Using the 'engagement' model of problem solving to assist students in capstone learning

Abstract

The engagement model for problem solving was developed as a response to soft systems methodology being difficult to implement in certain circumstances. In the years since the original paper was published, the model has developed into an iterative problem solving approach for the assessment, creation and implementation of new ideas in difficult problem situations. This case study paper exemplifies the kind of work undertaken through the use of the model and provides a practical scenario for how one might apply it. The case study takes place in a higher education environment and relates to the development of a capstone course for management majors. The paper concludes with suggestions for future research.

Keywords

Engagement model of problem solving, soft systems methodology, case study

Introduction

Teaching problem solving is difficult. As Checkland (1981) notes, each context is different, each situation is unique and one can only ever learn their way into a complex management problem. A lot of education around problem solving has relied solely on the idea that any situation can be optimised given the known constraints (Simon 1960). The problem with that view is that it's linked to the idea that a problem can be easily thought of as a linear construct, with known variables, known outcomes and an easy to understand pathway for a solution (Fernandes and Simon 1999).

Management is not like economics in this sense. Management requires judgement (Vickers 1983), critical reasoning (Mingers 2000), systems thinking (Jackson 2001) as well as an ability to think and create new solutions to emergent crises (Houghton and Metcalfe 2010). Traditionally, we have looked to optimization for solving problems. Not all problems are given to known constraints (Rosenhead 1996). Some even contain behavioural aspects where emotions, empathy and seemingly irrational behaviour drive sense making and judgement (Weick 2007). How can one effectively teach problem solving to management students? In particular, we posit how might a pair of academics engage students in a teaching and learning experience involving judgment, reflexivity, learning and feedback.

This was the challenge handed to the authors twelve months ago when undertaking a course called Management Problem Solving at Griffith University in Queensland Australia. An analysis of the Bachelor of Business program at the university revealed that there was a subsequent lack of pedagogy around the subject of problem solving in the management discipline. The goal of this course was to facilitate learning about how to manage people problems in organizations.

The usual temptation for the lead author would be to rely on the traditional OR (Operations Research) methods that involve modelling and so forth (see Mingers and Rosenhead 2004) instead of a more fluid process of interaction. To get to this fluidity it was decided to rely on a set of philosophical assumptions known as the 'engagement' model of problem solving developed at first by Houghton and Ledington (2004).

While the OR community has dealt with education and soft OR (see O'Brien 2004, Ackermann 2012 for example) the discussion is fairly general and limited to teaching the methods effectively. This paper makes a departure from these literatures and focuses instead on the education process and capstone learning, instead of teaching the methods in class. The method employed here has not been employed in education yet but has been applied in a variety of other contexts (Houghton and Metcalfe 2010, Houghton and Ledington 2004 for example).

In this article, we outline how the engagement model was applied to develop graduates who were required to do two simple things. Firstly, to be able to effectively reflect on what they had previously learned during their Business Management Major. Secondly, to use these ideas to develop a strategy of implementation (an engagement process - see figure 1 below) whereby they could use these ideas to solve a management problem. For example, how could students use these constructs from previous learnings in courses and apply them to a problem in a simulated learning environment. Before we can explain this in greater detail though a brief background on the 'engagement' approach to problem solving is required.

Background

The engagement approach to problem solving came from the over complication of Soft Systems Methodology (Checkland 1981). The desire was to deliver engaged stakeholder conversations about feasible change to drive accommodation of world views, without the express need for systems modelling. That is, could we start simply by using other ideas instead of systems models (Houghton and Ledington 2004). Houghton and Ledington (2004) depicted the model as a way of engaging in problem solving conversations with the express purpose of providing groundwork for synthesis (Houghton and Metcalfe 2010). The approach takes a few key assumptions for granted.

1. Every situation that humans interact in involves expressions of pain.

Pain here is used in the way that Grint (2005) and Conklin (2005) use it as 'naming the pain'. The term problem means the way in which people empathically express the pain of a real world problem context. That is, faced with a sales downturn, a manager may express it as 'we are losing money.' That expression is a point of view that needs to be mapped and understood effectively. To remove the emotion or feeling of a problem context from the situation is to say that human beings do not process empathy or empathetic responses to problems (see Conklin 2005).

