

A Twin Peak Model of Industry University Relationships

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This paper explores industry-university relationships. In the United Kingdom (UK) the relationship between higher education and industry has been of specific interest during both the previous and current Government. The previous Government made industry engagement an explicit higher education priority. Higher educational institutions were encouraged to engage more directly with industry in order to provide a more 'relevant' offering. Under the current Government, the ushering in of higher tuition fees is expected to foster a return on investment approach to higher education. This paper presents ongoing work to develop a model of the relationship between academic study and professional practice. This paper presents a model which can be mobilised to help understand the current shape of the built environment educational offering and guide the direction of it.

Key Words: Knowledge, Industry-university relationships, Relationship model, Theory building

Introduction

In the United Kingdom (UK) the relationship between higher education and industry has been of specific interest during both the previous and current Government. The previous Government made industry engagement an explicit higher education priority. Higher educational institutions were encouraged to engage more directly with industry in order to provide a more 'relevant' offering. In return, industry was expected to shoulder more of the cost of this demand-led higher education product. Under the current Government, the ushering in of higher tuition fees, transferring a greater amount of the cost of the education onto the student, is expected to foster a return on investment type approach to higher education. This makes attributes such as graduate employability an ever increasingly important factor in the recruitment of students. These two agendas, one of specific employer engagement and the other of return on investment for the students, bring into sharper focus engagement activity; something which is of particular importance in a vocationally based disciplines such as construction.

At the core of an industry organisation-university relationship is the exchange of knowledge. Knowledge is considered both in terms of an asset or a flow. In fact, these views can be reconciled and, through partnership, there can be co-production of knowledge. In an engagement activity between a university and an industry organisation, there can be a flow of knowledge that can benefit both parties. For example, this could be new knowledge from research undertaken in the university being transferred to the company so that some form of competitive advantage is gained.

This paper presents ongoing work to develop a model of the relationship between academic study and professional practice. Instead a model is presented which can be mobilised to help understand the current shape of the built environment educational offering and guide the direction of it.

Literature Review

Before launching into the development of arguments supporting a new model of the relationship between academic study and professional practice it is first important to consider three areas of literature. These encompass the context in which the industry organisation-university relationship takes place, the nature of knowledge creation and dissemination within the relationship and finally an appreciation of educational supply and pedagogy. Each of these areas is covered briefly in the following literature review section.

Context

In the UK, the construction industry is an economically important sector but over the past 30 years it has been a slow moving object. This reluctance to change has triggered a series of reports encouraging the industry to modernise and improve. These include Constructing the Team (Latham, 1994), Rethinking Construction (Egan, 1998) and Accelerating Change (Egan, 2002). While there has been increasing pressure on the industry to modernise this drive for change appears not to have been recognised within the construction related higher education. The supporting higher education system appears to reflect the nature of its industry and could even be seen to act as an anchor for it. Furthermore, this unwillingness to change could have a detrimental impact on the quality of future recruits who could be an important vehicle through which innovation and change could be enabled.

The concern that the links between the construction industry and its higher education sector were perceived to be weak and that levels of engagement were low led to the genesis of the Making Connections initiative (CITB, 2001) created by what was then the Construction Industry Training Board. That initiative was established out of a perceived lack of engagement between industry and academia and the problems that could arise as a consequence.

The problem as initially defined is a perceived lack of appropriate engagement between higher education and the industry and practice it serves. This was the view held by a number of leaders and policymakers in industry and academia that was expressed in the Making Connections Conference (CITB, 2001) and Rethinking Construction Conference (CITB, 2002), but this is a contestable notion. The argument about education and training has existed for a long time and there a differing views about the nature and purpose of vocational higher education. Some view the purpose of higher education is to develop individuals and enable the attainment of their potential (Cardinal Newman in Kelly, 2001). Others argue that where there is a clear vocational career as objective for the study, then the purpose must take account of the needs of the intended area of practice (King, 1948). Those who find it difficult to choose between these views adopt a third way and state that it is for the professional bodies to reconcile these positions, which in some circumstances they do.

A Perspective on Knowledge-Based Theories

However one defines the relationship between industry and universities the interaction contains elements of both knowledge creation and dissemination. Current thinking in organisational theory has moved beyond the information process view (Simon, 1957; Galbraith, 1974; Tushman and Nadler, 1978). This perspective espoused that organisations should match their information processing activities to their information needs. Recently there has been an increasing awareness that this information process view breaks down at the boundaries and that there are significant barriers to effectiveness that are not fully explained by the original contentions. It is now understood that those involved in for example projects do not possess a perfectly matched set of knowledge to the task in hand and at times they will need to import knowledge (Tushman , 1978). This need for information that is external to the process underlines the importance of the know-how in experts and the need to assemble groups that can make use of the appropriate knowledge for the task.

