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The problem of projects: understanding the theoretical underpinnings of project-led PBL

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For many years there has been a sharp division between project-based learning, and problem-based learning, with the former adopting a more technical rationalist approach while the latter adopts a more Socratic or dialogic approach. This article argues that current notions of project-based learning are too narrow and that combining the two approaches will improve student engagement and criticality. This article begins by outlining the key differences between project-based, and problem-based learning, suggesting a new constellation. It then provides an exemplar in the form of a case study that sought to undertake such a combination, and reports on implications for practice.

Keywords: project-based; problem-based; learning; project; practice; communities

Introduction

For many years in the UK there has been a sharp division between project-based learning and problem-based learning, with the former adopting a more technical rationalist approach than the latter which adopts a more Socratic and dialogic approach. In the field of creative, practice-based education this debate is of considerable importance, since project-based learning is one of the most commonly utilised, yet little theorised, paradigms for structuring the learning experience.

The term project-based learning is broad, far reaching and means different things in different countries and different disciplinary arenas. There are many differing approaches, models and methodologies available (de Graaff and Kolmos 2007, 1–8). Moreover, Project Management is seen as a discipline in its own right, offering a range of tools and techniques for adoption by educators. However, few of these are ideally suited to the kind of small-scale projects undertaken in an educational context. Furthermore, the lack of critical questioning on the subject of 'what it is we do when we do this thing called a project' (Hodgson and Cicmil 2006, 32) means the idea of a project is often not well understood.

For many educators project-based learning is utilised in such a way that it offers little more than administrative framework for delivering instrumental outcomes. The resultant assessment is then conducted by trying to align the project output with some previously specified learning outcomes. What is problematic here is that *what is learned* and *how it is learned* is not considered. As a result, the critical, creative and problem-solving processes

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involved in delivering a project's outputs are, for the most part, sidelined. Yet it seems clear that if 'performance is only to be valued through the material outcomes that it yields, [all it will reveal] is a warped and partial valuing of the students' educational efforts' (Barnett 2007, 79). This is suggests that if the relationship between product and process is to be properly addressed, then it is important to consider what is expected of students and what assumptions are made concerning how they will do it.

Problem-based learning on the other hand is a relatively mature pedagogy, with a distinct theory of learning, that places the process of knowledge acquisition at its core. This approach brings creative and critical practices to the fore and places values on the process of problem solving as much as on the solution (Barrows and Tamblyn 1980). In relation to creative, practice-based subjects, however, it is not an approach that focuses on the use of time-bound, risk-laden projects constrained by specific output requirements. The kind of teamwork required of project participants is of a different order of complexity to that required of typical problem-based learning groups. Furthermore, most forms of problem-based learning do not support skills training of the sort commonly found in practice-based subjects. Consequently, it is not always appropriate to adopt problem-based learning with creative, practice-based programmes of study.

This article argues that on their own current notions of project-based and problem-based learning are too narrow and that combining the two approaches will improve student engagement and criticality in the learning process. It begins by outlining the key differences between project-based and problem-based learning, and proposes a new constellation or hybrid model that draws together both approaches. It then provides an exemplar in the form of a case study that sought to undertake such a combination, and reports on the implications for practice.

The problem of projects

The use of projects as an educational approach in the field of creative and practice-based education differs greatly from the way it is commonly used in many other subjects. For example, on creative practice courses projects are often by their very nature complex, interdisciplinary, team orientated and seek to enhance creativity, innovation and enterprise as pedagogic attributes. This differs from the way in which projects might be used in other areas where perhaps the learning activity is more teacher directed and utilises a predefined set of skills, activities or interactions to address a specified set of learning outcomes. In fact, it might be more appropriate to differentiate the two uses here and describe the latter approach instead as 'task-based learning' (de Graaff and Kolmos 2007, 5).

For the purposes of the argument presented here, project-based learning is then; a time-bound activity which is directed by the project participants or team, who determine the course of the project and the final output in response to a brief of some description. The brief should ideally relate to a concrete or *real world issue* which the project participants are required to address. During the course of the project, participants might draw on widely differing disciplines and subject methods to achieve their goals. Student activity revolves around a complex series of interactions between the team members over time and draws on a range of key transferable skills such as communication, planning and team working.