2. Dialectic tension

When a problem contains a variety of pain points or expressions these can be teased out as models or points of view using tools like empathy maps, mind maps, concept maps or systems diagrams as in Checkland (1981). The point of exploring the tension these problems generate is to deliberately invoke synthesis in complex situations in a similar way to most problem structuring methods. The point here is that by comparing and contrasting different points of view, better concepts or ideas can emerge (Basadur et al 2000). This is not a chance to enter into an endless inertia cycle but to provoke discussion and ideas leading to change (Checkland 1981). The other challenge here for practitioners is that they need to be able to create or at least attempt to facilitate an environment where true synthesis can occur.

3. Framing and Reframing the problem

Once the expressions of the problem are compared and contrasted new ideas emerge for application. These ideas are argued to be elements of synthesis, where the dialectic gives way to a super concept that subsumes or removes the need for the tension to occur. In other words, you can dissolve a problem by finding: 1. A better way to explore it and; 2. A better way to frame it. This leads to conversations about how the problem could be effectively solved if a new approach was taken (Houghton and Metcalfe 2010).

4. Implementation and Feedback

Once the first three steps are undertaken, the fourth is to enter into a validated learning cycle, where ideas are put together as 'a framework for change' to be implemented through short experiments, idea generation and implementation and nested feedback cycles. As William James argued (Gunn 1990) the truth is what 'happens' to ideas. As we engage with a problem we must know if our ideas have a pragmatic form of realization, otherwise, they are simply

just an exercise in futility. As managers, we are often faced with situations where complexity and uncertainty are tightly linked.

Managers operate under extreme conditions of uncertainty, which is a premise that the original research about human problem solving also pointed out (see March and Simon 1958). The steps required to conduct problem solving in this case were always aligned with the idea of optimization. Once the goal was known then we align our subsequent steps towards the goal and select alternatives to optimize our problem solution. March and Simon (1958) argued that managers can only optimize for information that they have access to. You can't know what you don't know.

For this reason, they used the term 'satisficing' to describe meeting the optimal conditions to solve a problem under an amount of uncertainty. That is, because managers operate under uncertainty, they search for conditions that match their understanding of the problem with the information they have at hand. More recent work, including the engagement model, suggests that managers operate under conditions of extreme uncertainty (Shankur 2001, Stacey 2003). This kind of uncertainty means that nothing is actually stable or fixed in the realms of management but is actually up for exploration. The engagement model suggests that a better place to start with optimizing a problem is to look at how the 'pain' or problem expressions play out as stories and then to use those stories as a means for creating new ideas that dissolve the tension told in the story.

The main aim of the engagement model is to begin comparing expressions of the problem, from as many actors as possible, until the underlying tension is recognized (see Houghton and Tuffley 2015). What people think and feel about a problem is how they express that tension or conflict. Those conflicting ideas are a seedbed for creative thinking because it drives people towards a new concept (Metcalf 2005) where the old tensions of the problem can be dissolved (Ackoff 1979). What this approach adds is the capturing of problem expressions as emotional, personal and difficult ideas that at first seem contradictory, yet ultimately lead to pure creativity (see Basadur et al 2000).

As noted earlier and as Checkland and Holwell (1998) argue: Theoretically 'valid' concepts are subject to the philosophical underpinning of their creators. One of the philosophical tenets of the engagement approach is social constructivism. This is the idea that knowledge is only accessible through the minds of people who subjectively interpret their experience. For this reason what's valid, is what 'works'. The final part of the engagement approach is to create a hypothetical 'new concept' (see Houghton and Metcalf 2010). That 'new concept' needs to be validated. Unfortunately as practice is concerned there is no statistical validation that will suit. Neither can the practitioner rely on 'validation' from their colleagues. The situation has to improve. Ideas are wonderful and everything comes back to notions, conceptual frameworks and the like. In management, as in life, it is what makes the actual difference that works.

So the final part of the engagement approach is to seek feedback on whether or not the new concept 'works'. Here in lies the hardest part of the journey. To create an 'engagement' or a conceptual frame that drives innovation and change requires courage. It also needs to be measured, activated, used and reflected on. It could also be that the initial idea is simply the springboard to a laterally related concept. So why do we waste so much time in discussion? We have to be sure of what we are measuring. Without measuring that idea, to see if it helps, then all we are doing is creating more work that ultimately will not improve things.

An example is found in Eric Ries book on the lean start-up (Ries 2011). His idea is to first take what you think will work as a concept and create a series of measurable hypotheses around it. Once you have interacted with the customer base, you iterate and develop the concept, perhaps changing the frame slightly even incrementally, until you realize the perfect fit between the ideas and the customer or fail completely. While this seems harsh how can there be any other way to know if something is to work or not. As academics we have this tendency to discuss, debate and turn ideas over and over and continue to forget the scientific approach to which we are all born. The philosophy of science is about ideas, testing, implementation and reflection, no matter what branch you subscribe to.

