Chapter 7

The questioning classroom - 1994 – 1999

Questions:

How do I encourage and manage questions?

What do they reveal about my students?

How do questions become the texture of science?

How can questions be a spiritual quest?

Introduction

In 1990 I had a revelation as I was teaching physics. I thought perhaps there were three levels or types of learning. The first is where the teacher gives you an unsolicited answer - information. The next stage is where the teacher questions you so you are the one discovering the answers for yourself (the Socratic method). And the third stage is where you are now asking the questions and finding the answers. My intention then in 1990 as a teacher was to empower students to move into the third stage.

Thus, questioning and encouraging questioning became a major theme for me during my teaching…. finding ways of empowering students as well as finding ways of *being* that enabled me to listen more deeply to their questions and to manage them. And somewhere in that process the type of questions changed as well as the way I responded. So no longer were student questions just associated with constructivist meaning making but were more holistic, existential and related to personal being and becoming. So who am I becoming now as I listen to my students' questions?

Dealing with questions

1996. I am running a session for Dip Ed science students where I take them through a physics lesson introducing the concept of circular motion as an exemplar of an approach using multiple intelligences. I start by taking them on a guided visualization on a rocket ship which orbits the earth and then heads to the moon,

experiencing take off gravity and then freefall. I ask the students to write down all the questions they have as a result of this and they fill several pages of butchers' paper.

I then get them to share their questions and I say how I would pull these together in a concept map to design our topic on circular motion. One student says to me "But what do you do with the questions that don't fit? What happens if that question was really important to the student but you didn't let him investigate it further because of your need to develop the topic in a certain way?"

Hmmm. I say… well …

1994. As a result of these deeper activities that I am now doing in my Physics class, there is generation by the students of so many questions. Students are looking at their investigations with new eyes and asking each other what is going on and why. They are interrupting me as I explain things on the board, because they need to get to the bottom of things. They are not interested in just the surface anymore. This is in sharp contrast to my first year of teaching where only one boy seemed to be asking questions and where students were cross at me if science couldn't explain things.

Then there are the really big questions, the profound and the bizarre. How do I cope with all of these questions and how do I honor the students and their process? I really like questions, I have always been a great questioner myself, but how do I balance the need for students to have answers *now*, the need for me to get through course content, and the fact that other students might not be interested in their peer's questions? How do we use these questions in another way?

I feel that I am doing a good job. I am gradually changing the culture so students enjoy the fact that questions might be open and continue to be mulled over, rather than having a quick answer. I have set up a *The Bastard Book of Physics Questions* where only the very problematic questions get entered and students feel very proud to have a question put in it. Each year it seems that classes stew over particular big questions - *What is the nature of the edge of the universe? Can we have parallel universes?* There is a lot of wondering going on. I wonder how I can find the intriguing and deep questions *within* the course that I am teaching, not outside it.

I think that students are comfortable with questions and I am surprised when Michael comes up to me. He has just completed a self paced topic on *sound, waves and music,* where the students are given some investigations to do (some more open ended than others) and some big questions to think about. He is really bright and has done really well, extending the material and coming up with some innovative procedures and applications.

"I still have so many questions," he says to me. "My friend in the other class (who covered the topic through the teacher giving notes) doesn't have any and I am afraid that I haven't learnt enough to be able to pass the test." This takes me aback but then I start to think about what might be happening. I use an analogy - that when you are taken on a journey through a tunnel you can't really see anything other than what you are expected to see and therefore your questions are limited. But if you can go anywhere, of course you are going to have lots of questions.

He thinks about it and several days later tells me "I talked again to my friend about waves and do you know, Sue, he hardly knew anything. Even though I still have lots of questions I know so much more than him." I now see Michael change into someone who exuberantly asks questions, seeming to delight from questioning things to the n^{th} degree. I begin to realize how important it is for students to learn to manage openness.

At the end of the year I ask the students to put some of their most tricky questions on a poster for me to display at the annual physics teachers' conference. Michael has a paradoxical question which he puts down with pride. It is interesting the responses that physics teachers and lecturers have to this poster. Some try to answer the questions looking for one answer, some say that the questions are ridiculous and why am I encouraging my students to think that way, some are amazed by the inventiveness and passion of my students and others start sharing their own unanswered questions. What do these teachers' responses reveal about their assumptions of the nature of science and science teaching?