Two different understandings of knowledge can be identified – knowledge as an asset and knowing as a process. (Empson, 2001). For knowledge to be an asset it must be a definable commodity capable of being managed by control mechanisms. This view somewhat divorces knowledge away from the ‘knower’ and an alternative view is that knowledge is a social construct that is developed, transmitted and maintained within social situations. Dixon (2000) describes the difference between these two perspectives as the difference between a stable and a river. The stable can be understood as a store of discrete knowledge where the contents are known and controlled whereas the river represents a flow of knowledge that is constantly shifting, changing and being replenished. It becomes clear then that if knowledge is simply considered as information then it tends to be viewed as a commodity (Fahey and Prusack, 1998). Whereas when the human element, with all of its complexity, interactions and discourse, is brought into consideration then the concepts of knowledge flow or process begin to gain more traction (McDermott,1999). Within the context of professional services it can be seen then that the knowledge of an organisation is partly the knowledge of the community of people who work within it. Some of the knowledge residing within individual and some part constituted form the dynamic knowledge flow processes between them.

Three generations of the relationship between organisational theory and knowledge exist (Snowden, 2002). Already discussed is the view of the information processing organisation which formed the first generation. In the second generation this developed as knowledge and was identified as a key resource. Finally, the third generation moved beyond identification to management of the knowledge as a flow or process. In the first two generations knowledge is treated as an object and in the third as a flow but in reality knowledge can be seen a combination of both that requires a diverse management approach depending upon the context. These management approaches can either be based on codification or personal strategies (Hansen et al, 1999). Codification approaches are most consistent when knowledge is best treated as an object, allowing for its storage and retrieval to support effective transfer and communication of knowledge as information. When knowledge is best viewed as a flow or process than personal strategies focusing on tacit knowledge and person to person interactions are used. Maintaining an appropriate balance between these different perspectives, rather than adopting a polarised view, is important.

In summary, two perspectives of knowledge can be identified. The first treats knowledge as an object which can be transacted. The second treats knowledge as a flow which can be transformed. These two views of what knowledge is within an organisation as not mutually exclusive and both can, and do, exist together. For example, when a company recruits a graduate that graduate brings with them a certain amount of knowledge acquired during their studies. However, this knowledge is not absolutely apparent to the recruiting company and this lack of full awareness could lead to the graduate affecting the company itself. In this scenario the knowledge is transformational. In this scenario the knowledge that the graduate 'possesses' is neither wholly an object nor a flow but both.

Education Supply and Pedagogy

In the UK, it is common to refer to disciplines that are accredited by a professional body and aimed at a specific professional career as vocational; university level programs in these subjects are, therefore, referred to as vocational higher education and examples would include architecture, law, medicine and construction management. This is in contrast to purely academic disciplines for example philosophy, mathematics and physics. This work adopts the position that education in a vocational discipline, such as construction, forms part of the industry's educational supply chain. It is likely that the concept of an educational supply chain requires some further explanation and definition. Key to the concept of supply chain management is the alignment of the supply chain elements to the needs of the client or customer. Driving the concept of supply chain management are improvements in quality, functionality and value while at the same time maintaining or driving down costs. When an educational structure has a clear link to a vocational discipline, and supplies a significant proportion of the entrants to that industrial sector, then it is reasonable to propose that it is part of the supply chain, or in this case educational supply chain for that industry. Like many supply chains, the educational supply chain may be complex and comprise many parts. For example it could include universities, colleges, schools and industry training schemes (Christopher, 2005). The view that a university is part of an industry's supply chain does come with its own context. It places the needs of an industry squarely at the front of relationships between the industry and academia. Although that this is not to say that benefit should not flow back to both parties.

Some authors adopt the position that this 'interference' of business into education is neither helpful nor welcome (Monbiot, 2001; Klein, 2002; Chomsky, 2006; and Naylor, 2007). Indeed it is important to consider the merits of education as opposed to training. Encroachment of business into education can be argued to be an imposition of self-serving, free market interests which ultimately not serve the needs of society. These objections, mainly from a societal and political perspective, are valid but they do not diminish the fundamental requirement of a vocational education to connect with its vocational discipline. Engagement with a subject discipline has the potential to enrich the quality of education which is provided.

