Can Methodological Applications Develop Critical Thinking?

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Abstract: This paper outlines how using research methods to develop critical thinking was explored in a workshop and then developed into a curriculum. An exercise showed how diverse methodologies led to different answers, which were explored to consider the nature of knowledge itself and the subsequent implications. The paper concludes that such an approach can (a) develop critical thinking skills at a level of deep, rather than surface learning and (b) effectively challenge some preconceived ideas held by students about how knowledge is developed and shared. The crucial element of success was the design and implementation of the assessment.

Keywords: Critical thinking, research methodology, learning, knowledge

1. Introduction

In many universities and schools, an increasing emphasis is being laid upon encouraging more critical and questioning approaches to all studies, which would encourage reflective, deeper learning (Grauerholz, 2001; Reynolds, 1998; James, 1998; Warburton, 2003; Fulop, 2002) and which would develop greater synthesis and analytical skills within the student and/or researcher. However, it has been shown that some management students find the development of such skills challenging (Fulop, 2002). This paper postulates two reasons why critical thinking development is not being successfully implemented into student curricula. The first is that students are encouraged to find the 'right' answer (Fulop, 2002), which leads to a rational, often positivistic perspective, which precludes the notion of alternatives. The second, which encourages the first, is that, in order to measure student achievements, assessment seeks to establish if the student has found the "right" answer. This paper firstly, considers ways that may enable alternative answers to be developed and, secondly, considers how assessment needs to be constructed to support criticality. These considerations are then used to show how a curriculum was developed to actively encourage and support critical thinking.

2. How might methodological application develop alternative answers?

When undertaking research, it is usually argued that the framework of the methodology design will be directly relevant to the type and scope of the data collected (Cresswell, 1994; Blaikie, 2000). According to Amaratunga et al. "The overall choice [of methodology] needs, of course, to be the most suitable to achieve the objectives of the specified piece of research" (2002, p.30). As a result of this, it is logical to assume that a different methodology might lead to a different understanding of the same question. Such differences could be explored, compared and contrasted in order to develop a more holistic and considered perspective on complex problems. For this reason, mixed methodologies are increasingly being adopted to expand the answers to research problems (Cresswell, 1994; Denzin, 1970; Denzin and Lincoln, 1994; Onwuegbuzie, 2002). In work using multiple methodologies, the design is usually still driven by the question, rather than using different methodologies to explore whether different answers are discovered to the same problem. However, such approaches do highlight that there will be differences in outputs depending upon the methodologies chosen (Tashakkori and Teddlie, 1998).

Grey and Willmott (2002) argue that the positivist legacy has dominated management research within the United States since the 1950's and that this has impacted upon the teaching of management worldwide. However, within the social sciences there has been a 'near collapse of the positivist consensus' (Grey and Willmott, 2002, p.2). There is a recognition that there needs to be a growth in the diversity of approaches towards management research and education (Zald, 2002; Grey and Willmott, 2002). The importance of this is stressed by Grey and Willmott (2002) who argue that the most optimistic positivist must admit that the capacity of management research to produce predictive models has been limited.

With the gradual debunking and discrediting of positivist authority, a space for alternatives has emerged (Grey and Wilmott, 2002). Critical management studies have developed, advancing

ideas to challenge currently accepted perceptions of managerial and business problems. A wide variety of areas have been analysed from a critical perspective, with the core theme being the development of an alternative rhetoric (Parker, 2002). In doing this, researchers 'borrowed' from diverse empirical and philosophical disciplines in order to support challenges to 'the myth of objectivity', and to argue for a very different, critical, conception of management (Alvesson and Willmott, 1992, pp.3-4). This desire for criticality has permeated throughout much research, publication and into the business and management education curriculum.

However, it is argued that, because management students are often not well enough equipped to be able to undertake such studies effectively, simply presenting students with critical management theory may not lead to the desired outcomes. Mingers (2000) and Fulop (2002) both argue that, in order for there to be a critical approach to management studies, students must achieve the ability to think critically and understand what such skills mean. Without this, student learning goals will be unlikely to move beyond their currently understood model, especially as very often they will have been encouraged to look for one right answer (Fulop, 2002). To change from performance orientated goals to learning goals will take positive encouragement and support (Valle et al., 2003; Ames, 1992). Therefore, not only should critical management studies be within the curriculum but, because critical thinking is rarely something that comes naturally to students, mechanisms for critical thinking teaching need to be developed in a structured way.