The engagement approach to problem solving is like a journey that starts and ends with the same kind of thing. The first phase is about learning. What are the current ways of thinking and feeling that create the current 'frame'. From this a discussion or synthesis of views takes place to examine these conflicts. After these tensions are revealed then we comprehend the need for change. As the dialectic of the situation is revealed through the problem expressions, new concepts, then new ideas emerge to try. Once these new ideas emerge, we move into implementation where we measure just how 'useful' these ideas are through a process of action learning. Validity here refers to usefulness. It does not refer to the scientific concepts of validity but the philosophy of pragmatism. Do these ideas provide a useful, albeit temporal, learning junction from which to explore and integrate new concepts? Put simply, if it works what do we do next?

Finally, the engagement approach is a philosophy of problem solving based on the idea that courage, mixed with cleverness and a certain degree of risk lead to a continuous cycle of learning in which situations are constantly improved. Similar to the idea of quality circles but drawing on ideas from the conceptual frame of references found in Soft Operations Research (Rosenhead 1996), where problems are perceptions (Jackson 2001). If a problem is a perception, then the solution is also, at first a perception. New perceptions create new opportunities and new problems. That is not to say that all is perceptual which is a weighty subject that we do not explore in this paper. It is to say that perceptions drive problems to the point where we are unable to perceive a new and better reality because our mind instructs us that our present circumstances are all that will ever be.

The engagement approach seeks to do three overall things. Firstly, to dig deep into the psychology of the situation, uncover the thinking patterns that exist and find out what people feel is the problem. Secondly, from this we borrow Checkland's (1981) idea of comparing mental models (sans the systems diagram) to under cover the tensions to discuss ways to dissolve them. Lastly, we measure, learn and validate new ideas through a process of action learning. This process is shown below in what we know as the engagement model that is about a 'journey' and a learning cycle/philosophy of problem solving.

Figure 1 – The Engagement of Problem Solving (adapted from Houghton and Ledington 2004 and Houghton 2008)

The study

In this paper we describe a two-year action research project where we applied the engagement model to a semester long capstone course called Management Problem Solving. The course was designed to be the final course in a management program prior to students leaving the university and entering the workforce. It is part of Griffith University's Bachelor of Business program. Students conducted several courses prior to these including: Organizational Behaviour, Business Processes, Management Concepts (Introduction to Management), Management Strategy and Decision Making, Managing People in the Global Economy, Quality Management and Business Ethics and Corporate Governance. The aim of the course was to synthesize the experience at University and create a space for reflecting on the learning conducted in order to give the students a deep sense of what they should have learned. A secondary interest was to facilitate the shift to the real world by teaching skills of applied problem solving and decision making in terms of a practical case study.

To do this the authors followed a two-year action research cycle that aimed to use the Checkland and Holwell (1998) basic framework for research. This framework has been developed over the 30-year program of Soft Systems Methodology research (see Checkland 2005). This research is built on the premise that all action research begins with constructing an intellectual framework of ideas to be embedded into a process of inquiry and learning (methodology) and then applied to a situation of concern. What differentiates action research from other forms of research is that it takes a pragmatic or critical concern as the basis for analysis (Morten and Greenwood 2001).

Our intellectual framework was the engagement model. That is, we wished to see if this model would be a useful framework for students to apply in studying real world problems. The problem we were studying was: How can we get students to engage in real world problem solving while reflecting on what they have learned. We built our first learning

cycle around this core concept. To apply this idea we created a learning environment where students had to study real world ideas in the form of pitches and then find effective solutions to problems with limited notice. In the second half of the course we gave the students a real world case study to engage with and then asked them to work in teams to analyze the problems from different angles. The problem was a case study where students were given minimal information, few details about what to expect and a basic structure. The aim of this was to see how they might engage with the problem through the disciplinary knowledge they should have gained in the first instance.