In the UK, the use of project-based learning currently tends to draw predominantly on project management literature which not only offers a theoretical discourse for us to consider, but also a range of applicable methodologies that might be of benefit to educators and to students. It offers a 'shared repertoire' (Wenger 1998, 82) of tools that will be recognised by employers, workers and students in the creative industries along with a

terminology that provides a fit between real world professional practice and the creative endeavours of undergraduate learners.

A critical reading of project management methodologies such as those conducted by Hodgson and Cicmil (2006) will, however, reveal that the project management discourse carries with it a particular set of problems. For example, the common 'techno-rationalist' conception of project management such as: 'a purely technical process of implementing a time-limited undertaking that seeks to minimise uncertainty and maximise predictability' (Hodgson and Cicmil 2006, 32) may lead to a reification of the abstract objects of project management (tools, processes and strategies). Such that they come to dominate the social relations of project participants and bind their creative endeavours to the needs of the project objects. This then results in the project being subsumed by an ideology of control dampening the possibility for creativity.

Furthermore, historically, project management as most people understand it, emerges from large scale construction projects and thus its reputation as an unwieldy tool may seem off-putting or not of *our-field-of-practice*. Indeed, the methodologies utilised on large-scale complex projects such as the UK government endorsed 'Projects IN Controlled Environments 2' (PRINCE2) comes with such a high management overhead that it would be totally impractical to adopt it wholesale as a learning tool for small-scale projects in an educational context. While the methodology encompasses the management, control and organisation of a project in a way that would be familiar to most businesses, it is commonly recognised that PRINCE2 constrains creativity and innovation. The concern is that under the burden or 'overhead' of such an overarching, didactic business-orientated approach, creativity will be flattened and ideologically determined by the framing of administrative needs as the primary indicator of success. That is to say that while the project may well have been properly documented as evidenced by the potentially cumbersome project plan, it may not have delivered any innovative outcomes or generated new learning.

In their exploration of Plato's 'Forms of Awareness', Sower and Fair (2005) make just this point. For them, the syndrome of quality management, here synonymous with that of project management, limits the opportunity for creativity and innovation through the use of quality metrics that are determined by quantitative data or instrumental outcomes. For Sower and Fair, these administrative methodologies impede innovation through reificative processes in which the objects or tools deployed to manage a process become *thingified* and take on a life of their own. It is proposed that instead we see these reificative objects 'as stepping-stones to take off from, enabling us to reach the un-hypothetical first principle of everything' (Sower and Fair 2005). The suggestion here is that the tools are just that – tools. They should be put to work for the benefit of a project not as determiners of a project.

If educators are to value the learning process as much as the outcome then it must be recognised that project-based learning needs to become more than just a series of administrative actions and check points that focus the learning process. Project-based learning needs to become an approach that opens up the possibility of a process-led activity where transcendence, intuition and creative play are celebrated – one in which new hypotheses are generated from learning and where innovation is possible.

The practice of projects

If a project is a complex series of interactions between team members over time (Hodgson and Cicmil 2006, 32) as this article would argue, then there is a clear resonance here, not only with Lave and Wenger's (1991) notion of 'communities of practice', but also with the forms of project-based learning developed by de Graff and Kolmos (2007) and argued for by

Illeris (2009). For these authors, learning focuses on a community as a locus for the acquisition and creation of knowledge that emerges in a response to the project, problem or challenge (adapted from de Graaff and Kolmos 2007, 1–8; Wenger 1998, 237–239). In short, such learning occurs through:

- Problem encounters that offer the opportunity for the application of skills and knowledge requiring decision-making, the devising of solutions, creativity and problem solving.
- Boundary encounters that require negotiation with exterior communities and unfamiliar discourses.
- Access to a shared repertoire of language, terminology, technologies, tools and techniques with which to engage, experiment and play.
- Negotiation of a joint enterprise, shared values, mutual evaluation of that enterprise and moments of reflection.
- Access to reificative and participative memory; old timers, champions, mentors, sponsors and storytellers as well as to traditional repositories such as libraries.

Taking this as a starting point, it is then possible to see a project as a 'language and a practice' (Linehan and Kavanagh 2006, 56) in which the participants become storytellers, recounting project stories through an emergent discourse utilising a repertoire of professional terminology or jargon. This shared lexicon is an indicator of a network of relations through which forms of participation emerge and 'includes a sense of becoming as [the learner] engages with the communities' activities' (Linehan and Kavanagh 2006, 58). From an ontological point of view, 'the students' educational being becomes itself through critical dialogue with other voices, through participatory engagement and 'close interaction with others' (Barnett 2007, 43–44). Problem encounters become the motor for this pedagogy of practice and shape the learners' trajectory through the process of a project.