What story of science am I telling with this approach to questions in science? It is OK to not to know something? Science is tentative and iterative? It is OK to ask the tough questions? Students now start saying to me that they should be marked on the quality of their questions. I think they have a point. At the end of the year, I give each student a certificate saying that they are masters of *Boldly asking questions where no-one has gone before.* The students are pleased and excited; it seems like a rite of passage - a celebration of what we have achieved in a way of orienting ourselves to the world. Many years later a student tells me he still has it on his wall.

Yes, I am hooked now on this journey of asking questions. And I begin to be more aware of the processes I am using as I manage these questions. I encourage students to articulate their questions in class so everyone can hear and understand and be involved in thinking about them. I give them time to think of questions and to frame them and to tease them out with their peers. I give them think time between lessons, introducing what I will cover the next lesson through a series of a questions at the end of the current lesson. I find that students begin to ask questions from a much deeper perspective in the following session.

Students seem more aware of framing questions so that they help in our shared understanding. I am using the whiteboard as a space for students' questions, where we tease out ideas and possibilities. Students are comfortable coming up to the board and writing up questions or explaining them to each other.

I become aware of how some questions can close down and others open up discussion, how some 'way out' questions are actually helpful in giving us greater understanding of an idea, and how helpful the humorous extension of an idea might be. That we begin to understand not necessarily by getting to something from a linear building up to it but can come at it from different angles and perspectives.

Yes, my role here is a mediator of the various questions coming to me. I am orchestrating them. And I begin to realize that I have been valuing some students' questions over others…. The questions which fit with my own agenda of getting certain material across or capture my own curiosity or are within my capability of understanding and managing. Hmmm. It is so easy to be dismissive of student's questions when they don't seem to fit. Is this an issue for them? Do I need to discover within their questions something of significance for what we are doing now? Is it OK to have multiple streams of questions occurring in the classroom, sometimes connecting and sometimes not?

I find that the simple technique of listing everyone's contribution on the board, even one's I might have previously dismissed out of hand, helps me and the other students in making meaning. In writing all thoughts down I often see ways of linking them as part of the story we are developing and realize how useful they are in helping me begin to see more out of the box. I wonder whether previously I had not been

Types of questions
Playful
Imaginative
Existential
Humorous
Wondering
Speculative
Iterative
Self-aware
Connecting to experiences

Fig 7.1

listening to all the questions and looking deeper into the meaning behind them. What did they reveal to me about my students?

I am also becoming more aware of the nature of questions… the ones which might have a deeper philosophic meaning and those which are just requiring pat answers. The difference between a student asking *what is magnetism really?* and *what is the formula for magnetism?* Initially such questions throw me but then I really enjoy discussing them with my students, and encourage them to think philosophically as well as scientifically.

Questions which go deep

At the beginning of the next year I ask my students to write for me on a piece of paper the courses they are doing, their goals for the year and questions they might have.

I am really surprised by the responses; the range of questions, from the mundane to the meta-physical, pragmatic and existential. I have heard physics teachers saying that students are just doing the physics for the marks to get into university, but their questions reveal to me a whole new side to my students. They are coming with a deep curiosity and a wonder about the meaning of life. The issue is not so much how to help them experience wonder, rather how not to stifle it.

Some students say to me after this exercise how teachers have never asked them what their questions are, just poured information into them. They say it is very refreshing being invited to share their questions and in particular to be able to pursue them in their individual presentations to the class (which

Students Big and Little Questions

- Will humans exist in another star system?
- Could time ever stop?
- I wonder if we are all creating our own destinies with every decision we make, or is life already determined for us?
- Looking at stars and seeing light they emitted thousands of years ago - a star could be a white dwarf already but no-one would know.
- Why is an orange orange?
- Is there life on Mars, in other galaxies, in the universe?
- Is matter composed of what we think it is?
- Are there any very large planetary bodies bigger than our sun?
- Where is my life going and why is it going there? Why am I here? Why are any of us here, at this point in eternity and for how long?
- What more is there to find out? What happens when we find out everything?
- How do scientists come up with theories/ideas which have never been initiated before?
- How big is the universe?
- When the leaves drop from the branches, why must they drop right to left and left to right?
- Why and how did Daniel Benoulli think up his idea on fluid dynamics, especially given the fact he did this 200 years before the Wright Brothers flew their plane?
- What is the point of life?
- Does God exist?
- Why are there so many thousands of people on this planet and why are things like World Hunger an issue when there must be more to life than sorting out Life Problems?

Fig 7.2

is not a compulsory requirement of the course but something I had established as an important part of my teaching early on as a way of bringing current science into the course.)