The course selected

The course we employed this framework on is called *Management Problem Solving*. It ran over 13 weeks in the second Australian semester from 2014-2015 (inclusive). The course had three pieces of assessment. The first is a 'creative synthesis' where students worked in small teams and devised an answer to a problem that is set by the lecturers. They had to conduct this five times over the duration of the semester. Students were also given a case study that they worked on individually and took the shape of a real problem. Finally, we asked students to reflect on the course using their own words so we could capture their experience in the final assessment. The course also formed part of a Griffith Business School project for testing active engagement in learning. The course is situated in the Griffith Business School's management major. It is designed to provide an 'exit experience' to develop and test what students have learned up to this point. In this way the course had two main aims. Firstly, to ask students to apply what they should learned over their management major thus far. Secondly, the course aimed to provide a simulated learning experience using this prior knowledge. The course had two hours of contact in class in which students do problem solving activities for 13 weeks. It also had one hour of 'pre-recorded' content that students needed to complete before coming to class.

Applying the engagement model – Initial Frame #1

Students were not given traditional lectures but recordings of key skills in problem solving. These included: identifying problems, meditating and reflecting on problems, problem structuring, systems thinking and so forth. We even presented the engagement model to students to show them the underpinning philosophy of the course in Week 8. This provided a heuristic they could use to structure their assessment as they went through. We chose to apply the bulk of the study in giving them a context of a 'supply chain' problem for an Acai Berry company. The case was taken from a news article on a famous health organization with a supply chain problem however the supply chain focus was not communicated to students.. We asked them to address two key points relative to the case:

1. To optimize the supply chain or make suggestions there of
2. To come up with four alternative strategies the company could employ to diversify its plans for growth.

The first part of the problem required them to work in a team to assess whether or not the Acai Berry Company could be optimized. This meant returning to their disciplinary backgrounds and discussing the problems expressed from a few fixed points of view (something made much clearer in the second iteration). Initially we wanted them to think about how to collect and express as many points of view as possible. Remembering that

students had already had several tutorial experiences at this point allowing them to practice what this feels like with smaller real world problems.

In part 1, students were expected to collect key problem expressions and reflect, with their team members, on one consistent plan for problem expression. This forced them into a discussion about how to solve the issue; they had to work out how to manage group expectations about what were feasible routes for optimization of the problem. This then fed into part 2 where they had to apply what they had learned in their management degree thus far. They had to come up with alternative concepts of how to manage the business strategy. The problem frame changed significantly at this point because the case study assumed that a key market partner was 'hit by a bus'. The scenario asked students to think about new streams of revenue, income and other strategic business aspects that people needed to undertake moving forward. The students needed to return and apply the engagement model to collect expressions, model them against each other, then recommend a single and optimal course of action. We also allowed them to recommend more than one course of action during discussions.

Results of Learning Cycle 1 – Phase 2 – Collecting Expressions

Early results provided the students with a great deal of confusion. As it was the first offering of the course, students felt that they were asked to do too much over the course of the semester. Although their participation was quite high, their overall engagement with the problem solving activity confused them. Despite this confusion, high achieving and engaged students found this process interesting and wondered why this university had not allowed them the freedom to explore and actively learn as this subject targetted.

Feedback indicated that students were confused about the material, didn't understand how 'part a' linked to 'part b' (that is the optimization problem linked to the strategic reframing) and as such they required a lot more guidance than we would have liked. It was interesting to note that many capstone literatures assume that the student is an astute learner who remembers everything they have done up to this point. The reality is much different than that. We constantly had to remind students of what it was they should have learned. University administration was of no use either. They frequently sent students who had not completed the major to the course. While we did find these outside perspectives useful, it was tiring and difficult to constantly tell the outside group that they had to fit into what the course profile stated. As a first recommendation, I would ensure that the audience were fixed and located in either the right disciplinary grouping or focused on an interdisciplinary block.

The next major learning outcome of the first cycle was interactivity in class and outside of class. This raised an interesting problem. Students were expressing all kinds of creative thought and lateral thinking, which previous conveners had warned us about as they believed students were incapable of because we have 'dumb' students. On the contrary, we found students could think outside of the box if we facilitated the conversation properly. To do this we had weekly pitches in which students had to think creatively about problems. Students were given a problem to solve in which they had to find potential solutions within a limited time, and then present their ideas to the class in a rapid discussion group format. This allowed us to assess how well they could analyse and synthesize various viewpoints to work towards solutions.

Phase 3 – Dialectic Tension

True creativity and idea generation flowed in this process. Many students were involved and indicated to us that the true potential was evident in the work they had conducted previously. Still, they could not make the connections back to what they had learned in their degree, which was the main learning outcome of the course. The fork in the road was: how can we connect that creativity to what they should have learned from their degree? It raised a bigger problem: why were most of them not remembering what they should have learned? Although the latter is a program level issue, we felt it was our duty to carry over into the next offering a clear set of guidelines on what they should have learned.

