



Setting the Scene

The MSc class room at Schumacher College is a small room, fitted under the hundreds of years old beams of the sloping roof

of the Old Postern. For almost twenty years, it has been the home of the inquiry into Holistic Science. Every year, 15 or 16 students (for no more will fit) take their place in this space to take up the inquiry (Franses and Wride, 2015). This year, 2015, is no different – there are 15 students and two teachers. Time seems to slow down into a process that has taken on the rhythm of years of study here. The space seems to empty out into a 'cloud of unknowing' to use the term of an unknown 14th century English mystic (Underhill).

The silence that precedes the teaching sessions enables a receptivity to new ideas and facilitates the expression of new possibilities. Even how physics and biology might come together in a more whole meaning. It is a cloud in which those possibilities that precipitate out, are like raindrops which satisfy a thirst for learning. The end is drawing the beginning towards itself in an entangled loop of fulfilment.

There is something beyond instrumental educational experiences of cause and effect here. The whole meaning that will emerge during this week somehow already exists as pure potential in this space, and is somehow already palpable within the room.

"Wholeness, it is said, contains everything about itself, within itself." (Franses, p 7).

This year, specifically, we are exploring how physics and biology might come together in a more whole meaning. This is a truly transdisciplinary approach to education (Mantouri) where the space from within which the new meaning emerges, transcends the

isolated monoliths of the two subjects seen separately.

We were enabling a direct experience of the creative space that transcends both disciplines and all the individuals involved – teachers and students. We were experiencing the dynamics of a complex system (the class) of which we were integral parts and to which we all contributed. We allow that the parts necessary for this unfolding of the learning suggest themselves. The parts we speak about, whether in the Universe as a whole, in quantum biology or in the developing embryo, are suggested as the requirement for developing a meaning between us as true participants in this learning. There are no passive observers. *"We are shapers and creators living in a participatory universe" (Folger).*

So, there is a completely different educational process unfolding here. We are not beginning with parts of knowledge whose outcome is already foreseen. We are not didactically conveying 'fixed facts' from text books. The parts of the teaching come up, as suggested by the whole meaning that wants to be born in the active space we are creating in the process. In this way, physics and biology are not isolated mountains to climb. They are natural ways and means through which the collective goal of the class, to experience new meaning, is enabled.

Searching the Meaning

As an experiment, Mike Wride and Philip Franses decided to teach the second and third weeks of the MSc in Holistic Science, complexity module, together.

It was easy to say we would teach together, but how would this work in practice?

Philip's first step was to visit a bookshop on the Sunday before the teaching started and find a book called "Life on the Edge, The Coming of Age of Quantum Biology" by Jim Al-Khalili and John Jo McFadden (Al-Khalili and McFadden).

Although a fine read, the authors seem to feel

the need to go out of their way to disassociate the science they are describing, from any connection to meaning or spiritual connotation.

The book gives detailed oversight of the new bridge that is being uncovered between the essence of physics, quantum theory, and the basis of biology, the molecular genetic basis of life. However, though broad in its universal scope, it stumbles in trying to proceed by taking the specialism of quantum theory and applying it to the understanding of biology in a rigid way. It felt to Philip, there was no leeway for a comprehension that truly transforms our understanding of life.

The experience of the world continuously shows us how disparate possibilities concentrate into the distinction of a whole identity. Whole natures (macro-state of tree, or human or even God) persist in holding the freedom of many micro-states, without reducing to the level of these sub-actors. Thus meaning, even in its mathematical understanding of order, is innate to life. Yet for a modern science book to claim legitimacy, it has to give the impression that meaning is simply the understanding that our intellectual insight places upon an otherwise inert, material universe.

In the same book, the quantum effects all refer to the aligning of possibilities around a unity of whole function; for example, photosynthesis or respiration, as distinguishing features of life. To remove meaning and its relation to matter from such a discussion felt like it was being dogmatic about science. Meaning had been erased from the story of biology for the benefit of scientific expediency.

Together, Mike and Philip had two weeks to probe slowly, how these two aspects of matter and meaning around biology, physics and the new insights of quantum biology might more naturally and productively come together. Heading to the train station from the bookshop, a text message from Mike surprisingly said that he was also passing through Exeter on the same train Philip was on. We started fittingly, in the synchrony of sharing a journey from Exeter to Totnes, falling

into our exploration of the 'matter of meaning' and what we were going to do in the two weeks of teaching together.

Into the Cloud of Unknowing

It was simple enough just to talk about teaching together during the two weeks. We had already developed a scaffolding, a plan outlining the topics we had in mind to cover each day. We each had our own material to cover, and our own experience and expertise that we wanted to bring to the sessions. How was this going to work, putting two separate disciplines as physics and biology together, without it seeming artificial and contrived?