Projects as problems

In order to re-evaluate the nature of project-based learning and place problem encounters at the heart of the learning experience, perhaps it is useful to look at projects through the lens of a problem-based methodology such as that proposed by Savin-Baden (2007a), who drew on the work of Bernstein (1992) to argue for the importance of the development of pedagogic identity in problem-based learning. Bernstein (1992) has argued that through their experiences as students, individuals within higher education are in the process of identity formation. He has suggested that the construction of pedagogic identities will change according to the different relationships that occur between society, higher education and knowledge. For Bernstein, pedagogic identities 'arise out of contemporary culture and technological change that emerge from dislocations and are perceived as the means of regulating and effecting change' (Bernstein 1992, 3). Thus, pedagogic identities are characterised by the social–cultural emphases of the time and are necessarily reflective of the kinds of problem students encounter.

The emergence and development of problem-based learning similarly reflect a number of historic changes in understandings of learning and the shaping of higher education worldwide. For example, in the 1960s educators began to question traditional teaching methods where the staff member acted as the primary vehicle of information. Negotiation of meaning, the focus on experience and the development of sound social practices and ideologies began to be viewed as central to the exploration of the nature of knowledge (for example Boud

and Feletti 1997; Conway and Little 2000). As these ideas converged with other contextual forces, space opened for change, and problem-based learning emerged as an innovative approach to education. Of significance here is the shift away from a tutor-led curriculum towards one devised by the students, who shape the content of their learning in response to the problem scenario that has been presented to them (Duch, Groh, and Allen 2001).

There is a need, however, to understand problem-based learning in respect of the different kinds of learning outcomes specified by different subject disciplines. For example, it became apparent in the UK that problem-based learning was seen as a model that could embrace uncertainty and criticality as central tenets of learning, in ways not suggested in earlier models (Barrows and Tamblyn 1980; Clarke 1978). This was particularly evident in the work of Taylor (1997) and Savin-Baden (2000). It is notable in this work that the consideration of how students learn within a subject discipline prefigures a range of approaches to implementing problem-based learning, as does the alignment of problem encounters with subject knowledge and assessment processes. From this discourse emerges a number of distinct models, each of which corresponds to a different set of pedagogic needs, learning processes, facilitator roles and assessment outputs. Savin-Baden (2000, 2007a) formulates the five main problem-based learning models as:

- *Model I*: for epistemological competencies where knowledge is more or less propositional with a narrow problem scenario.
- *Model II*: for professional action where knowledge is practical and performance-orientated and the problem scenario is characterised by real-life situations.
- *Model III*: for interdisciplinary understanding where knowledge is both propositional, performance-orientated and practical and the problem scenario is centred on a situation where a combination of theory and practice occurs.
- *Model IV*: for trans-disciplinary learning where the aim is to test given knowledge and the problem scenario is characterised by dilemmas of a different kind.
- *Model V*: for critical contestability where knowledge might be contingent, contextual and constructed by the learner for given situations and the problem scenario is open and offers multi dimensional possibilities.

The models range from narrow disciplinary problem solving that requires predetermined solutions to open-ended interdisciplinary problem solving that deals with messy or ill-structured problems. Such models suggest that problem-based learning needs to be seen as an approach that utilises a range of methods that overlap and may vary. What is common to all these models is the use of a problem that in some way reflects professional practice or configures a real-world encounter in relation to disciplinary knowledge. However, although in both project-based and problem-based approaches learning is organised around the problem encounter (de Graaff and Kolmos 2007, 6), the two approaches are not interchangeable. Nor do they easily map onto each other in a way that would offer an insight into the nature of the problem encounter at the heart of a project.

Attempting to map project-based onto problem-based approaches

Initial attempts to relate project-based approaches to problem-based ones led to the realisation that there was not a direct fit between the two methods. Mapping PRINCE2 in some scalable form onto problem-based learning was awkward. The fluidity of problem-based learning seemed to somehow be interrupted by the didactic forms at play in traditional project management methodologies. The authors' initial attempts at undertaking this

exercise was limited further by the lack of any substantial writing on the subject of small-scale project management. It was only on reading Bentley's (2005) discussion on the scalability of PRINCE2 that a way forward became apparent.