One last learning outcome for the students was that moving from optimization to creativity was too complex. Many of them found the optimization task very easy. Students were not able to make the link between the problems. In fairness, the issues were not connected. The first part was too easy and the second part, a completely unrelated problem, was difficult to contextualize. After reviewing the feedback from the course it was decided that we would lay out learning pathways and show them which of the four courses they had done (business ethics and sustainability, strategy, process management and organizational behaviour) and for students to choose one to implement in terms of a new strategy for a business. Given that the pitches were so well received we decided to maintain these as formative assessments.

The reasoning was that if students could reflect on a discipline area, apply a transformational strategy to an area of concern (e.g. strategy or sustainability), then they could easily reflect on something they had learned. With this guidance they would be able to have a reflective learning pathway that would iteratively move between problem and their theoretical preference. In turn this would allow them to discuss at length how the theory fits the real world context and actively learn by furthering the simulated learning agenda of the course. With this feedback in mind we set out on the next leg of the journey, which was to implement the learning pathway model.

End of Learning Cycle 1 – Phase 4 New Interpretations

Our engagement idea produced rich results. It enabled us to create a bricolage model (a framework) that we could implement and 'validate'. In our first learning cycle we tested our assumptions, that students should be able to reflect on what they have learned and be able to optimize and strategize, only to find that this process confused them. Our framework of ideas needed to be adjusted because the practice, shown in the engagement model as the values and ideas interacting, demonstrated a need to adjust according to the harsh realities of practice. An interesting addition here needs to be made to the practice for the engagement model shown above. In learning there is always practice. As William James puts it (Gunn 2000, p.90-95) the truth is what happens to ideas.

Our ideas when presented to an audience produce dialectic, or a difference of perspective, which leads to learning. To resist this process of learning through trying, or 'validating' our learning, is to dismiss the necessary components of idea validation and optimization. Put another way: how can you know what's going to work under extreme complexity and uncertainty. Simon's (1960) ideas of bounded rationality address the idea that limited information are available. In situations when no information is available, this adds to the complexities of problem solving and decision making as Simon consistently argued. If we don't keep our minds open to the realities of practice during learning iterations of models

such as these, we run the risk of 'assuming' that we know which version of reality is optimal. Uncertainty increases in social systems when modes of rational decision making decrease (see Shankur 2001). You can't perform a search for something that you can't find. You must engage ideas, iterate, learn and adapt to the context if you are to find a useful answer. In this context, the information could now be optimized and further developed.

Further, we learned that the framework of ideas we implemented, developed and tested in this context were against what we originally assumed. Surely, students who have studied a major over the last 18 months would be able to build on what they have learned. No, not necessarily. We learned that our assumption that led to our original framework of ideas, was deeply flawed. Some students may have passed the course through surface learning, but our experience and feedback suggested that, most of them have not learned what we had hoped they would. This means that we were wrong to assume we could simply tell students to pick a theory and use it to fix a problem. We had to go back, show them the key areas of their own learning to help them contextualize their experience in the major.

To remedy this, we iterated our ideas, shown in cycle 2 below, rethought our framework and planned a second cycle. The second cycle of this iteration was well received particularly in comparison with the previous as discussed below.

Learning Cycle 2 Phase 1 – Framing a Learning Pathway Model

In this section we outline how both our learning experience with students and their experience create some interesting outcomes for the engagement model of problem solving.

After collecting the lessons from the previous section of feedback, we created a platform for analysis based on the previous learning. In particular, we wanted to create a learning pathway where students have four distinct choices upon which to reflect on their degree level learning experience to that point. We found a case study on a restaurant that had been named the filthiest restaurant in Australia (not an official claim but rather a claim based on sensational journalism). Once we had this we asked students to form teams of four people and select one theoretical aspect from their learning experience in their degree in order to analyze and eventually synthesize the case. During the analysis phase students had to select either: Process Management, Corporate and Social Responsibility, Strategy and Decision Making and Organizational Behaviour. From these learning experiences, the student then created a platform for analysis based on a key theory from this course. For example, if they selected a strategy they would have to analyse strategically where the business had failed. In order for us to apply and iterate what we had learned in the previous version of the course we had to apply a model of synthesis based on the engagement model. To do this we would ask the students to move from analysis to synthesis.