In order to teach critical thinking as a skill and to create learning tools which will enable such a skill to be acquired, critical thinking itself will need to be defined (Mingers 2000; Fulop, 2002). Mingers (2000) identifies four dimensions which can be ascertained as encompassing the skills required for critical thinking, in that they enable the questioning of the implicit assumptions or validity claims that should be challenged when applying a critical approach to management:

> *"First, the logical soundness of the argument and its manner of expression (rhetoric); second, the taken-for-granted assumptions about factual matters and acceptable social practices and values (tradition); third, assumptions made about legitimacy and whose views should be privileged (authority), and fourth, assumptions concerning the validity of knowledge and information (objectivity)" (Mingers, 2000, p. 225).*

What will be fundamental, therefore, will be in what ways such questioning can be developed. Various curriculum designs have been outlined (see for example Knights and Wilmott, 1999; Fulop, 2002; Mingers 2000), all encouraging alternative perspectives upon standard management thinking. All discuss epistemology and methodology in order to identify alternative ways of recognising and securing knowledge, but still assume that there should be a choice of methodological application, based upon the epistemological perspective being explored. Zald (2002, p.382), whilst advocating a change in approach to a 'reflexive/pragmatist epistemology that questions its own grounds', is still not comparing differences between ideas, rather the choosing of an alternative avenue of research; the application is still being chosen to suit the problem in hand.

However, the question can be raised that, if the desire is to challenge what is currently believed, would it not be possible to do this by demonstrating that different 'knowledge' emerges if the same problem is approached from different perspectives. Such recognition would enable several of Mingers (2000) dimensions to be explored at once: the logical soundness would be challenged if different answers were emerging and thus rhetoric would be explored; tradition could be challenged as accepted assumptions could end up in conflict with alternative solutions; issues of authority would emerge, as it would become apparent that different methodologies favoured different stakeholders in a particular situation, whilst assumptions concerning the objectivity and validity of knowledge and information would be challenged. Bhalla et al. (2004) have made some of these arguments when showing how the way that a case study is analysed affects the "knowledge" that develops. The existence of alternative findings and "knowledge" would show that the notion of objectivity needs serious re-evaluation. The difference in this approach from standard triangulation is that, instead of starting with the problem and determining an appropriate methodological strategy, the student would start with a problem and explore what emerges if alternative approaches are applied. The possibility of using methodology in this alternative way offers choices in developing both student learning and, potentially, the possibilities of developing new management research strategies.

3. The role of assessment in critical management education

It is well documented that students are driven by the assessment diet they are presented with

(Rowntree, 1987; Entwistle et al., 2000), and there is no reason to believe that undertaking critical management studies will be different. Organisational behaviour theory demonstrates that behaviour is triggered from perceived rewards (LeBoeuf 1985), moreover in many of the writings on successful assessment, the focus has been upon learning systems and how assessment will trigger learning (Knight 1995, Brown et al. 1997, Freeman and Lewis 1998). Student's respond to what is perceived as important and this, in their perspective, is what is being assessed.

If the objective of undertaking critical management studies is to enable students to perceive the world in a different way, developing alternative mental models of knowledge and potential problem solutions, then the assessment must focus in a way that supports change not confirmation. According to Reynolds "The concept of reflection in experiential learning also embraces an evaluation of alternative explanations and courses of action and of the assumptions on which these are based" (1998, p.3). Reynolds argues that critical reflection is different from other versions of reflection in that "It is concerned with questioning assumptions … the fundamental task of critical reflection is to identify, question and if necessary, change these assumptions" (1998, p. 5). Such critical reflection is described as evolving via techniques, which encourage a range of perspectives. This clearly fits with the notion of changing mental models.

The focus must be upon the process of the assessment and the knowledge development, rather than fixed knowledge outcomes and 'correct' answers. If criteria focus upon analysing process as well as outcomes, in order to develop an awareness of the opportunities for alternative forms of "knowledge' and the possibilities that this implies, the outcomes should support criticality and multiple understandings from the same problem. This paper will now outline the approach that was taken to create a curriculum that would enable critical thinking skills using a methodological approach and using assessment as a primary learning driver.

4. Methodology

There were two phases to the curriculum development. Phase 1 was an exploratory workshop used to identify that the use of methodology gave demonstrably different knowledge outcomes from the same problem. Phase 2 used the workshop outcomes to develop exercises that would enable the development of critical thinking skills using methodology as the framework.