In this discussion, Bentley suggests that, as a minimum, a project can be scaled down to two distinct stages which, following Von Stamm (2003), will be referred to as an initial innovation stage, followed by an implementation stage. Bentley presents this two-stage model with a very user-friendly flowchart explaining the individual steps or modules that make up a project's process (Bentley 2005, 2006). Each stage in the flowchart utilises standard PRINCE2 modular terminology and is presented as the 'minimum' requirement for the process documentation of a small-scale project. This insight facilitated further thinking concerning how to map project-based and problem-based learning. Since, if it is possible to break a project into two distinct stages, this then offers a possibility for mapping differing problem-based learning models onto each project stage.

Thus, the fit between project-based and problem-based learning can be thought of as a 'fit over time'. The first stage of a project, that of 'innovation', is exploratory in nature and involves students in encounters with problem scenarios in a way that encourages them to engage with, and manage, their own learning. The second, or implementation stage of a project, then seeks to deliver an artefact, service or other output to a real or simulated client. This can be further characterised utilising Savin-Baden's models as below:

- *Stage one (project innovation)*: Critical, creative, questioning, innovation, brainstorming, ideas, problem solving, characterised working, non-hierarchical: *Model V: PBL for critical contestability* (Savin-Baden 2000).
- *Stage two (project implementation)*: Process led, implementation, doing, practical, goal orientated, with action, characterised by team hierarchical: *Model III: PBL for interdisciplinary understanding* (Savin-Baden 2000).

In fact the nature of the problem encounters faced by project participants is likely to be more fluid and include any number of problems that may emerge from differing domains. While many of these problems might seem small and insignificant in the grand scheme of things, the resulting complexity of interactions that occur during a project life-cycle means that every problem draws the team into an encounter with uncertainty in a multiplicity of ways. Consequently, while it might be theoretically useful to define the relationships between problem-based learning approaches and a project's stages as has been argued above, it is, in itself, not a solution that addresses the fluid and changing nature of project activities and the way in which uncertainty shapes the range of problem encounters students will face.

A new constellation: project-led problem-based learning

It was this exploration of the differentiation between the two approaches that subsequently led to the emergence of a new formulation that draws on the idea that a range of different problem-based learning approaches needs to be utilised in order to place problems at the core of any project-based learning methodology. This formulation was subsequently entitled 'Constellation 3: Project-led Problem-based Learning' (Savin-Baden 2007a). The notion of a constellation was adopted to reflect the idea that project-led problem-based learning is complex, comprises multiple constantly changing elements and is less outcome focused than more traditional project-based learning. Locating this as a constellation embraces the overlapping nature of differing practices that relate to one another and intersect in particular configurations or patterns.

The idea of grouping approaches in this way is drawn from Bernstein (1992) who argued for the use of constellations as 'a juxtaposed rather than integrated cluster of changing elements that resist reduction to a common denominator, essential, core or generative first principle'. The use of constellations allows for the categorisation of problem-based learning approaches according to problem type, form of interaction, knowledge focus, form of facilitation, focus of assessment and learning emphasis. An important factor when considering the grouping of problem-based learning practices in this way is the mode of knowledge that is to be designated as disciplinary knowledge. An overview of the three constellations adapted from Savin-Baden (2007a) is presented in Table 1.

In practice, Constellation 3 focuses on students acquiring skills for practice in the context of a project that is work-related, such as producing an artefact or providing a service and which may involve a 'live' client brief. It utilises project management tools to structure the problem-based learning exercise, where some subject-specific knowledge and skills may be delineated by the tutor, but in general, learning is derived from utilising opportunities, resources and experience through the 'doing' of the project and is led by the participating students. The initial, innovation stage of the model is a discovery or problem analysis phase which foregrounds the development of critical thinking and creative problem-solving skills as an embedded component of a project's process. The following implementation stage focuses on learners acquiring knowledge to 'do' as they 'implement' their creative ideas and is essentially interdisciplinary. Problem solving is also at the heart of the implementation stage though here it relates closely to the process of the project, its participants' inter-relations and stated delivery objectives.

