with it.

I list below the key genres that I draw from with their claims to validity:

**Auto-ethnographical studies** are usually judged in terms of authenticity (aims to develop the reader's understanding and appreciation of their own views), verisimilitude (how well it conveys a sense of the real?), crystallization

(enabling plurality of meaning), and coherence (clear sense of story and direction - chronological or propositional).

**Action research/lived experience studies** are usually judged on how systematic was the research, the level of critical inquiry and reflection brought by the researcher, evidence for any claims and a transparency about the values one is bringing in making those claims, and contextualizing within current educational theories and frameworks. (Whitehead, 1998)

**The writing** itself could be judged in terms of aesthetics, artistry and literary qualities - Is it compelling? Does it transport the reader to another place? Do the metaphors work powerfully? Is the language poetic? Is the composition artful and intriguing? Is the story moved forward? Does it have dramatic control and characterization? Does it create perturbations and ambiguities to enable space for the reader to come to their own understandings?

But perhaps central to my own need as a change agent, is this - does this study create **praxis**? Does it excite the urge to do, to change understandings or practice? Can it help inform transformation of the system? Yes, I am changed in the process of doing this study, but is it enough?

## **The contexts**

### **Physics in context with other subjects and ways of teaching**

I frame my experience of teaching Year 12 Physics with the teaching of my other classes - Journalism and Maths - in order to contrast the different teaching styles, the underpinning curriculum metaphors and the different needs of the students.

Physics sits within a content based culture of delivery to self-actualized learners, while journalism is an enterprising, experiential, project based course which fosters student transformation and self-reflection. My 'students-at-risk' Maths class features students who are dealing with deep personal issues and are marginalized by our current education system. These students help me to dig deeper in myself in asking *what is the purpose of education?* and *what does it mean to be a holistic teacher?* (See a tabulated summary of the differences of the three subjects in Appendix 5.)

### **Holistic teaching of physics in context of Constructivism**

Constructivism has been a key referent in the last 10 years in Tasmania (and the world) for science teachers in thinking about how to teach science. So I contextualize my journey in Part 2 by starting with constructivist pedagogies and then showing how holistic pedagogies and principles can infuse and transform these.

### **Physics teaching in context of the Tasmanian Education system**

I am also working within context of the Tasmanian Education system whose changing frameworks also provide a context for my research. So although a key theme for me is looking at ways to reconceptualise science education, I am also very interested in how my experiences can inform curriculum visioning for Year 11/12 colleges in Tasmania. So as part of my playful writing I introduce a fictional group of Year 11/12 *curriculum planners* who discuss the implications of my exploration on the development of new curriculum frameworks. Their discussions are in **Arial** font. Below, I describe the context of the Tasmanian Education system so that you are familiar with both the contexts of my journey and my fictional curriculum planners.

## **The Tasmanian Education system context**

Tasmania is a small state in Australia, in both physical size and population (only 470,000 people). It has 214 government schools with 63,000 students, 66 non-government schools with 21,000 students, and 5,700 teachers in total.

(National Report on Schooling in Australia, 2002).

The different education sectors are: **primary schools** which go from pre-Kinder to Year 6, **high schools** from Year 7 to Year 10 and **colleges** from Year 11 to Year 12 (including a few mature age students). From college, students can articulate to university or technical/vocational colleges or training.

There has been a major review of K-10 education over the last five years, resulting in a new curriculum framework - the *Essential Learnings* (ELs). A key aspect of the new curriculum is the movement away from discrete subjects into a more integrative inquiry based curriculum - *the thinking curriculum*. This has been in various stages of implementation, depending on the school, for the last few years and will not be fully rolled out for another few. It will have major ramifications for college curricula.

There are eight government Year 11/12 colleges in the state. They each have between 600 and 1400 students and can offer a large range of subjects because of their size. They prepare students for university entrance, provide vocational training and pathways, as well as provide more general subjects. From 2004 to 2006, Year 11/12 education has been under a major review process - *what are our values, worldviews, future trends, student needs, impact of the ELs and what conceptualization of a curriculum framework can cater for the emerging educational vision?*

Because of Tasmania's small size the process of educational re-visioning has aimed to be consultative, inclusive and empowering. Tasmanian education has

had a history of face to face moderation between teachers, with teachers participating in subject writing parties and part of whole curriculum conceptualizing. It is easy for an ordinary teacher to have quite an impact on the whole and many teachers have an expectation of being able to be part of any new developments. This is possibly unique as many other education systems have top down decision making often by people who have been out of a classroom for years.