On the first day it was very much that we each stated our ground. Philip talked about the unnatural separation of meaning and matter in the history of science. Mike followed with an introduction to developmental biology, bringing the story of the journey of the embryo and the recognition, through some collective moments of insight, that the fertilized egg is like a class at the beginning of a learning journey – open to the possibilities for differentiation, not 'nothing', but 'no-thing' or even a 'know-thing'.

We had introduced a ground of matter and meaning, but it was unclear how we should enter it. For instance, how would a talk on physics have any connection to biology? It all seemed to be just oscillating between physics and biology at that point. What would be the point of that? Who would follow it? Everything had now reached a point of balance.

At a given moment on Tuesday morning, Philip made the first step, thinking: "You know what? I really have to trust Mike, and Mike has to trust me and we have to leap together into the unknown and see where we can take this.." The teaching would not work if we were each kings of two isolated islands defending our own ground, passively watching the waves of meaning on a dead sea between us. If we stayed in our own sphere of authority, nothing would develop beyond that. Somehow, we had to trust each other into uncharted territory for it to work.

As soon as we made that commitment, things began to get clear. We realised that instead of embarking on physics and biology as completely separate disciplines, we could start with the common meaning that links the two. Trust changed the dynamic.

On Tuesday, Philip explored the mathematical concepts of electric and magnetic fields, which on their own are just abstract symbols. They become real only through the equations of Maxwell, that defines their play as the basis of light and electromagnetic waves, for instance in mobile phones. Then, instead of immediately going into the biology, Mike spontaneously introduced a card game (*Eller*) epitomising parts and wholes, and the unfolding of and relative interpretations of meaning. Mike had brought the cards with him, but till then had not made a decision about where they would fit in the sessions. Now it seemed intuitively obvious to him that this was the time to bring them out. The students were each given a single card and could only describe to each other (not show) the picture on the card. Each picture was a part of a story. The students had to work out the place of their card in the sequence of the story, by understanding the relation of their card to the whole meaning. The meaning of the whole story gradually, dramatically unfolded from the relationship between the pictures depicted on each card. In a brilliant show of patience and collective group work, the different pictures were finally illuminated as a whole story through the imagination of the group. Only at the end were all the cards laid out in order and turned over to reveal the whole narrative that matched the story built up in the imagination of the group, when communicating their individual cards.

We had both seemingly gone off the track of what our individual content was going to be, and had entered a whole new terrain and pattern of letting this process develop, seemingly of its own accord. It started feeling, very clearly, there was some new meaning that wanted to reveal itself through us which had unfolded from within itself in the card game.

This now acted as a crystallisation point for what would happen next.

Living the Story

On the Wednesday, we started by Mike laying out a set of new cards, this time depicting different stages of zebra fish embryo development. Because we had already seen the cards of the story the day before, and we had worked out the story's meaning, the cards of the embryo immediately took on a particular significance so that we were not just looking at things and labels, even though we had gone through all the labels of the different processes and parts of the embryo. We were, in fact, looking at a process of unfolding meaning. This was very startling, for in mechanistic approaches to biology we are trained to only see steps or separate parts without any underlying message emerging from the inter-relationships of the parts. We were now looking at the embryo's journey as the unfolding of meaning, because we had all experienced that with the card game. The transformation was already beginning to happen within us - biology was not just about abstract knowledge as the only way to understand life. Life was something about us, not distant or distinct from us. Just like we understood the story through the generation of new meaning in the story of the card game, we now saw something similar unfolding in the embryo cards. Biology was beginning to come alive, we were seeing the development of the fertilized egg cell as something to do with the experience of meaning in our lives.

At this point, Philip introduced Einstein and Relativity. This might have seemed a big leap to make from one specialist subject to another, but in talking about space, time and Einstein's understanding of the universe through light, it became very clear that the embryo illustrated this view of space and time. We did not need space and time as abstract principles to understand the journey of meaning and its unfolding. In fact, the rhythm of that journey of meaning through the embryo enabled us to talk about space and time and see them both in a new way. The rhythm of embryo development identified points in the cycle that

distinguished periods of time. The growing of the embryo created its own relative boundary in space. We did not need to measure space and we could directly experience the relativity of time through the unfolding of new meaning as the embryo developed.

There was a dramatic realisation that Einstein was not talking just about the universe, but also about the embryo, and its journey of meaning; 'As above, so below'. The card game had started with the Universe, with a view of planet Earth as if viewed from a space ship and it had ended with the rooster's comb. But at the beginning of the card game, the students had no idea 'where' they were – all we had were fragmented snap shots of the isolated meaning on the individual cards. Entering the cloud of un-knowing/not-knowing was the only way forward. It was only through the relative inter-relationships that the new meaning emerged. And going even further down into the genetics of the rooster and its embryonic development more and more things aligned, the micro, the macro with the human in between.