4.1 Phase 1

Initially a workshop entitled 'How does methodological research inform our organisational debates?' was undertaken at the British Academy of Management Conference in 2002. The argument being considered was whether the utilisation of alternative methodologies would enable problems to be considered in different ways and, therefore, lead to different solutions being generated, which would, potentially, have implications for organisational study and our understanding of organisational learning. The objectives for the session were given as:

- To explore the role of research methodology in developing new meanings
- To apply such an understanding to improving organisational problem solving
- To explore specific methodologies and consider their contribution to potential organisational learning.

Approximately 45 people undertook an interactive workshop. Groups were asked to identify a specific issue or problem and then apply two or three methodologies, such as ethnography, narrative analysis, metaphor analysis, focus groups, phenomenology, case study development and repertory grids, to that problem. The group identified what was specific about each methodology and then discussed how the use of that approach would facilitate new knowledge and ideas to be used for decision-making. Comparisons between the different outputs enabled the groups to determine whether the application of alternative methodologies would provide useful further study of this approach.

4.2 Phase 2

An exercise was given to approximately 370 second and third year undergraduate students. The disciplines of the students ranged widely, including Business and Management, Marketing, Engineering, Tourism and Computing. The chosen unit explored the relationships between individual learning, organisational learning, knowledge creation and usage and how all of these elements affect, and are affected by, change. A fundamental aspect within the unit was that there must be knowledge developed if there was to be a change in the way people perceived their world and that, for there to be change, new knowledge must be developed. Specifically, the unit outcomes were to:

- Evaluate different conceptualisations of organisational learning;
- Discuss the concept of the learning organisation along with its perceived nature and role;

- Describe processes for knowledge acquisition and management;
- Assess the implications of intellectual capital for management and organization;
- Evaluate theories of learning in relation to knowledge formation and development;
- Synthesise learning and knowledge literatures in order to develop learning and knowledge strategies for organisations and to be able to use this knowledge in order to improve organisational development strategies.

The specific objectives of the exercise were: to consider different knowledge outcomes from different methodologies'; to consider different research strategies and the extent to which they would affect learning; to explore how knowledge is developed and shared amongst groups and to reflect on the differences between information and knowledge; to recognise and develop the need for reflection in the effective utilisation of knowledge (Kolb 1984; Dewey 1933).

Each seminar group was split up into six sub-groups with each addressing the question "Why do students choose the course they do at University?" Each group was given a different type of research methodology to approach this question: these were: ethnography; a closed question survey; an open question survey; a case study approach; semi-structured interviews or a literature review. The choice of methodology was based upon the most common methods being undertaken by students in undergraduate dissertations. The groups were given some supporting materials as a starting point and then allocated time to undertake their research. The students were instructed that they would need to (a) present their findings to their seminar group, (b) compare and discuss their findings with those of other groups in order to discuss the differences and the implications of this exercise upon knowledge development, learning processes and the unit as a whole and (c) prepare for an examination question, which would ask them to reflect upon what they had learnt from the exercise about learning and knowledge and the extent to which this would affect organisational learning and the potential for change.

The exercise was undertaken in class but was then examined in a formal way in order to assess the learning outcomes. By assessing the exercise in the exam, a clear message was being sent that the exercise was important and a fundamental part of the learning for the unit. Such an approach reinforced what had been taught, since in order for learning to take place, which leads to new knowledge creation, there must be a perceived need or desire to learn (Hedburg 1981). In this case, the wish to pass the exam ensured that students would concentrate upon the exercise and think carefully about their learning.

A 5% sample of the exam scripts were analysed in order to determine whether the learning that had been planned had been achieved. The sample was gender balanced and represented students across all marking classifications. Quotes taken from the exam scripts are used as evidence in the following sections.

5. Findings

Outcomes from the workshop can be seen in Table 1. The overall conclusion was that all of Mingers (2000) four dimensions were being challenged in these activities and it appeared that an application of such ideas could be used to enhance critical thinking skills.