There appears to have been a divergence in the way universities, the professional bodies and employers have developed over the last few decades (CITB, 2001). In many cases this has led to an increased disconnection between higher education and industry which has nurtured the idea that education takes place in universities and that training takes place in work. The purpose of education is an important issue when considering the nature of universities and their role in vocational education.

The main focus of education can be seen to be the acquisition of knowledge and the development of understanding (Dewey, 1998). Teaching and learning that is focussed on education is full of information and explanations that can

be presented to students through lectures, tutorials and seminars or facilitated through other forms of teaching. Training is to do with skills and competence (Burke, 1989). This means the ability to apply knowledge in a practical or real situation – the ability to do something rather than just think about it. The focus here is on application rather than acquisition; although the latter is not ruled out. Training programmes can be characterised by the amount of practice they include. By practice, we mean the opportunity to perform a particular task repeatedly until it can be performed well on every occasion.

Vocational education incorporates is a blend of both education and training (West and Steedman, 2003). Where a particular profession is the objective of students, then it is reasonable to contend that their development must include all aspects of knowledge, understanding, skills and capabilities relevant to the profession.

To this end the aim of most vocational programmes is to produce reflective practitioners (Schön, 1991). A reflective practitioner is a person who continuously looks back at their performance and considers how to improve. They, therefore, reflect on their experience and make adjustments for the future (Schön, 1987). A key issue in the design of any vocational programme is the balance between education and training. The traditional academic view is that these two aspects are mutually exclusive and that if you pack a programme full of training, then there must be a corresponding reduction in the educational component (Hills and Tedford, 2003). This view has been challenged with the introduction of problem-based learning and similar application based approaches to teaching and learning (Burke, 1989). While there have been some concerns expressed over the knowledge gaps that can surface in people who have learned through problem-based learning, overall the levels of competence achieved are higher (Albanese and Mitchell, 1993).

The conclusion to be drawn from the success of problem-based programmes is that education and training are not mutually exclusive. Indeed, the development of knowledge and understanding with skills and capability, while being quite different, can arise from the same learning opportunity (Norman and Schmidt, 2001).
In the introductory section to this section, the medical professions and architecture were given as examples of where the educational programmes in these disciplines are aimed at producing graduates with an appropriate balance of education and training; a balance that makes them competent at the point of graduation. This is not to say that they do not continue to gain experience or to develop and practise their skills - clearly they do. But what is equally clear is the design of these programmes is very focussed on producing the finished article (Heijke et al, 2003).

Methodology

The theory development contained within this paper forms one part of a larger work which adopts a grounded theory approach.

Grounded theory method

The definition of a grounded theory is a theory that is grounded in data. More specifically, it is one that has been generated or discovered following the principles initially established by Glaser and Strauss (1967). The grounded theory method is, therefore, a research process that is used to arrive at grounded theory.

Grounded theory method begins with a situation or a set of issues that the researcher seeks to understand. It is an iterative process that examines evidence and data and develops concepts, ideas and principles from its interpretation. The emerging theory is then tested against further evidence and data to establish its veracity. This approach is appropriate to the circumstances of this study where there is an issue, engagement, and series of instances of it, the case studies, and a need to understand and develop theory around the issue.
Since the original development of grounded theory method (Glaser and Strauss, 1967), there has been a divergence between the authors, Glaser and Strauss, in the implementation of the method. The difference was summarised by Onions (2006).

Thought Trials

The thought trials are an important element of the development of the theory for engagement activity. The grounded theory method produces data from various sources – literature and practice. The interpretation of the data and the attempt to understand it through developing ideas, concepts and principles was undertaken in the main through the process of thought trials.

Sutherland (1975, p9) defined theory as 'an ordered set of assertions about a generic behaviour or structure assumed to hold throughout a significantly broad range of specific instances'. This is definition is useful here as it recognises that for a theory to be valid it must only hold true in a significant number of instances. Moreover, the fact that a theory does not hold true in all instances is not a reason to think that it is invalid. Ultimately, it is a matter of balance and utility.

In this study, the authors have conducted a series of thought trials on the boundary objects identified in the research process. These trials were initiated through a brainstorming process conducted with other members of the Centre for Education in the Built Environment. The analysis and synthesis were undertaken and written up into a preliminary proposition, which was evaluated by an expert panel. The expert panel comprised of leading industry figures.

Discussion

Figure 1 shows a way of reconciling the tension between the traditional academic approaches of universities with the needs of vocational education. The diagram is a corrupted version of a Venn diagram using triangles instead of circles and the vertical axis is used to indicate the degree of the challenge – the higher up you are, the greater the achievement. It depicts two mountains that an individual may climb. Both mountains present legitimate objectives for an individual learner, but each mountain presents its own unique challenge. It may be that the techniques required to climb the academic research mountain are different to those for the reflective practice one, but the equal height of the peaks indicates that degree of difficulty and the reward for reaching the summit should be similar. The lateral disposition of the two mountains will also tell you something about the current state of education and training in a subject.