These presentations are seen by many of the students as one of the most interesting aspects of the course because of the wonderful variety of topics that they choose to explore - from black holes, to submarines, kayaking through river eddies, String Theory, the physics of Star Trek, music synthesizers, to arguments against the big bang.

One girl, Jenny, says in an interview:

> In other subjects passing the exam is the motivation. In physics it is our curiosity – wondering why and how.

One boy runs up to me in the quadrangle before the start of the year and says:

> Sue, you don't know me, I'm Nick, I am going to be in your physics class, and I just wanted to tell you I have already worked out my topic for my presentation – it is going to look at ….

One boy, John, writes on the back of an end of year questionnaire:

> Having never previously thought about the meaning of life and whether the sky was blue before, it was nothing short of an exciting time in my life to think about all the possibilities and all the constants and all the enormous numbers and smallest particles. My indifference has been replaced with something else…. Dare I say it; a desire to know more.

As I read John's response I can sense that light in his eyes. Yes, I have done well in helping my students to wonder and *ask* questions. But have I empowered them to *manage* them … to orchestrate multiple perspectives and infer meaning and significance? This means helping them to see questioning from a meta-cognitive level. Hmmm. Not yet, *I* have to master it first.

I now wonder how I can better facilitate my students in being able to bring their big and small questions into the everyday of the physics learning – not just in their special topic. Is it in the awareness I bring of what questions might be possible, inviting students to disclose what they care about and might be vulnerable in thinking? Is it the way I listen to their questions and hear the deeper ones inside and encourage others to do the same? Is it having a computer in the room so they can look up questions quickly?

I wonder how students can follow through their questions, reflect on them and extrapolate. It occurs to me that something like a reflective journal might be useful. I call it an 'I wonder' journal and it seems that for the students who choose to create one it becomes a refuge for

deeper questioning about life, the universe and everything. It is also becomes a window for me into their very being – their feelings, thoughts, imaginings, concerns as well as for some their very personal concerns.

In inviting students to participate in this journal I incorporate what I have learnt from my enrichment session on *Dreams and Visualizations*… the importance of other ways of expressing self rather than just reflective writing… poetry, drawing, play, dialogue. I use what I have learnt from journalism in how to tactfully respond to students' journals. I take from an inspiring conference session (Remen 1999) at the Spirituality in Education conference (1997) questions like *What inspires you, intrigues and surprises you?*

What goes in an '*I wonder*' journal?

New ideas
What has surprised me, intrigued me, inspired me?

Questions
What bothers me? What questions do I have… big and little?

Explorations
What are key concepts, processes or beliefs about science I have grasped?
How has my knowledge changed?

Reflecting on my learning
What helps me think and talk scientifically?
What helps me be motivated?
What do I value about certain activities and working with certain people?

Playing
using imagination, prose, dialogue, poetry, scripts, concept maps, cartoons, feelings, what I am reading, experiencing

Fig 7.3

And as a result I am astonished by the creativity of my students and how these different modes of expressions enable students to explore and express different perspectives of science and their experience of it. I rush into my supervisor's office and show him with amazement the poetry, dialogue and imaginative writing in which students seem to bare their souls. I feel privileged to be allowed to see this wonderfully rich world into my students' lives, thinking and being. What does it mean to hold such insights into another in one's hands? Who am I as I read their words?

Previously I have worried that perhaps I was too prescriptive and not giving students enough space within activities and within the class, but now I realize that students are finding the space. That learning is happening outside class, being mulled over for months, or popping up way after something occurred in class. I am not the controller or facilitator of their learning… just the occasioner.

Where is science now? It seems to be more than just a scientific inquiry process. It seems that we are still keeping with a scientific desire to *inquire* into something, but now we are

bringing other lenses to it… philosophic, existential. We are using our imaginations, linking to our feelings and angst, and exploring with many intelligences. Is it still science? It feels that it is, but some of my colleagues don't think it is.

Where is soul now? Soul sings in the questions. It lies in the students' investment into the questions and the passions hidden in the questions. Yes, soul is clear and present. And those existential questions, about god, life and meaning? Well aren't those the sort of questions one might ask if one is on a spiritual path? Am I providing a place where students can nurture those questions within? Am I helping to develop *existential intelligence*? Is this quest for meaning a *spiritual quest*? Has spirituality somehow infiltrated the physics classroom?

I wonder how the questions that students are asking might reveal their deeper soul purpose and help them to articulate soul in what they do. They seem passionate… is this revealing their deep passions? Are passions an indicator of deeper purpose?