Phase 2 – Collecting Expressions

In the synthesis part of their journey students had to devise, from their analysis, a new strategy that would take the business forward. They had to present this to their peers, as a team, in Week 10 of the course. As the students learned, grew and developed they moved into a new phase of engagement where the business idea (i.e. strategy pathway) took on a reality that could not have been imagined. Students began to question the reality of their judgments and see how the strategy informed and developed their perspective on what might work and what might not.

After the second cycle the student feedback was much richer, more developed and contained a lot more evidence of the learning needed at the program level. Given this was a capstone course, designed explicitly to deliver a review of previous learning, this second cycle was significantly more successful. While the second phase of our action research project was successful, it should be noted that the underlying philosophy of the engagement model guided and drove our actions. In the following section we will analyse the role this philosophy of problem solving had. Some examples of these were captured in the reflections. These examples are shown below.

One of the great things I learned by doing the pitches and assignment is do not let my own thoughts affect others motivation on thinking. Each week for the pitch I always encourage my group members share their thoughts together and pick the best out of us. Even some of the opinions got left out; I always find something good on that to encourage group members to get engaged. International Student

Creative thinkers would be more inclined to be fiery red and sunshine yellow people who make decision easily and are extroverted in their mannerism and their thinking abilities. This thinking isn't going to change for the next generation or for my generation, however being informed about what type of problem solver you are and what other types of problem solvers are out there has allowed me to become more open when deliberating on a problem. Domestic Student

When applying a theory towards a problem it's important that you justify why you chose that said theory before expanding upon it. If you cannot justify why you would implement that theory instead of any other similar theories, it becomes apparent that you will run into a brick wall sooner than later when trying to adapt it towards the problem. This becomes a poor use of your time, which instead could be used to brainstorm more fitting theories to solve the problem. International Student

What was more needed was to cultivate a management in which employees that were hired had to be people that were comfortable working in such an environment. Management of the company had to promote group tasks, group achievements that were more important than individual achievements and expanding creative thinking using visuals and props. International Student

In regard to being in these management situations, the course has given me somewhat of an insight to what kind of problems I may be faced with and how these problems should be addressed and approached. By being in a management position, I understand that the responsibility will be put on me to resolve issues and I must work in conjunction with my team in order to identify and solve all problems. Domestic Student.

Phase 3 Outcomes – Dialectic Tension

It should be noted that we had over 54 pieces of feedback with similar themes to these. The course has since gone into a summer/online version where it continues to provoke thinking along these lines. At the time of this writing there has not yet been a chance to implement this with more detail. However, the tension that needs to be resolved and developed further is discussed below. It should be noted that this is the **Phase 4** section of the model. As in, this is where the authors are at with the project at the time of this writing.

The team has learned however that more freedom, trust and support need to be giving to students in structuring their own learning. The tension created here was incidental. That is, we have put the team at odds with a structure that wants linear formats and less interactivity. On the positive side students want more space to think and more time to frame their own solutions to difficult situations through practical project based activity. In summary, the new interpretation (Phase 4 – discussed below) will have to address these. What's really needed here is a clearer understanding of how to teach complex problem solving to management students. The authors now reflect on this process below and discuss a way forward.

Discussion

Figure 2 – Reprised Engagement Model

Through a process of engaging ideas into an uncertain situation, learning and reflecting through dialectical processes, we were able to create new concepts that better informed our exploration of a complex issue. A couple of interesting learning outcomes need to be explored because the idea or the underpinning philosophy behind this model lacks clarity. In **Phase 1** cycle 1, we learned a great deal about how our own opinions were not aligned with our own expectations (see **Phase 2** in cycle 1). The key learning outcome in this case was that we learnt how our systemic assumptions could be brutally dismembered by the rigours of pragmatic experience.

As we progressed through to **Phase 3** with students, it became clear that we didn't know what we were doing. To that extent we had to start somewhere. The tension between students' expectations and our own was wide. It's not reasonable to turn up to class without notes, nothing prepared and no material from which to build a learning experience. The first and most striking assumption for us is that when you have a framework of ideas, you will never know if it suits the situation in advance. In fact, we learned that our ideas, in cycle 1, were not a good match to the expectations of the school or the students. We developed the ideas in

a way that we expected they should match but didn't. Here is the reality of this situation: the framework only provided a benchmark for what we didn't know. Our ideas of where we wanted students to go were not founded on anything other than conjecture.