## **Significance**

How can one person's teaching of Year 12 Physics inform thinking about science education?

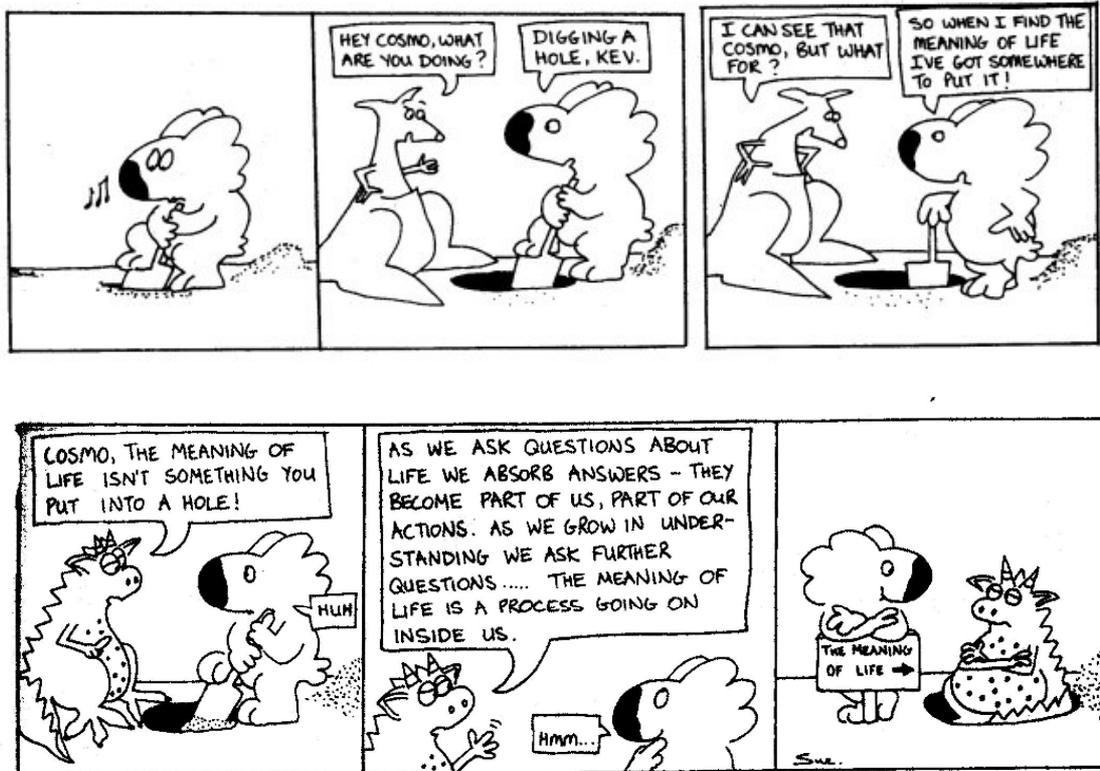
Physics has considerable significance in the design and consideration of science programs from primary to university. High school science programs (Years 7-10) are often designed with the aim of providing students with pre-requisite knowledge for pre-tertiary Year 11 and 12 courses like Physics and Chemistry, even though the majority of students do not choose these subjects in Years 11/12. By examining the issues to do with teaching such a class I question the assumptions that such curriculum designers are making about what is important in science education. What are our underpinning metaphors and are these what we really want to have? What are the purposes of science education?

By showing what these Year 12 students might be able to achieve in physics I am challenging universities to consider programs which speak to the development age of the students and help to foster students' continued transformation.

In examining the issues that university lecturers and teachers face in changing practice, I am able to apply a cultural theory (spiral dynamics) which explains some of the issues and possible solutions in the transformative processes.

My culminating effort of creating an integrative model for soul and science has major implications for science educators who are interested in exploring the implications of Integral and Holistic perspectives in their teaching of science and teaching of science educators.

*Cosmo and his Search for the Meaning of Life*



Stack 1995

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