"The spirit is fascinated by the future, wants to know the meaning of everything, and would like to stretch, if not break altogether, the laws of nature through technology or prayer. It is full of ideals and ambition, and is a necessary, rewarding, and inspiring aspect of human life.

"By confronting us with irreducible mysteries that stretch our daily vision to include infinity, nature opens an inviting and guiding path toward a spiritual life."

Thomas Moore

Where is learning now? Is learning in the freedom to ask questions? The freedom of the students to pursue their own thinking and meaning-making? Rather than me constructing a path of meaning, are they doing it themselves, guided by their own questions? Is this possible within this heavily regimented content? Perhaps learning is in the freedom to express who they are and all they understand in the praxis of their questions?

Where is my notion of constructivism now? During this period I begin my PhD, starting in 1996, and am inducted into the academic world of constructivism ranging from pragmatic classroom practice (Treagust et al. 1996), research into how students construct alternative frameworks (Driver et al. 1994) to more philosophic discussions and critiques from trivial, social, critical and radical versions (e.g. von Glasserfield 1990, 1993, Eger 1993, Claxton 1996, Mathews 1993, Taylor 1997 and many more (eyes glaze over)).

In my first session on trivial constructivism I am astonished when the visiting lecturer 'probes for understanding' in such a way that streamlines our responses and ignores the

wealth of experience in the room from myself and my experienced co-educators. His agenda has shut down any possibilities emerging.

It seems to me that there is a spectrum of constructivism – including versions which are barely removed from directive information sessions to other versions which invite participation of the wealth of understandings and ways of being of everyone… which is co-constructive and co-creative. (Perhaps from a *spiral dynamic* point of view (Beck and Cowan 1996) this might be the difference between constructivism practiced within the pragmatic, goal oriented *orange* cultural meme and that practiced in the *green* meme of postmodernism and open space technology.)

I am concerned about where I really am on this spectrum in my teaching of physics. Do I too have too much of an agenda? An article by Tobin (1993) challenges my thinking further, questioning the roles I take in the classroom. Even though I am inviting student questions am I still directive? Am I shaping too much what can be asked and what is heard? How do my metaphors of teaching limit who I can be as a 'teacher'? Am I limiting or stifling my students in the same way I feel stifled in some of these PhD coursework sessions?

Just asking these questions lifts me to a new sensitivity and vigilance. I begin to see how much the type and ways of using questions has changed in my teaching over the past few years. I realize that it isn't enough to empower students to ask their own questions; it is equally as important to foster a place which opens up the type of questions that can be asked. The paradigm we are in dictates what we see. The *eyes* we use (spiritual, mental, physical) dictate what we see. The way we are together dictates what we share and reveal to each other and to ourselves.

So while *critical constructivist* discourses take into account student voice and negotiation in their learning I feel that there is something missing. It seems constructivism is based on assisting students to *come to know* **mentally** this subject that is being taught; it focuses mostly on epistemology – the ways that meaning making is framed and legitimized. Where is the ontology? Sometimes there is mention of *being*; helping students to *be* scientists and thinkers. But what about holistic knowing, including more than just the *mental eye*? What about holistic *being*? What about the value of relationships and experience? What about development of the child?

It seems in this journey of encouraging questioning in my classes that my role of teacher has changed. I am far more than a subject teacher finding ways of improving my craft and

improving student learning of my subject. I am now wanting to build relationships with my students, to care for them, help them flourish and help them extend their current capacities and explore others. I have come to know them through allowing them the freedom to express their questions, their passions and themselves and this creates a sense of compassion, connection and greater responsibility in assisting their holistic well being.

So, as I read the various constructivist literature I find myself looking for where the author is coming from. Are they bringing a spiritual or holistic sensitivity? What assumptions about the purpose of education and the development of the child underpin their research? It seems that much of the academic debate on this topic is like two old dusty men squabbling over pennies when someone nearby is exuberantly handing out hundred dollar bills. So while I am using constructivism in my physics classroom as a basic tool of my craft, I find it lacking as an explanatory theory of student being and becoming. I find myself a little frustrated with the mind games of the debate and I turn to theories of Holistic Education (J. Miller 1993, 1996, R. Miller 1990, Moffat 1994), Steiner (Childs 1996), Dewey (1966) and Egan (1986) to now try to understand deeper into the heart of education and what it is for.