Table 1: Workshop outcomes mapped to Minger's (2000) dimensions

It is usually considered that the problem should drive the methodology, but the application of other methodologies permits interesting alternative perspectives upon the problem with different apparent knowledge ensuing (challenging objectivity)
Each group found that by applying very different methodologies to the same problem, different areas of interest emerged
The nature of the problem is seen to be very different when alternative methodological paradigms and methods are used (challenging rhetoric)
Diverse assumptions are surfaced when applying different methodologies (challenging tradition)
Alternative understandings of the problem and the potential solutions can be elucidated
Discussions regarding the use of metaphor analysis for evaluating training effectiveness determined that it would give much more meaningful feedback and enable real analysis
It was mooted that the use of alternative methodologies would give different possible futures and this might alter the decisions made
Alternative worldviews would be promulgated and this might lead to different perceptions of all aspects of the problem-solving process including the roles of those involved (challenging authority)

These findings confirmed the proposition that such an approach could be used to develop critical management thinking and a curriculum was developed that would encompass such ideas, using the assessment to support the new focus upon multiple understandings. It was, therefore, posited that successful critical thinking would only

occur if there was deep learning (Warburton 2003) which needed holistic understandings and high motivation, leading to knowledge that would be retained and be applicable to other situations. Consequently, the unit content was mapped onto Warburton's (2003) model (figure 1) where it could be seen that the inputs should promote the motivation required to achieve the requisite deep learning and change student mental models.
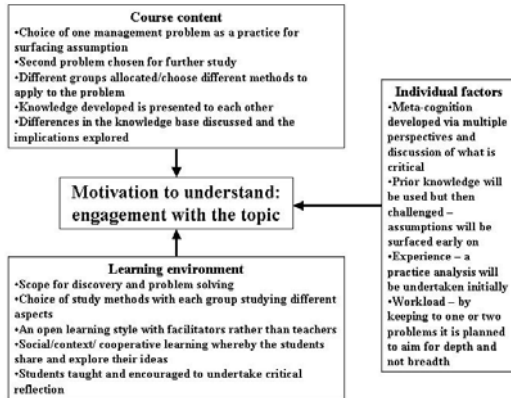

Figure 1: Incentives for deep learning in the critical thinking unit

This curriculum design was then trialled and the findings are presented by examining the four dimensions identified by Mingers (2000). The discussion comes from examining the assessment in order to determine whether the reflection that occurred as a result of the activity, then followed by the assessment, was developing critical ideas in an effective way (Fulop 2002). The second element of analysis was to establish whether the notions of differing knowledge outcomes, as a result of different methodologies effectively challenged student mental models (Hill and Levenhagen 1995) of objectivity and certainty in methodological study.

5.1 Questioning the logical soundness of the argument and its manner of expression (rhetoric)

Students tend to be taught and, therefore, think, in a rather linear way and do not always consider that an argument may be challenged, poorly made or even fallacious. The objective of the exercise was to show that different answers could be gained from varied methodological approaches and alternative methods. By doing this it would be clear that two dissimilar arguments might both appear to be logical but could lead to different, even opposing, solutions. Students recognised the possibilities of differences in several ways. The first realisation was the impact of context and its possible affect upon an argument:

"Although both learning and knowledge are interrelated the outcomes of both concepts may be positive or negative depending on each context they are used in and also the ways in which they are used."

The role of context was seen as important for both the way the argument worked and in considering how to set up learning and knowledge development:

"In managing both concepts great care must be taken by managers to understand what is meant by O[rganisation] L[earning]/O[rganisation]K[nowledge] and then contextualise and institutionalise both concepts into the organisation".

The type of knowledge being developed was also cited as potentially affecting the validity and the certainty of the argument:

"Information varies according to number of people surveyed. That is why other methods such as semi-structured interview, which is a combination of close-ended and open-ended question surveys, which is analysis [of] deep information gained by questioning respondents all critically require proper analysis of information obtained. The explicit knowledge gained is very broad, thus it becomes difficult to cut through it to get to the tacit knowledge involved (Nonaka, 1994). There is no doubt that all methods lead to learning; however, what knowledge is gathered can be questioned. This is because the embedded knowledge may as well have never been found through any of the techniques after all. Looking at explicit knowledge may not lead to any learning after all".

It was recognised that the explicit knowledge, which was gained by asking respondents the answers, in whatever method, might not reflect any tacit knowledge affecting the answers and this might undermine the validity of the arguments made. Another aspect considered as challenging the possible certainty of an argument was the role of mental models in pre-empting what is learnt (Blackman 2001). An argument can be made that the choice of method is determined, not only by the question to be answered, but also by the previous experiences, beliefs and expectations of the researcher and this was reflected by some students: "what is learnt may not actually be the knowledge attempted to learn because of [existing] mental models which inhibit our learning"; "The observer might be bias[ed] (unintentionally) towards what he is learning due to his mental models". As a result of the exercise many students recognised that:

"it can be seen that the relationship between [learning and knowledge] is that

the nature of knowledge is relative to the method of learning used",

In other words the knowledge outcomes gained from the learning processes used depended upon which processes were chosen and how they were implemented.

