

Knowledge Production Within the Innovation System: A UK case study

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Abstract

This paper focuses on a key issue for university managers, educational developers and teaching practitioners that of producing new operational knowledge in the innovation system. In this case the knowledge required to guide individual and institutional styles of teaching and learning. The case study presented outlines a sustainable approach for achieving quality enhancement of teaching and producing new operational knowledge. Sustainability is achieved by linking to, and being sympathetic to, the innovative activity led concept of learning presented.

Introduction

A recent OECD report highlights the implications for institutional actors of an engagement in quality teaching (OECD, 2009). In particular it emphasizes that “a quality culture at institutional level can be better achieved through diverse initiatives, the consolidation of bottom-up initiatives, small sized experiments at course or programme level, replication of success stories, the evaluation of quality teaching as a vehicle of discussion, and the participation of technical and administrative staff to provide mediation between academia and students.” (OECD, 2009, p.8)

The Faculty of Engineering and Computing (FEC) at Coventry University is instituting the above activities within an activity led vision and concept of learning (Wilson-Medhurst et al, 2008, Wilson-Medhurst and Glendinning 2009). This vision and concept of learning is to develop communities of learners engaged in employer and profession focused activity led education. Working definitions of the Activity Led Learning (ALL) pedagogy are presented in Wilson-Medhurst et al, 2008 and Wilson-Medhurst and Glendinning, 2009. A key feature is the activity as the starting point for engagement in learning and the role of the tutor as facilitator. The learning process itself requires “a self directed process [...] in which the individual learner, or team of learners, seek and apply knowledge skilful practices, resources (personal and physical) relevant to the activity being undertaken.” (Wilson-Medhurst et al, 2008).

This paper explores how this ALL concept of learning is of itself an innovation in response to the need for organisational adaptation. It then explores how this concept of learning frames the challenge of converting information into operational knowledge that guides individual and institutional styles and practices of teaching and learning. Operational knowledge is defined here as a form of knowledge that is distinct from disciplinary knowledge, and is associated with the way a university goes about its business. Operational knowledge is held or embodied in a university’s values, policies and practices (James, 2000). The FEC case study presented serves to illustrate how this challenge is being approached within a large multi-disciplinary UK Engineering and Computing faculty with over 4000 students.

The challenge

In response to external pressures "...universities have become compelled to look for structures and processes better suited to frequent adaptation" (James, 2000, p.43). As James also observes teaching is the site of much of the change and adaptation due to three main pressures: the growth in HE participation and the associated diversity of the student population; changes in student-teacher relationships; the impact of technology on the forms of learning and learning delivery that are possible (James, 2000)

In this UK case study context the organisational 'adaptation' is to define a concept of Activity Led Learning (ALL) that in itself allows an adaptive response to the demands of the discipline and the challenges above. At the same time it provides a framework of operation that guides learning support, learning facilities and the roles of staff and students. It also lends itself to context sensitive evaluation and measurement as will be explored below.

James, 2000 articulates five tentative principles for strengthening the adaptive capacity of universities:

- Recognize that the department/centre is the key learning unit
- Consciously build feedback loop
- Establish clear, agreed and measurable objectives
- Encourage experimentation, tolerate error
- Create nodes for knowledge diffusion (James, 2000)

These principles accord well with the findings of recent OECD review of quality teaching in HE (OECD, 2009). However this OECD report also acknowledges achieving sustainable change in relation to learning and teaching is challenging in part because measuring teaching quality is complex and difficult. This complexity is reflected in the following barriers or learning inhibitors to organizational adaptation within universities (James, 2000):

- Feedback on organizational performance in higher education is often ambiguous
- There are lengthy delays in the feedback loops
- Causal links between actions and outcomes are unclear
- Universities have individualistic cultures
- Quality assurance has often been a top-down activity (James, 2000)

The measurement problem

As suggested above lengthy delays in the feedback loops and problems establishing causal links between actions and outcomes all contribute to the measurement difficulties associated with assessing teaching quality. HE therefore looks for measurement opportunities with short-loop feedback properties that can serve as adequate proxies for longer term outcomes (James, 2000). In the UK the student satisfaction survey the National Student Survey (NSS) (HEFCE, 2009) is just such a proxy for teaching quality. However the NSS, as with local variants such as the Coventry student satisfaction survey based on the student satisfaction approach pioneered by at the Centre for Research into Quality (CRQ, undated) do suffer from the limitations associated with top-down quality assurance initiatives outlined above.

A survey such as the NSS may identify teaching quality deficits and often the challenge then is to develop new operational knowledge to address the deficit. Such knowledge must be understood and owned by the teachers and students. As Ramsden (1991) notes with reference to the Course Experience Questionnaire (CEQ) which informed the current NSS "...evidence of how a course or department has responded to student evaluation data – the capacity of its teachers to learn from their mistakes – might be regarded as one of the most important indexes of its educational effectiveness" (Ramsden, 1991, p.134). However one cannot assume that the operational knowledge is already 'in situ' and it may need to be developed.