I write to my supervisor in 1997 about where constructivism fits into the directions I want to take in exploring holistic principles in my teaching:

> However, all that other part of the constructivist stuff that we had to do (as part of your course) does not really fit in. It annoys me excessively. I understand it, I disagree with its emphasis on intellectual knowing but I have no urge to argue it. Because I have set up a different context, even raising it and debating it is irrelevant to my plot.

Yes, I want to detach myself from this thing which seems to have colonized science teaching and focus on what I think is more important. But I can't because the constructivism debate is part of the science education culture of the time and to be part of a scientific teaching community I need to connect in some way to what is the key concern of my peers. I am heartened also by my supervisor's own response to the epistemological focus of constructivism – his attempts to bring notions of *being* and *values* to 'value-add' the debate about *knowing* (Taylor 1998).

So despite my concern (or perhaps because of it) this foray into the worlds of academic constructivism from 1996 to 1998 leaves its mark. I am inducted into postmodern discourses, relativity of meaning, interpretative lenses. These cause me to reflect on my own teaching and teaching journey and to question my own assumptions and actions. It helps me bring rigor to my thinking about spirituality, helping me to be more vigilant in listening to the

language I use and making explicit the underpinning metaphors that I might be unconsciously buying into.

This academic journey into constructivism also helps me hone my craft, enabling greater self-awareness of what I had begun to do naturally as a result of integrating earlier learnings from our state-wide sessions on constructivism. So I am able to bring a more critical eye to my practice and move above it, beginning to play with it more – not owned by it. And while my previous learnings of *trivial constructivism* now seem to be surpassed by more mature versions of constructivism there is an essence of trivial constructivism which is worth retaining and makes a good starting point in the journey of *coming to see another.*

This is the permission to move into the perspective of the student – to ask what they know, to invite their questions, to try to understand their thinking. I have value-added it, through my engagement with Holistic Education principles, giving myself permission to enter even more deeply into their *beingness* as well as into their thinking. However, having opened the door into students' souls is a bit like opening Pandora's Box and I will talk in later chapters about the responsibility that brings.

When in 1999 I work with university physics lecturers to help them improve their teaching practice I start with *trivial constructivism* as a means of initiating the process of helping them move out from behind the lectern into ways of understanding and coming to know their students more deeply. I talk about this process and the difficulties in more detail in Appendix 3.

But to be honest, many of the deeper philosophical arguments about epistemology, *dasein*, hermeneutics and feminist politics went over my head at the time. When I look back now in 2006 at the many papers I had available to me then, I realize how much I have discovered for myself through 'hard won knowledge' that was already there for me to take and use, but I had not yet grown into a place where the findings were understandable, relevant or meaningful to me. But my learning style is one where I need to learn from experience rather than have it merely told me… I need to live my way into my questions and I suspect one of the reasons I got very ill in 1999 was because I was trying to live my way into far too many questions at once.

Now with the hindsight of Integral Theory I think I can look at the literature and tentatively map where it might be on Wilber's (2000) quadrants and levels, or on Beck and Cowans'

(1996) spiral. I might be able to better appreciate the 'partial truths' in each and how they might integrate into a greater whole.

For me now the various levels of constructivism seem to have an evolutionary aspect, so one size doesn't fit all, but rather suit the perspectival level or cultural meme that someone might be operating at. Thus assisting transformation of a teacher would involve assisting them into looking at a more mature version of constructivism than they might be currently operating at which can help them see what they are currently doing from a greater distance, thus dis-identifying from it and being able to grow to a new perspectival level (Kegan 1982). As Vygotsky says, it is through play that we can bridge that gap from where we are now to where we have the potential to be. So perhaps it is by playing with these constructivist theories which act as temporary scaffolding that we can move across the gap. They are useful when they assist our own transformation and openness to further possibilities, and less useful when they cement us into a fixed position or paradigm about science education.

But I am again getting too ahead of myself…. Back to my 1998 'head'… or heart?

Where does wholeness lie now? Does it lie in helping students express their deep existential selves? Does it lie in the *integration* of various aspects of themselves in what they do? Is it in the *being fully present* and *fully alive*? And what do I mean by *fully*? And what is this thing called integration? Am I seeing integration in them because perhaps I am experiencing it in myself… the beginning of reconciliation between my spiritual self and science self? What is the process of explicating who we are and then integrating? Do we become wiser, more self realized?

And what is the key to this process of becoming and being? Permission to bring one's own passions and questions to what you are doing? Being in an environment where others are doing the same… stimulating you and interacting with your own passions? Do we need a community to inspire, intrigue and surprise us… to perturb us and support us… providing the synergy for growth?