5.2 Questioning the taken-for-granted assumptions about factual matters and acceptable social practices and values (tradition)

Not a great deal was discussed about this, which was not surprising really from the nature of the exercise given. The discussions about the impacts of the social nature of learning and its impacts could have been linked to this but, during analysis, were more clearly linked to challenging authority or objectivity. What was recognised by students, however, that reflects an outcome in the previous section, was that for there to be effective new knowledge it is necessary to challenge current assumptions and givens:

"Another important relationship I saw is that the level of learning greatly shaped the output. Theorists such as Senge (1990) argued that learning (and thus the knowledge output) is enhanced when mental models are challenged".

5.3 Questioning the assumptions made about legitimacy and whose views should be privileged (authority)

Several students raised questions about the legitimacy of the knowledge developed due to the fact that different methods lead to different answers and who should decide which of these is privileged:

"it can be seen that each method yields different results on the same things. None of the results are technically 'wrong' or the 'correct' results. They are just different perspectives on the same thing. As such, one can argue that the nature of [knowledge] is relative to the method used".

This notion of not being able to be sure which results should gain precedence was linked with the issue of observer bias:

"This method [ethnography] is useful to get broad information about certain issues, when information cannot be elicited, as people are either not co-operate or unaware. Although this method also has its limitations, which contain the extent of learning and knowledge gained … It includes a time constraint, as it needs to be longitudinal to have greater accuracy, and also people may change their behaviour

when they become aware of the observer, there could be observer bias, you need to be at the right place at the right time, it doesn't provide the researcher with specific information and may have ethical issues".

Some students felt that Cook and Brown's (1999) theory of bridging epistemologies and knowledge development through interactions needed to be considered when looking at the authority of knowledge:

"The use of ethnography may be related to Dewey's social learning theory, in that through direct and participative observation, ethnographers are interacting in a social context and ultimately learning from their interactions and experiences".

What they went on to note was that this meant that the researcher and/or observer was an important element of the research outcome as they would affect the choice of learning process, as well as the way that the knowledge was amassed and analysed:

"All methods are open to bias by the researcher"

(The student went on to identify that bias emerges through what is chosen to read, what is asked and how it is interpreted). The process becomes cyclical, affecting and being affected by the experiences undertaken. Thus, it is important to assess the observer and/or researcher as an integral part of the knowledge creation process:

"The learning process itself produces new knowledge and that knowledge impacts upon future learning and thus future possibilities for organisational knowledge".

Consequently, students outlined the fact that, when managing knowledge creation, the researcher and their biases needed to be assessed and managed as well as other elements of the learning process. Ideas such as groups of researchers, researcher history and a range of methods were proposed in order to reduce the potential biasing in the authority of the knowledge created.

5.4 Questioning the assumptions concerning the validity of knowledge and information (objectivity)

The fourth element that can be challenged, thereby encouraging criticality, is the actual validity and objectivity of the knowledge being developed. This outcome of the exercise using methodology proved to be particularly successful, in that students became very aware of the need to challenge objectivity. The fact that there is no one answer was widely accepted:

"The findings from the exercise proved that there is no one best option or one best way to get the "right" answer". Several areas get linked together: "we can see that each person has their own mental model, perspective and way of learning. They thus each provide a different perspective on an issue. None of these are the "correct" response (indeed Popper (1989) argues no knower can ever truly know) but yet they are not wrong either".

This shows that the students have really learnt about the potential for challenging the notion of 'truth' and a 'right way'. Students not only assessed the fact that objectivity was debateable but also made suggestions for improvements for future research:

"Thus for organisations to enhance the scope and validity of knowledge used it should use many different methods of learning, i.e. allow more people to provide their perspective and opinions. Indeed, theorists such as Nonaka (1994) argue that this is why team and employee involvement enhance the knowledge output because numerous different perspectives, shaped by each person's learning method is provided" and "due to the extensive forms of bias in each method it is better to adapt an eclectic approach in using these methods. In order to maximise learning and gather efficient knowledge, the best of each method should be applied and the disadvantages eliminated as efficiently as possible".

What can be seen examining the Mingers (2000) dimensions above is that students do seem to have learnt a great deal about the nature of knowledge developed via different methodologies. They have recognised that there are different knowledge outcomes from different learning processes and have learnt to challenge the outcomes of apparently valid research.