This is not startling, however, it did provide a benchmark for our further learning. We knew what we wanted to do or had to do, but had no idea on how to achieve it. With this underpinning philosophy we were able to put some ideas together and try something. It's not trial and error either because we were dealing with extreme complexity and uncertainty. That is, we tried something and by having that idea and practice, we learned what students wanted through nested feedback to inform practice (teaching). We created a set of ideas that ultimately lead to **Phase 4**, where we had collected data to understand how the goals of the project could be met, while holding true to what the students still needed to learn and what the curriculum demanded. That context, the framework of our school, the staff that we interacted with within that school and the students, shaped and formed a much clearer **Phase 4**. The problem is that there would be no cycle 2 without something being there in cycle 1. The two cycles could not have been based on ideas that were more different: our perceived ideas of the problem versus new interpretations. In summary, the first learning outcome provided us an idea that we thought would work. Reality then shaped and moulded that idea into something more suitable, appropriate and effective. Our learning from the first cycle set up the frame for **Phase 1** in the second cycle.

As was again demonstrated here, this tension produced the potential for creative thought that resulted in being able to frame a solution to a problem that would not have been possible if we had not of tested these conflicting assumptions. In an odd twist, what has been discussed previously (Houghton and Metcalfe, 2009 & Houghton and Tuffley 2015), is further exemplified here. Synthesis comes from tension. Most problem solving literatures, including the mainstream management literature, does not foster a feeling of confusion as being normal. In fact, confusion, loss of understanding, that 'feeling' that the path is slipping away from under your feet is possibly just the situation changing and moving into synthesis. We learned that true creativity involves risk, calculated measured and carefully watched (using our model in this case) and it may involve conflict. Ultimately, we are in the game of 'synthesis' or dissolving tension through creative original thought. What we learned in higher education is that to do this, you need to be prepared to push the barriers of design. In this way the model in **Phase 3** is not designed to facilitate agreement. It's designed to put people at odds with their own assumptions to test if this is even the right thing to be doing. The authors found this to be a horrible and testing process at times.

To be creative requires a new concept which we call **Phase 4**. It adds to the idea that to truly have an immersive problem solving experience you have to be willing to fail by trying something. This creates the learning points through which tension can then lead to future success. However, it's not a linear process that ends neatly. We had some answers but more questions. In that way the new 'frame' for cycle two **Phase 1** left us with as many problems as it did answers.

The second major learning outcome for the model, is that feedback is a series of nested loops, not something that happens at the end of a problem solving experience. At each stage we learned things about the situation (shown as A in the model), the framework and how bad it was (F) and the way in which we were approaching the students (M). Checkland and Holwell (1998) argue that these kinds of interventions, lead to these layers of learning. What is not made clear is that it's a complex learning process in which you get layers upon layers of

insight about all three of these layers simultaneously. To help in this we used nested feedback. This included many different activities. Firstly, a focus group in various weeks to assist us in seeing where we were. Secondly, then presenting our ideas explicitly at various points to sense how our benchmark needs further refinement. Lastly, gaining quantitative feedback at various points. As part of the assessment a reflective essay summarizing the student learning experience was also used. In other words, data and feedback are essential parts of this nested feedback loop. Without these loops a model could be implemented with no clarity or precision.

Finally, the third major outcome of this process was that we could see the problem engagement over time and note its improvement through shifting ideas. As we deliberately set out to change something, it was good to see it eventually create a model that provided the outcomes of the business school and improved learning outcomes for students. It was not a straight path. There was no 'agreement' between stakeholders at any point. There was an iterative process of engaging the framework into a social context where feedback created tensions that could lead to new and better ways of framing and ultimately 'solving' the problem. There was also the idea of value neutrality actively promoted by the lecturers. We admitted up front, we didn't know what we were doing! This disarmed students, yet they were very open to giving us that critical data that ultimately shaped the learning experience. It also provided feedback, which was pivotal in providing the experience we needed.

Limitations

While the experience was useful there are interesting drawbacks to be noted by people who want to try this kind of process. First, you need support. We were blessed to have the support of our Department Head, the students and our school, which we are very grateful for. The students also appeared keen to try a simulated learning experience as a means for reflecting on their journey. However, if this was a harsh environment where people were resistant to the idea of trying something just to see what happens, then this won't work. The engagement philosophy requires an explorers mind set. Without it, you will never succeed.

Secondly, you have to be aware that tension points are natural in the exploration of ideas. Hegel (Gadamer spent a lifetime trying to explain this). A tension point is only an opportunity for a better idea. Through feedback and learning you can overcome the problem with better solutions. We had a good working team that collaborated across all dimensions. Even when students appeared at the end of the lecture in Week 4 during cycle 1 to tell me why it was a disaster, we didn't let that stop us. You can't pay attention to that without having faith in the process. The reality is that the situation may not get any better at all. It could even get worse, but most discoveries appear to come at times of high tension. In this case we learned what didn't work which in turn provided us with valuable data and feedback that ultimately assisted us in what worked.