Am I really reading too much in all of this because I want to see soul and spirit in everything?

Who am I becoming now?

And how am I feeling? Humbled and inspired by my students. Playful and laughing. Joyous and energized. Inspired by the questions we are asking. Increased sense of awe and wonder in not just the universe and the way we try to describe it, but also in us, the human beings who are experiencing it. Life is good and I love opening the door to my classroom.

Yes, if you were to ask me the question "What intrigues, inspires and surprises you?" I would have to answer "my students." And in the words of John, I would probably say "It was nothing short of being the most exciting time of my life." This openness to be surprised seems to energize my soul, and remind me of my humanity. It is something which today (2006) I dearly miss about not teaching physics – now I have to cultivate an openness in my life to be surprised without being in the energizing presence of 20 students who are discovering what it means to be enchanted with the Kosmos. Perhaps I can remember the essence of this and try to bring back some enchantment into the lives of my current journalism students, some of whom are suppressed / depressed. Perhaps I can even bring a sense of enchantment in writing my thesis. But hey, let's not go overboard!

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Interlude 1

A quote by Albert Einstein followed by three extracts from my students' 'I wonder' journals

> *"The important thing is not to stop questioning. Curiosity has its own reason for existing."*
>
> Albert Einstein

Robots and other thoughts…

What is the real purpose of momentum? Can physics explain how people get teleported in star trek? Why does the blood rush to the top of your head when you hang upside down, yet nothing is abnormal when you are the right way up? Where does the matter go when it is sucked into a black hole? Could a black hole be an opening into a parallel universe?

From Robot Dreams:

> *You've made a positronic brain pattern remarkably like that of a human brain. Human brains must dream to reorganize, to get rid periodically of knots and snarls. Perhaps so must this robot, and for the same reason*.

I am reading some of Asimov and am thoroughly enjoying it. Could I do my talk on some of his ideas?

Amanda (early in the year)

* * *

What is the meaning of life?

What is the meaning of life? Do we have a designated purpose that each of us has to fulfill before we are released into the spiritual world?

I went to a philosophy seminar which spoke about "Emptiness is the key to reality." Does that mean that reality does not exist behind us? That reality is

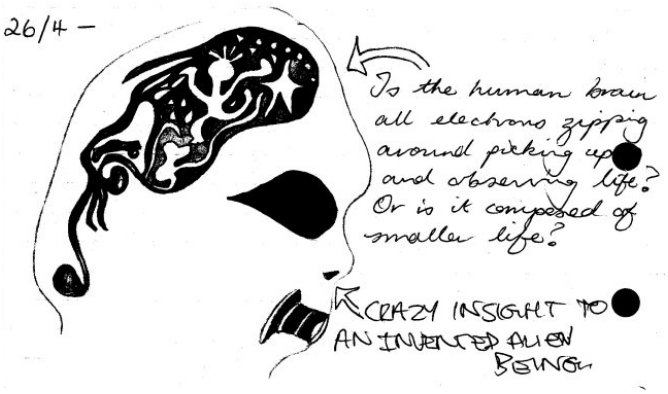
only what we can see? Therefore is it possible that we are all a figment of each other's imagination?

My brother was trying to convince me the other day that the universe did exist as different matter beforehand and then someone figured out the key to the universe. As a result of this the universe collapsed and now new complications have formed. If we figure out the key to this new universe, what will happen to us? Would it collapse and would it reform? Is this concept believable at all?

Amanda (mid-way in year)

* * *

What is reality?



Reality is what we believe to be real. However, do we really know what is real?

There are so many possibilities, we could be living on a hollow earth, all atoms could be galaxy's, human beings could be combinations of infinite galaxies, we could all be figments of our own imagination, all be someone else's dreams, singularly matter and not any mind, and if so what do other people perceive us to be. Are we all lumps of mass that people view and create our own personalities for?

Are colours colours? Do people see the same? What would it be like to see the world through another person's eyes? (get people to go in pairs and one to close their eyes. Draw a picture on the board and get person to describe it, then people with eyes closed to open them and see if it is the same as what they thought it would be)

What would happen when all the planets aligned? Will the gravitational effect be so great that we would be sucked into the middle of the earth, or would the effect be so balanced and great that we would float?