We were not focused only on some 'thing' - either the cell and how it develops into the embryo, or the universe and how we now understand it. But we were talking about an underlying unifying process that had many forms, which gave a feeling of a common journey into meaning. Instead of life being put into a compartment called biology, with a specific text book of dissection into separate properties, life had become the underlying ground that was true about everything - of embryo development, of human development, of the development of the universe.

We needed our relation to the living journey of the organism in order to put into perspective our own journeys, and our own relation to the universe. There was a feeling of a profound truth here in the classroom that the universe is a developing organism too. Life had popped out of this dull biology book, and was becoming a pointer to us, something real. We recognised it. We recognised something that was true of every embryo, of the universe, of ourselves on our own journeys, our own differentiation. By going into the relationship

of physics and biology, in a relationship of trust to each other, we revealed a fractal pattern, true at many levels of scale: the cell, the organism, ourselves, the universe. We recognised the pattern and how we fitted into it. We were not talking about something abstract, distant, disconnected from us, we were talking about life itself. There was no division of science and spirit, biology and physics, meaning and matter. This was living in the learning and learning in the living at an elemental level.

The question 'What is life?' was now connected clearly to meaning.

In that moment of illumination that occurred as the embryo cards lay on the floor and Philip was speaking about relativity, we went through the doorway of trust. Life appears as a quality, with a specific direction towards meaning as the means, to completion. The story completes itself by putting all the cards of separate stages of the embryo into the order of new life. We had realised that learning is about the unfolding of meaning from within ourselves and between each other as well as in dynamic relationship with the material we were covering – meaning matters. We had gained the insight that perhaps life is the means by which matter explores meaning and, conversely, matter is the means by which life explores meaning.

Quantum biology

On Thursday we went full circle, spiralling back to quantum theory, which is how wholeness comes into being at that elementary shore of the particle and showing how that is also true of quantum biology. At this shore, we are at a point of choice. We can stay with matter alone. Or we can see emptiness and possibility as a challenge to travel the sea of uncertainty where the everyday reveals itself with inherent meaning. Classically, the possibilities of quantum theory describe themselves with respect to a nothingness giving only formal meaning to any observation. But in terms of quantum biology, the possibilities align together as the living character of being. The possibilities recognise themselves in the single identity that gives coherent meaning. The unity

of life is the story that takes up all the separate pictures of the cards, or stages of development and tells them as a whole realisation.

Everything comes into the present, at its rightful place. Mike found an inscription by Tagore at the Dartington Hall Gardens. *"Here rolls the sea, and even here lies the other shore waiting to be reached, yes here is the everlasting present, not distant not anywhere else."*

Transformative Learning

On Friday morning, we reflected on the week.

Alex: *"I would describe this week as a clearing of the mind. Rare! This feeling just after not knowing, when you come out of a profound experience that is so vast and so evolutionary that all the questions you have, create a symphony and that symphony forms a silence that is just waiting. So I feel [I'm] in that precious stage of what's next?"*

A butterfly appears in the teaching room - seemingly out of nowhere - perhaps epitomising the transformation that has occurred during this special week of teaching and learning. In that moment, it seemed that the butterfly was the physical manifestation of everything we were teaching and learning. It fluttered towards the window perhaps telling us that we should stop and go outside.

Silent pilgrimage

We gathered in a circle outside to embark on a short pilgrimage to a nearby church. Only one rule from now on - silence. Could we find freedom and coherence in the silence? Is 'science' to be found within this 'silence'? Could the potential of the silence as a study of self-metamorphosis, like the butterfly, and the emergence from the chrysalis take us into the light of new meaning at the end? We would see.

We led the way through the woods, each walking in their own time, some barefoot, but all silent, each a cell in the organism of this group. We moved mindfully, listening to the

wind rustling the trees. There is a freedom now coming to us within the silence, but also silent communication and intrinsic coherence. We arrived at St Mary's church. Mike circles the church three times, some students follow, others climb trees, but we eventually all enter the silence of this sacred space epitomising meaning in matter. Wholeness, health, holiness - everything is encapsulated in this place, linking to the meaning of the teaching and the vast ultimate meaning of the universe. There is silence here, but also a palpable depth to the experience. We are all silently reflecting on what has happened during this week. How we had all differentiated from 'nothing' to 'nothing' to 'know things' along the way! We found trust in the freedom of the parts and the coherence of the whole, and each of us had emerged transformed by the experience. A new meaning was revealed, ordering our separate individual selves into a whole illumination of our place in life. We knew that we were the same, but we had caught a glimpse of a unity where something else could be made of experience.

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