The flexibility and fluidity of this model suit the conception of a project as a complex set of interactions that evolve in response to the problem encounter. As a theoretical position, it answers many of the questions posed at the beginning of the article concerning the nature of projects and how learning occurs during a project. However, there emerges here a gap between the theorisation of this project-based pedagogy and the nature of the tools available to educators and students to support the delivery of a project. The traditional tools drawn from methodologies such as PRINCE2, as explored above, are orientated towards controlling uncertainty. In contrast, within a problem-based approach uncertainty is highly valued, since it is the students' encounter with the kinds of problems that emerge from uncertainty that is most valued pedagogically. This led the authors to further investigate project management techniques in search of an alternative that would fit the needs of a pedagogic undertaking without loosing site of the need to formally structure this activity.

Table 1. Constellations of problem-based learning.

	Constellation 1 Problem solving learning	Constellation 2 Problem-based learning for knowledge management	Constellation 3 Project-led problem-based learning
Problem type	Linear	Designed to promote cognitive competence	Real-world/non-linear
Level of interaction	Problem-focused	Problem-focused	Project team
Form of facilitation	Directive	Directive	Project focused
Focus of assessment	Solving of problem	Testing of knowledge	Critical reflection
Learning emphasis	Achievement of task	Knowledge management	Completion of project

Agile projects solve agile problems

In recent years, a new project management methodology, Agile Project Management (Agile Alliance 2001), has emerged in response to a need within the software development sector for a flexible process-led approach that allows for rapid delivery of high-quality software and the alignment of the customer and service providers' business objectives (Cohen 2005; DeCarlo 2004; Fischman 2008; Griffiths 2006; Highsmith 2004). An Agile process suits small teams, thrives in chaos and offers a reflexive response to change in the face of uncertainty. The Agile philosophy resonates deeply with the ideas expressed above, placing at its heart; the fostering of interactions within the team over processes and tools, a focus on delivery rather than on documentation, the project vision and collaborative relationships as organising principals, responding to change over following a plan (Fitchner 2011).

The principles of Agile Project Management require an engagement with the process of delivering a project that celebrates learning through continued and regular critical reflection on the nature of the project. With methodologies such as PRINCE2, this is typically undertaken at the end of the project, whereas with Agile it becomes an organising principle and the key factor for measuring progress. Teams are self-organising, coalescing around shared goals. Solutions to problem encounters are managed by the team who also select the most appropriate tools to use on the basis that the art of Agile is the 'art of maximising the work not done' (Fitchner 2011).

Essentially non-linear, Agile exists in antithesis with the linear, didactic principles of project management typified by PRINCE2 and offers an iterative flexibility that values intuition and creative play. The focus on critical thinking and creative problem solving, along with the value placed on learning by such an approach, suggests that a re-conceptualisation of project management in this way has much to offer as a pedagogic tool. This is partly because it is conceptually unconstrained by didactic methods or burdened with the need to produce documents purely to satisfy a determined process. Additionally, the use of Agile offers the possibility for defining project management philosophy in ways that place learning, creativity and innovative thinking at the heart of a project.

In a sense, Agile is Constellation 3 exemplified. It provides a well-defined set of flexible tools and techniques for educators to adopt, along with a theory of learning that constructs Agile as a productive pedagogy. It is a methodology that celebrates uncertainty rather than attempting to control it. The adoption of Agile project management as an underpinning philosophy offers the possibility of a move away from traditional, instrumental approaches to project management and an exploration of more fluid approaches. Such a move might posit Constellation 3 as an Agile learning methodology, one where critical enquiry, reflection and creativity are pedagogically embedded into a projects process.

An exploratory case study of Constellation 3

In the field of media practice education, 'project-based learning' is utilised as a common approach to teaching. This use of 'projects' as a framework for practice-based teaching is embedded in the curriculum and has a long tradition in the discipline. To some extent in the field of media practice, the use of projects is *almost* unquestioned, unnoticed and often misunderstood. Projects are conceived as objects native to the discipline and there is an assumption that students have an innate ability to manage them. Thus, there is an expectation that students are able to deliver complex risk-laden projects and tutors are often surprised when they struggle with the task. Clearly, students need to be equipped with a range of related professional skills to be able to undertake media production. It is the nature

of these skills and the conception of how to teach them that has radically altered. Barnett (1994, 59) has suggested:

> Talk of skills often takes the forms that 'we can use our judgement in applying our skills'. … The problem with this way of looking at things is that it separates the skill from the judgement; the actions from the reflection. … It is misleading to think of the surgeon in the operation as being engaged in two sets of activities: the use of advanced complex professional skills and the application of cognitions, insights and judgements. The judgement of the surgeon in the operating theatre is significantly embedded in his or her skill.