What are people? Are they bodies wandering aimless around the earth looking for a purpose they can never find? Are they real? Do they appear the same to everyone? Am I always the same to everyone, the same matter, but different mind? And if so, how can we say that we know someone, if we can only really define their matter. And even then, matter appears different to every one. What is beautiful to one person can be the inverse and opposite to the other. That is the way the mind works. It is different to every one. I view my mind as my own, something secret kept hidden under rocks and stones for no one to see. No one ever sees the real me, my mind. It is fucked as all shit. Hidden under a lot of grass, in which no one can ever graze. But if no one can ever graze it, is it really grass. If it's not grass what is it? An un-comprehensible cover that no one can understand and interpret. And if no one can interpret it is it real?

What is temperature? Is it a fragmentation of our own personal experiences. Hot is associated with extreme feelings, whereas cold is hardly any feeling at all. It is the expression of nothing. Therefore if it is the expression of nothing, then does that mean that I feel nothing as my circulation is poor. What does that say about me? Am I an ice object, someone who does not feel anything at all?

What is a feeling? Is it an expression, a stable form of our mind, an unexplainable being, influencing what we believe to be so?

April

* * *

Who are these people, these souls?

What privilege I feel in being given glimpses into their inner being.

I wonder at what else might be hidden, what I might be suppressing with my agendas.

Yes, what is it like to *create a spiritual space within us so we can accept our students' gifts?* (Palmer 1997)

Interlude 2
Two different takes on questions courtesy of two physics lecturers

Take 1 - 1999

I am sitting in on a first year physics lecture as a researcher/observer as part of a project at the university to improve teaching and learning in first year physics courses. There are about 60 students in this lecture theatre which could take 200. The lecturer, Dan, is down the front giving a talk on optics, using a power point presentation which carefully constructs the concepts using well designed diagrams. It is the third lecture of the year.

Dan would like to use more questions in his lectures to cause students to think about what he is talking about and to make it a little bit more interactive. I am there to give him feedback about what he is doing already.

Dan asks a question. "Another application of a prism is…?" I look around at how the students are reacting to this. They are shifting a little in their chairs, some are tilting their heads or looking at their friends, some are leaning forward. They seem to be thinking and now hands are going up from all around the lecture theatre. One student says "a telescope?" Dan says "No… well yes, but that isn't the one I am after …. So another application of a prism … is ….a …?"
Another student tries but it isn't the right answer and finally Dan says "Another application of a prism is …. The eye!"

There seems to be a change in energy in the room. It seems colder.

A bit later on Dan asks another question which is also closed. This time students are holding themselves, waiting. Non-committal. One person right at the front puts up their hand.

Take 2

A quote from another physics lecturer:

> A scientist needs to ask questions in such a way to allow for surprise. That is the joy of being a scientist … to be surprised… to find out something that you completely didn't expect. If you have in mind what it is you want to find out, then your questions might shut down the possibilities of what you might find.

Take 3

I am in the morning tea room talking to Dan about what I observed in the lecture theatre. "Actually Dan, I noticed that you asked quite a few questions. Did *you* notice how the students responded?" Dan says how he doesn't really see what is going on because he is so focussed on remembering what he has to say next.
"Are you aware of the difference between open and closed questions?" I ask.
No, he hasn't really thought about it. I explain how the students seemed to shut down when they were expected to come up with the one answer that he was thinking of. Perhaps the issue isn't how many questions you ask but the type of questions… giving students an open question that could have several possibilities, encouraging them to be more speculative, allowing for different approaches, valuing any thinking they are doing… that way students are encouraged to participate. I am warming to my theme.
But Dan is looking horrified. "I can't ask them an open ended question." he says. "I wouldn't know what possibilities were reasonable and what weren't. I would have to work out all the possibilities before I could ask a question like that. I can't think on the spot … I need time to think. I would be totally stressed." He is getting more and more agitated.
Hmmm. "When presented with several possibilities perhaps you could imagine yourself as a scientist then, rather than a teacher… what techniques do you use to decide whether something is plausible… look for justifying theory, test it out, do a thought experiment? How could you ask your students to be scientists with you?"

Dan is not convinced that he could carry it off but he says he will go away and think about it. A few days later, he tells me of an open ended question that he might use in the optics lab session the next day. He feels there are two options for his question and that he would ask the students to test these out.

The lab session starts with Dan up the front giving the students instructions on putting together optical benches, lenses and mirrors to see different aspects of optical theory. There is not much discussion between students in their pairs… just practical conversations… "look through this", "place this here", "where has that bit gone to?". There are three other lecturers in the room observing, standing back against the walls.