6. Changing student mental models

Students did develop ideas, which would lead to more critical thinking. However, for this to lead to new patterns of thinking and ongoing challenge in their studies, they needed to have developed new patterns of behaviour and mental models, which would encourage the creation of alternative solutions to similar problems. Evidence of reflection was looked for, which would then lead to a re-evaluation of thinking in a way that would simulate Kolb's experiential learning cycle (1984) or Argyris and Schon's double loop learning (1996) and lead to the development of new theories. There was evidence that at least some of the students had developed such reflective practices:

"[The exercise] made us realise that different theories and methods and techniques were effective in different ways": "As a marketing student you tend to see research as more black and white".

Some students reflected on the problems they saw with what they were doing. Examples include:

"To be in a group of students and just listen to them and observe them while they are discussing and talking about the course chosen is very effective… didn't have the opportunity to think twice on questions and no one interrupted or led them in their discussion" and "what is learned may not actually represent the knowledge that requires to be grasped. Social learning occurs through experiences and observations, so, all these methods undertaken needs to be adapted in such a way that knowledge is not mistaken or ignored."

Other students merely indicated that they needed to reconsider things, whilst some began to show what this meant for their future thinking and plans:

"We can increase the scope and validity of knowledge by using many different learning methods. Thus in terms of how they [learning and knowledge] should be managed we should not limit ourselves to one method of learning"

At the end of the unit it was clear that the students were reassessing the way they thought that knowledge developed. They recognised that in future they would have to develop processes that would permit them to reflect more carefully. The students did not only reflect upon the exercise but also the learning within the unit as a whole. The overall unit reflection led to a picture of learning as an ongoing and changeable process which, depending upon its implementation, would lead to different, probably constructed, knowledge which needs to be regularly challenged.

7. Implications

Table 2: Range of critical factors

The exercise was a summative exercise based upon a body of knowledge about learning and knowledge, which enabled the students to reflect upon the results in the light of their understanding.
A range of both qualitative and quantitative methods was used which forced students to reflect upon different techniques and see how they led to different types of knowledge
The unit had been focussed upon challenging student mental models by asking them to read and reflect upon different perspectives on knowledge

creation throughout the semester.
The team chose to clarify the importance of the criticality by including the exercise reflection as a part of the exam to (a) ensure that everyone took part and (b) took the reflection discussions seriously.
By presenting the different findings of the same question it was a real example of ideas already discussed in class.

The objective was to test the theory that the use of methodological applications and different methods would enable students to develop criticality; they would be able to learn to challenge assumptions made in arguments and about knowledge. This research indicates that this form of curriculum design would enable such alternative thinking. The success of the exercise was based upon the study of a range of methods and the forcing of real reflection in this exercise. The lecturing team felt that the success of the exercise was owing to a range of critical factors as shown in Table 2.

From this, it can be seen that it was the combination of the mental models developed by knowledge presented in the unit, the methodological content of the exercise, the forced reflection via the presentations and the linking of the theory and practice and the fact that the exercise was examined. All these elements came together to lead to a way of developing critical mental models within students. The key is to develop a programme that works on the development of criticality as the desired output throughout the unit. With this learning outcome in mind, it can be concluded that the use of a research methods based exercise is an effective tool that can develop the ability in students to challenge at least three of the assumptions found in arguments and knowledge development. Moreover, student mental models can be led towards more reflective practices and critical thinking over time.

8. Conclusions

This contention of this paper was to outline how to link methodological approaches and critical thinking and to demonstrate the need for further development in the area of teaching critical thinking, especially with the increasing cross disciplinary focus upon teaching management in a more critical way. The development of the assessment tools was fundamental to the success of this undertaking. What is envisaged is that the individuals will become more sensitive to the criticality of methodology and the potential for "knowledge" to be developed in different and, potentially, more interesting ways. The alternative outputs could lead to an awareness that current managerial ways of working may restrict the potential of both individuals and organisations to be innovative, as the linear processes of knowledge development, starting from the problem, prevent a range of ideas occurring. Such awareness may also prove interesting for organisations as well and it is a contention of this paper that, should the approach prove successful with students, it will be an approach that could also be taught to managers in organisations, in order to develop alternative paradigms for innovation development. It is, therefore, hoped that this research will develop a pedagogical approach that can successfully promote critical thinking skills not only in undergraduate students but longer term, within organisations as well. The paper concludes that such an approach can effectively challenge some preconceived ideas held by students about how knowledge is developed and shared. The answers in the exam demonstrated that not only were the different methodologies perceived as developing different outcomes to the same question, but that the implications of this were understood in terms of challenging more traditional approaches to organisational learning and knowledge acquisition.

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