Finally, this is not a linear process. There is no moment at which the ride stops. Literally, this course and its development could run for another thousand years but in reality it won't. It starts when the problem solvers/innovators want it to, then it stops when it's time to 'finish' (Eden 1987). There is no point at which the ride is smooth. Instead, the problem solving process is bumpy, at times confusing, misleading and overall a painful experience. After a while, as the iterations continue so does the learning. A metaphor for this would be travelling into a foreign country where you don't know the language, the people, the food or even where you left your passport. The non-linearity of it seems to produce the emergent platform that

resulted in this case. This is the single biggest drawback of this approach. It is very difficult to convince people that when things going wrong this is normal. Yet, out of what doesn't work we begin to see a picture of what might. Might is the operative word. It also may not work at all. The issue is that when developing ideas, businesses curricula and so forth, you are unlikely to know the result in advance. There is uncertainty in knowing the complexity of roles that people play, how they will receive the uncertainty and their capacity to understand or create a new social reality. Chances are they won't know.

This is not discouraging but it's the reality of problem solving. There is no problem to be solved. We are exploring our ideas to see if they make sense enough to move the situation into a more favourable light in which we exchange one set of opportunities or problems for another. It is learning. Yet, the position our business school finds itself in, is now much more encouraging than where it was in the beginning. We can at least say that two groups of students know what it means to live with uncertainty and many with improved problem solving abilities.

Summarising the journey of applying the engagement approach

In the beginning of the course development we had no clear understanding as to what the outcomes would be. We were given a mandate to create a course that was a capstone experience that drew on simulated learning. Initially, the course was more traditional with lectures, tutorials and assessment that resembled more traditional coursework. As we applied the engagement approach we tried new expressions from our learning that resulted in a course with no tutorials, more interactivity and a higher degree of simulations. Our feedback showed us that our initial assumptions were unfounded. Students were ready for this kind of learning and wanted to be shown how. This problem led us to the reframing of the course to have less tutorial work, less lecturing and more project work.

The third iteration of the course is currently going live under new leadership. It has taken the lecturing out, removed the tutorials completely and now there is project work with discussions on the meaning of management. The next offering of the course is entirely project based with 'touch base' sessions designed to help facilitate learning. There are sessions planned where the lecturing team will be acting as consultants for the company and very little guidance, outside of stories and consultation sessions, is to be imagined. What was learned by applying this approach was twofold. Firstly, the outcome cannot be known at the start. You must go through a dialectical wrangling of 'finding' the way, as opposed to structuring it. You must create the path with the people on it, instead of dictating, you must learn with the students and take action. Secondly, there is risk involved. While the current offering of the course is very highly regarded by students, this is not a generalised indicator of success. What is in our opinion is the fact that these students gain real insights into what complex problem solving is actually like.

That is, what does it feel like to need feedback but none is available? When people don't agree how do you move forward? A key piece of learning for us, looking back, would be tell our future selves that it will work out if you continue to give in and trust the creative process of synthesis and allow the dialectic to do its work. That work is not to shape outcomes, or dictate curriculum, but to lead in a general direction in order to provoke thinking about what might be. Engagement in problem solving means not knowing, not understanding by expressing options, trying things, trial and error and moving in a general direction where the outcome is not known. In comparing the 2014 offering with the offering in 2016 it's clear

the newer version has much to still learn but it's much closer to the authentic simulated problem solving experience we originally envisaged. If it weren't for trying new ideas, engaging expressions and conflict on purpose, it would have just been another boring business school course.

Summary

This paper applied the engagement model of problem solving to a two-year case study in which the development of a problem solving course for managers was implemented. We suggested that people seeking to engage problems should seek to generate new ideas without the 'fear of failure'. Secondly, we suggest that users of the model apply nested feedback loops to collect insights and data along the way. Lastly, we discussed how the model demands we tame uncertainty in a non-linear way in which we accept tension as part of the learning process. Uncertainty is a way of life in this age but through engaging our ideas in order to create tensions for creative synthesis, we can begin to build a better platform than the one we had. Extreme uncertainty demands that we shape, mould and foster our ideas to try new ideas and approaches. After all, isn't a half-baked idea better than no idea?

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