Therefore in looking at organisational knowledge and learning and moving to a 'learning organisation' (Senge 1990), James, 2000 suggests that the organisation "...requires deeper insights into their present systems and structures for organisational learning, and into the kinds of steps and arrangements that support the creation and application of new organisational knowledge". James, 2000, pp. 47-48 goes on to observe:

"Given the complexity of university operating environments and their missions, the knowledge guiding day-to-day practices is likely to be uncertain and "error" prone – using "error" here in a technical sense to refer to mismatches between expectations and outcomes. Under these circumstances, error prevention through rule-based management is unlikely and learning from error becomes the principal means for advancement; that is, the safest strategy for improvement is to nurture systems for learning from experimentation and feedback. Localised problem-solving will be optimised by conditions that foster and maintain experimentation, that are forgiving of risk-taking, and that maximise feedback."

Given the above challenges what is suggested here is that quality enhancement of learning and teaching be achieved through feedback mechanisms that are more closely aligned to the concept of learning within which the feedback loop operates. Thus as the OECD, 2009 report recommends, quality of teaching is viewed as a vehicle of discussion. This requires both the top-down flow of centrally collected evaluation data (such as the NSS and Coventry University satisfaction survey data that in part inspired the ALL initiative) but also an effective counter flow of 'bottom-up' feedback such as locally collected evaluation data. The

creation of this effective counter flow is focused on here. Such 'bottom-up' feedback should ultimately lead to more context sensitive performance indicators for staff, students and managers for the purposes of quality enhancement of teaching.

Introducing the case study context

The faculty of Engineering and Computing (FEC) at Coventry university have a significant evaluation challenge. ALL is being developed and implemented through a continuous improvement change management process (Wilson-Medhurst et al, 2008). Within this context there has been an initial focus on evaluating 'what works' (or not) at the modular level and identifying case studies of operation (see e.g. Booth and White, 2008, Davis 2008, Davis and Davies, 2008, Lambert et al, 2008) moving to a more systematic review of the first year experience of ALL at programme level in one department (Green and Wilson-Medhurst, 2009).

As these activities are scaled up to all undergraduate programmes across the faculty there is a need to also consider how ALL will be developed as well as measured and evaluated to promote discussion around quality of teaching. Given the learning inhibitors and other challenges identified above a bottom-up approach to quality enhancement was instituted within the frame of the overarching (top-down) concept of learning. This included setting up an LTA (Learning Teaching and Assessment) sub-group within FEC at Coventry (Wilson-Medhurst, 2008) to provide a forum and a focus for deliberation around quality enhancement in teaching issues. This included engaging with the evidence emerging from ALL pilots within FEC as well as similar activity elsewhere.

Towards a developmental measurement tool

Over time it became clear that the LTA sub-group needed to develop a common evaluation 'language' that was flexible enough to be tailored to each of the disciplinary contexts within which ALL was being implemented and thence for evaluation within those contexts.

As outlined above there was an attempt to assess the quality of teaching at first year programme level pilot of ALL (Green and Wilson-Medhurst, 2009). This was using a questionnaire based around the Coventry University student satisfaction survey mentioned above plus student and staff focus groups (Green and Wilson-Medhurst, 2009). While this evaluation identified some useful feedback it became clear in the light of tackling this evaluation that an instrument more tailored to the ALL approach would be useful. This was particularly in relation to the kind of active learning behaviours and roles that the activity led learning pedagogy requires for effective learning to take place. Having an appropriate evaluation instrument for learning and teaching behaviours is particularly important when one considers that, as recent research suggests, once students are on their programme of study it is the quality of the learning and teaching experience that has the most influence on student satisfaction (or otherwise) rather than other aspects such as the physical environment (Douglas et al, 2006).

In developing such a tailored instrument a suitable pilot approach was identified once the LTA sub-group focussed around the overall objectives of the ALL concept of learning, that is, to promote student engagement. To this end it was important to identify what was meant by engaged learning and a report identifying indicators of engaged learning (Jones et al, 1995) provided a useful insight (see appendix A). These indicators of engaged learning formed the basis for discussions around the derivation of an evaluation instrument for ALL. The LTA sub-group containing representatives from all departments discussed and agreed that FEC would pilot a questionnaire based on these indicators of engaged learning. This piloting to be conducted within a focus group setting.

Consistent with the ALL concept of learning the intention at this stage was to design an evaluation instrument that may be used consensually by students and staff to:

- Encourage student reflection on their learning (Rowley, 2003)
- Allow students the opportunity to give teaching staff feedback on their learning experience to date and therefore give staff a ‘window’ on that experience and the opportunity to respond

This was an approach to ‘shorten’ the feedback loop and to optimise localised problem-solving to allow learning from experimentation and feedback.

Questions asked focussed on ALL learning and teaching behaviours and approaches. Questions asked students to rate the extent to which they are satisfied with various aspects of their learning experience on their course, and then to rate how important they are to their experience as a student. Thus for example where the Coventry University satisfaction survey may prompt “Teaching staff are sympathetic and supportive of your needs” and “Teaching staff treat you with appropriate respect”, the ALL survey asks “The tutors listen to your ideas” and “I can question my tutors and debate concepts and ideas”. The ALL survey questions are better aligned (Biggs, 1999) to the ALL concept of learning.