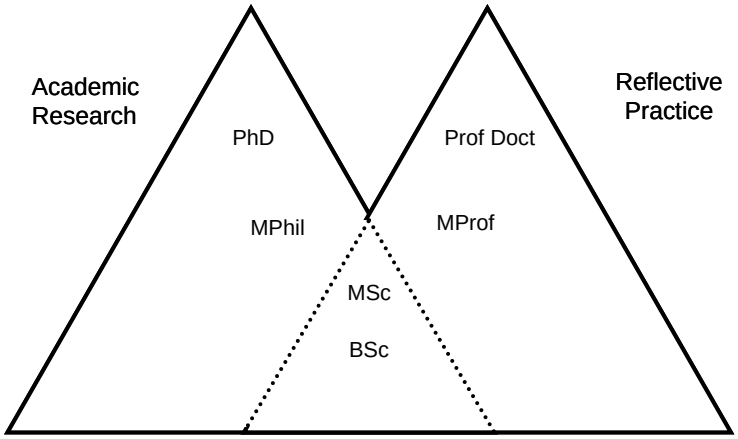

Figure 1: The Twin Peak model

Consider a discipline like medicine, for example, which is found in many older universities. Its principal learning objective is to produce effective practitioners (doctors, nurses etc.). Schools of medicine see their role as producing, amongst others, surgeons who not only understand the procedures, but who can also carry them out. Another example is architecture which has its roots in the study of design of buildings as an art form and many schools are still to be found within faculties of art. Here the emphasis is on the practice of art as much as the theory. Painting, sculpting and playing music are fundamentally 'doing' things and follow similar patterns. It would be a strange school of architecture that produced a designer who could not draw. However, the comparison breaks down when

the length of programmes is taken into account. Most of these courses with highly practical outcomes are longer than the standard undergraduate programme.

Interestingly, this issue is mirrored in the view industry has of its academics. The very best academics associated with medical surgery are to be found in operating theatres, demonstrating pioneering surgical techniques on real patients in front of students. Witness the work of Professor Magdi Yacoub on heart transplants in children. In architecture, when confronted with an academic, most practitioners would ask to see their design work and make a judgement based on the practical evidence. However, in construction management, academics are often seen as remote figures engaged in activities that are of interest to them, but of little value to practice. These are generalisations and no doubt everyone will have examples that demonstrate that they do not apply universally. But there can be no doubt that the connection between academia and practice is much stronger in medicine and architecture than it is in construction and engineering. The reason for this difference could be a cultural one.

On the basis of the arguments already presented above, the twin peaks for architecture and medicine would overlap substantially. The two summits would be relatively close to each other and the ridge that connects the two mountains at their highest interconnection would be only a short distance from the summits. For construction education a similar analysis would show a limited overlap and large lateral displacement. This would illustrate the disconnection between academia and industry/practice and go some way to explaining what must be done to put it right.

The diagram shows that lateral displacement of the twin peaks is an indicator of strategic alignment where the close the peaks then the greater the alignment. The diagram also shows that the closer the peaks then the higher the point at which they separate, this gives rise to a greater level of co-production of knowledge. This further development of the twin peak model is shown in Figure 2.

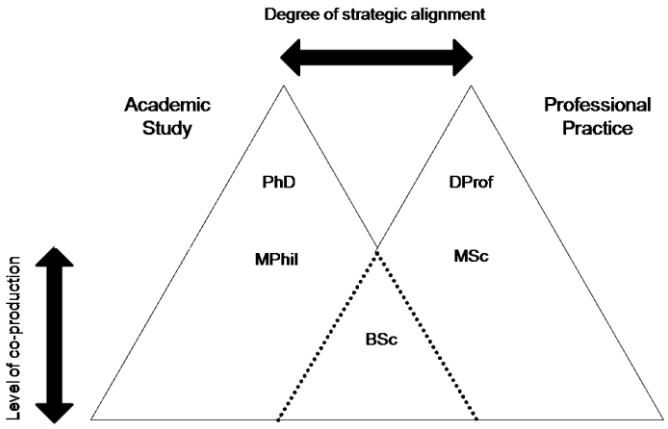

Figure 2: Twin peaks further developed

An interesting outcome of this diagram is that as the two peaks get closer then so do the highest qualifications i.e. PhD and DProf. This would seem to be rational as in those disciplines, such as medicine, where they effectively merge. The challenge at this stage of the study is to develop a conceptual framework that is capable of reflecting these issues and supporting the proper evaluation of knowledge capital. The value that is to be evaluated is the knowledge generated in of the co-production area of the diagram. Figure 3 present a range of different scenarios possible under the twin model with varying degrees of lateral displacement. The next question is can a framework for its evaluation be created?