Dan now asks his open ended question and asks each group to discuss possibilities. There is a lot of discussion and then Dan asks for ideas. There are three main possibilities that students come up with. Dan writes them all up on the board as I have suggested. He is

looking very uncomfortable as he writes up the third one. He then asks the students to think how they might test each of these out and to go ahead and work out which one might be the best explanation.

The energy of the room changes… the students seem fully engaged, theorising, exploring, testing. The observer lecturers are drawn from the outskirts of the room and start engaging with the students as they are trying to come up with theories… these lecturers seem to be enjoying the dialogue… challenging students to be more analytical as well as speculative. One student, who I have interviewed several times over the last weeks and is getting to know me, grabs me and says "Sue, I have been thinking how this might be relevant to… and I am wondering…" I am really pleased and think that this is now an inquiring classroom.

Dan is still up the front of the lab looking at his next lot of notes, head down. Oops, it is supposed to be him having these sort of conversations, not me.

Dan now calls everyone to attention and asks students to share what they have found out. There is a good discussion and he eliminates all but one possibility from the board and then gives the formal explanation.

After the three hour lab session I ask him how he feels his open ended question went. "I was not happy," he says, "When that third possibility came up I panicked. I couldn't think whether it might be true or not. I remembered what you said and I wrote it down on the board, but I really didn't want to put it up there."
"But it was such a success… the students were really engaged in some good scientific thinking. It seemed to be the highlight of the session."
"But I ended up running out of time. It took a lot longer than I thought. Now I have to cover more in the next session."
"Could you cover less content and give yourself time to do something like this?"
"I am going to have to think about it. I really don't feel comfortable with this sort of thing."

How can I help Dan to be more comfortable about this? Practice? Is this just about pedagogy, or does this reflect who Dan is? Can he change who he is, his very nature? Should I be expecting him to?

Interlude 3

An extract from a student's journal, an interview with three students about their journals, followed by a quick quiz and a reflection

> "Feeling pretty down at the moment, so I thought I would escape to the sanctuary of physics. It may sound crazy to an individual but at the moment it is an escape into another place for me."
>
> Amanda

* * *

Nina: "We had to write journals in high school and I hated it. We had to do exactly what the teacher wanted. I was really unsure about doing this in physics. I didn't know what to write. I was wondering what you wanted. And then I thought, "Hell, this is for me. I'm going to start one. I will write what I feel like." What was important, Sue, was that you didn't judge; there was no right way or wrong way to write in it; I could write down my ideas even if they were wrong. But I held myself back for the first couple of entries before I felt really confident to just say what I liked."

April: "This journal saved my life. I was going through a really tough time, broken up with my boyfriend and I was spiraling into depression. I found that by writing in it, I could let things bubble out. I remembered that when I was young I had a diary and I loved it. As well as the physics one, I started my own personal one. It was a release. But then I became too reflective and started to be depressed again. It was time to stop. I now know it is there. When I have problems again, I will use a journal… "

Amanda: "I liked the way I could just imagine… write down what I was reading and muse about it… I liked the way that you interacted… suggested other books… took my ideas further… it was a conversation."

Quick quiz:

1. How do you mark a student's 'I wonder' journal? How do you value what they are doing? What criteria are you thinking of as you read the journal?

2. How do you balance the need to allow students to gain confidence in speculating with providing a reality check if they are showing misconceptions of physics ideas?

3. What are you going to write in the journal? Whose space is it? The student's? A shared space? How can you be sensitive to students' own aims for their journal which may not be what you originally had in mind?

* * *

Yes, the 'I wonder' journal is a space for students to reflect about physics ideas and their learning of physics, isn't it? Then why am I also reading about girlfriend, boyfriend problems. Deeper issues. Do I allow it to continue or remind students that this is a **physics** journal? It certainly is giving me a deeper insight into my students, and a reality check for me if I think Physics is the be all and end all of people's lives.

The notion of the journal as a place of sanctuary is really interesting. It seems that this is the case for several of the students…. … a place where they can be *at home* with oneself… it is home in terms of the sanctuary of the inner imaginal life… home in the trust they have in me to hold their interior spaces with kindness, with non-judgment and a deep interest. Here am I, a person who sees them… and there is a sense of home in that. Is there an intimacy here between me and my students in the pages of their journals as I hold their words and perhaps their souls in my hands?

And those students who are not writing journals, how can I also look more deeply as we interact together inside and outside the classroom? How can I help them discover the best ways to express themselves?