Outline of method and findings from the pilot

The questionnaire was piloted with two groups of volunteer first and second year undergraduate students drawn from different programmes of study. 17 students participated in total. The focus group sessions were facilitated by student advocates from the faculty’s student experience enhancement unit (SEE-u). The questions based around indicators of engaged learning were largely understood well by students, and provoked discussion around matters that were clearly important to them. The discussions identified that activity led learning was being implemented differently and to different degrees in different modules, programmes and departments and that satisfaction was influenced by that different experience. Key factors included aspects of the teacher/facilitator role, learning activity design, and assessment design and alignment.

The aim of this pilot was to check students understanding of questions and whether they were important to them. Having identified that they were and where question refinements could usefully be made the next steps are to use the refined questionnaire with a larger number of student groups in the 2009/10 academic session. This is to help evaluate first year, first six-week ALL pilot implementations across the faculty. The aim is to inform the development of the ALL approach and identify new operational knowledge that will help staff and students to effectively utilise ALL within their disciplinary contexts. Ultimately this will seed the development of context sensitive performance indicators for staff, students and managers for the purposes of quality enhancement of teaching

Conclusions

A student satisfaction survey cannot be a sufficient proxy for teaching quality if the questions asked do not fully relate to the teaching and learning behaviours expected and required of both staff and students. Indeed it may promote learning and teaching practices that are not fully aligned to the concept of learning. This can potentially limit or undermine the development of context sensitive operational knowledge around learning and teaching practices. It is therefore important to identify and develop evaluation instruments that are better informed by the concept of learning in which they must operate.

This paper has presented a case study that demonstrates some of the processes through which this evaluation instrument can be developed. The instrument itself if used developmentally can promote improvements in teaching quality framed within the concept of learning. This is also with the aim of generating performance indicators better recognised and valued by those who need to respond to them at the operational level.

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Prepared for OECD What Works conference on Quality of Teaching in HE, Istanbul, Turkey, 12-13 Oct 2009 (draft - please contact the author Sarah.Wilson-Medhurst@coventry.ac.uk before citing)

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Appendix A

Table: Indicators of engaged learning (source Jones et al, 1995)

Variable	Indicator of engaged learning	Indicator definition
Vision of learning	Responsibility of learning	Learner involved in setting goals, choosing tasks, developing assessments
	Strategic	Learner actively develops repertoire of thinking or learning strategies
	Energised by learning	Learner is not dependent on reward from others; has a passion for learning
	Collaboration	Learner develops new ideas and understanding in conversations Work with others
Tasks	Authentic	Pertains to real world, may be addressed to personal interest
	Challenging	Difficult enough to be interesting, but not totally frustrating, usually sustained
	Multidisciplinary	Involves integrating disciplines to solve problems and address issues
Assessment	Performance-based	Involving a performance or demonstration, usually for a real audience and useful purpose
	Generative	Assessments have meaning for the learner; may produce information, product, service
	Seamless and on-going	Assessment is part of instruction and vice versa; students learn during assessment
	Equitable	Assessment is culture fair
Instructional model	Interactive	Teacher or technology program responsive to students needs, requests
	Generative	Instruction orientated to constructing meaning; providing meaningful activities/experiences
Learning context	Collaborative	Instruction conceptualises students as part of learning community; activities are collaborative
	Knowledge-building	Learning experiences set up to bring multiple perspectives to solve problems such that each perspective contributes to shared understanding for all; goes beyond brainstorming
	Empathetic	Learning environment and experiences set up for valuing diversity, multiple perspectives, strengths

Grouping	<p>Heterogeneous</p> <p>Equitable</p> <p>Flexible</p>	<p>Small groups with persons from different ability levels and backgrounds</p> <p>Small groups organised so that over time all students have challenging learning tasks or experiences</p> <p>Different groups organised for different instructional purposes so each person is a member of a different group; works with different people</p>
Teacher roles	<p>Facilitator</p> <p>Guide</p> <p>Co-learner; co-investigator</p>	<p>Engages in negotiation, stimulates and monitors discussion and project work but does not control</p> <p>Helps students to construct their own meaning by modelling, mediating, explaining when needed, redirecting focus, providing options</p> <p>Teacher considers self as learner; willing to take risks to explore areas outside their expertise; collaborates with other teachers and practising professionals</p>
Student roles	<p>Explorer</p> <p>Cognitive apprentice</p> <p>Teacher</p> <p>Producer</p>	<p>Students have the opportunity to explore new ideas or tools; push the envelope in ideas and research</p> <p>Learning is situated in relationship with mentor who coaches students to develop ideas and skills that simulate the role of practising professionals</p> <p>Students encouraged to teach others in formal and informal contexts</p> <p>Students develop products of real use to themselves and others</p>