For Barnett, learning and the generation of new knowledge are not separate from practice; it is in fact concomitant with practice. The case study that follows explores the use of a 'Live Project' on a media practice course to illustrate the way in which Constellation 3 provides a framework for enhancing the acquisition of knowledge through the embeddedness of practice. A 'Live Project' is here defined as one where a brief is given to students by a real business client, organisation or other partner who has a real business need. Importantly, the brief should present a situation that mirrors real-world business problems and which places students in a context of supported professional practice.

In this example, students were given a project brief by Music Fusion, a local charity external to the university who work exclusively with young people at risk of exclusion. The organisation involves its young people in a range of music-making activities and it approached the university with the idea of collaborating on the production of a number of music videos for the young people with which it works. The brief presented a 'messy' or 'ill-structured' problem (Uden and Beaumont 2006) as is typical of problem-based scenarios. On the surface it required the students to produce a video for one of the music groups of young people Music Fusion had identified as possible participants through an online competition.

After a presentation from a Music Fusion representative, the students wrote a one-page 'project definition' which outlined the aims, objectives, outputs, deadlines and importantly the business case for the project. Writing a definition follows the process of defining and analysing the problem as well as setting down in writing the expectations of the end user, in this case Music Fusion and its young people (as well as the course tutor who required delivery for assessment purposes). The students then engaged in a brainstorming process that resulted in a written outline. A process that required students to further analyse, propose and evaluate problem solutions. Their ideas were then presented in the form of a one-page pitch or outline, following professional practice in the media sector. Together, these two pages form the 'project initiation documents' (PID), a boundary object that maps out the scope or territory of the project and acts as a reference point when discussing the project with all the participants.

The second, or implementation stage, began with students planning their project. Following Agile Project Management principles, the students were required to attend weekly review meetings with their tutor at which the project team would undertake a 'Strengths, Weaknesses, Threats and Opportunities' assessment, or SWOT Analysis. The value of this activity lies in the identification of risks that might impact on the project. Not only are negative risks which might need to be controlled identified, the process also identifies positive risks that the students might want to enhance. As part of this process, they also self-evaluate their own performance as a team and prioritise actions for the coming week. Since this analysis is conducted on a weekly basis, the project can evolve over time and the need for a didactic plan which needs to be rigidly followed is removed. In this way, changes can be incorporated, creative excursions can be explored and the overall progress can be evaluated in a holistic manner.

The use of SWOT Analysis, a tool commonly used in the world of professional practice, not only places problem solving at the heart of the project management process. It also requires students to actively engage in higher level cognitive skills of analysis, synthesis and evaluation throughout the project's life cycle. Again, following the principles of Agile Project Management, this is a risk-driven process that minimises management overhead and focuses students' attention on those elements of the weekly evaluation meetings that require prioritisation. In this way, the project teams become self-directing as they make judgements concerning future project activities based on what is important to them.

The projects eventually resulted in the delivery of a final product for presentation to the end user (in this case Music Fusion). The videos were placed online to be used in a showcase for the organisation and were also presented as a case study at a national Youth Music conference (Youth Music being the government organisation that funds Music Fusion). The collaboration was widely praised as an exemplar of good practice for organisations such as Music Fusion.

Though the problem encounter on the surface seemed like a simple creative activity, it required the students to interact with their tutor, the university administration, Music Fusion, the groups of young people (who were all under 16 thus requiring Criminal Record Bureau checks and supervision at all meetings) and manage these activities in a sensitive and creative fashion. Consequently, even during the initial innovation stage of the project the students had started to engage with problem encounters from a multiplicity of problem domains. This is typical of the dynamic way in which media practice avoids simple categorisation in relation to static or linear problem-based learning models.

The complex of intersecting problem domains, the creative risks and opportunities at play and the trajectories of interpersonal dynamics all contributed to the production of these videos. However, very little of the learning experience was actually expressed in any concrete way within the final video. Surely 'the application of cognitions, insights and judgements' (Barnett 1994, 59) during the process of the project might have led to the development of higher level skills even if the final video had been quite poor. The two outcomes are not synonymous and consequently assessing student performance based only on a final output fails to recognise the embeddedness of learning in practice-based subjects. So Constellation 3 concludes with a piece of individual critical reflection from students who are encouraged to evaluate their own performance against the aims and objectives set out in their 'PID'.