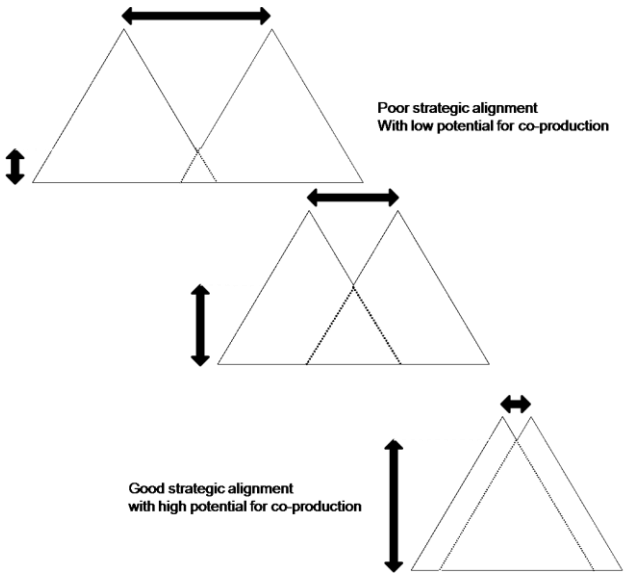

Figure 3: Twin peaks further developed showing lateral displacement

A hierarchy can be seen in this analysis. When viewed from the perspective of the industry partner there is a scale that goes from operational to strategic i.e. from doing the business to moving the business forward. From the perspective of the academic partner there is a scale that extends from knowledge dissemination to knowledge discovery and creation. Figure 4 shows this arrangement.

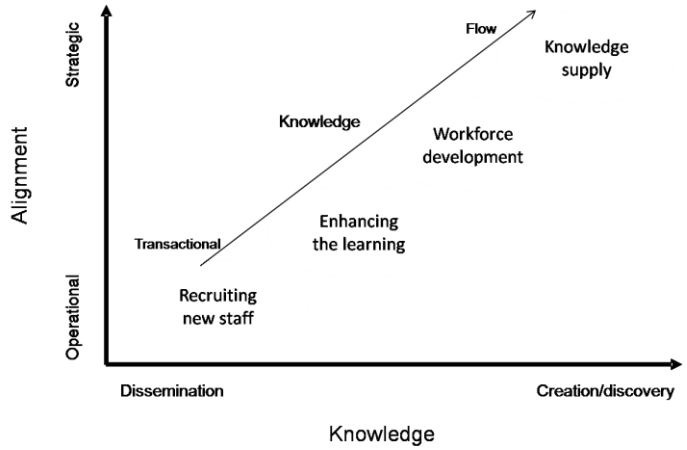

Figure 4: Hierarchy of engagement activity

The hierarchy provides a structured way of looking at the engagement activity from the perspective of its main purpose. This study has always had the focus of education and the impact on programmes and courses. In terms of the hierarchy described in Figure 4 this means that the areas that are of greatest interest are those that relate directly to course – recruiting new staff (education supply) and enhancing the learning experience. However, what the hierarchy shows is that there are more benefits to be had; specifically, in the areas of developing staff and creating knowledge. These higher order issues are more prevalent in the fields of medicine and engineering and less common in construction. The question that follows on from this is whether that difference between medicine and engineering on the one hand and construction on the other is a problem. Further research is being undertaken in order to answer this question.

Conclusions

This paper has presented a range of literature relating to industry-university relationships. A thought experiment has been presented comparing the disciplines of architecture and medicine to construction. Following this thought experiment a twin peaks model of industry-university relationships has been developed and explained. The twin peaks model is shown as a useful way of contrasting the strategic alignment of professional practice with academic enquiry in the various disciplines considered. An evaluation framework to support this model has also been given that shows how greater alignment could be achieved through stronger engagement. Taken together, the model and the evaluation framework provide a basis to re-examine relationships between industry and university. It lays down a challenge that these relationships are more than just about recruiting new staff and impacting on curriculum. It suggests that carefully crafted engagements can also enhance the competitive advantage of industry through enhancing organisational knowledge capital through co-production of new knowledge and enhancing staff capability.

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