The case study shows the way in which Constellation 3 is risk driven, employs Agile Project Management principles, highlights higher level critical and creative skills development, embraces uncertainty and recognises the range of intersecting problem domains at play throughout the life cycle of a project.

Discussion

Adopting Constellation 3 in practice-based disciplines, such as that of media practice, would help to improve student engagement. This is particularly important at a time when, in recent years, a number of authors have undertaken extensive reviews of the international research literature to investigate student engagement in higher education. The reviews of the student engagement literature conducted by Trowler and Trowler (2010) and Zepke and Leach (2010) offer a snap shot of a broad phenomenon that encompasses academic as well as selected non-academic and social aspects of the student experiences. Studies included in the reviews highlight themes relating to how students engage with their studies and what they, institutions and educators can do to improve engagement (and retention) including the roles

of institutional structures and cultures; a focus on learning design and how educators practise and relate to their students (Bailey and Garner 2010); student agency and motivation (Hockings et al. 2008); and the impact of environmental factors such as family, relationships and economic status (Case 2007).

Savin-Baden (2007b) positions learning as an ontological experience mediated within a 'spatial ecology' that is constructed through the interplay between 'striated and smooth space' (Deleuze and Guattari 1988). Here, striated space represents the tendency of institutions to deploy rigid instrumental structures that seek to regulate and bind students, whereas smooth space, an undulating plane of changing positions and relations, is characteristic of learning. Since smooth and striated spaces 'pervade one and another, and possibly emerge from each other and invade each other' (Savin-Baden 2007b, 15), the tension must be seen as intrinsic. Caught up in this interplay between smooth and striated spaces, students take an interstitial position, the boundaries of which are negotiated in response to problem encounters. This is the space then within which knowledge is generated and operated upon by students engaged in a project team.

The interstitial spatiality occupied by students undertaking project work is characteristic of a movement 'betwixt between' (Turner 1967, 1969) the striated space of the institution and the smooth space of learning. This is the liminal space, that of project space. For Turner, the liminal state is the precursor to the ontological shift and signifies an 'interstructural situation'; that is to say, there is a reordering of the subject's socio-cultural relationships. In the liminal mode, the subject becomes a 'transitional being' (Turner 1969, 93–95) for which confusion and ambiguity become the norm. As they emerge from the liminality of project space, their new status is recognised by their community but importantly it is also something they recognise within themselves. The project functions as a container for such enquiry (see diagram in Figure 1) bounding an interstitial space for creative practice, bridging the duel axis of learning space and operational project management methodologies.

The initial, innovation phase of the model is a discovery or problem analysis phase which foregrounds the development of critical thinking and creative problem-solving skills as an embedded component of a project's process. The second implementation phase focuses on learners acquiring knowledge to 'do' as they 'implement' their creative ideas and is essentially interdisciplinary. It 'bridges the gap between the know-how and know-that and between the different forms of disciplinary knowledge in the curriculum' (Savin-Baden 2000,

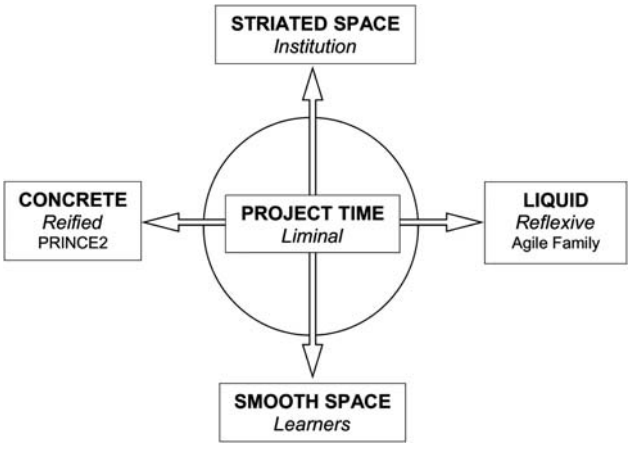

Figure 1. Constellation 3 PL-PBL model.

130). Thus, the Constellation 3 model offers a distinct *spatial ecology* with which educators can begin to re-frame a sense of creative practice as a pedagogic undertaking – a learning space in which students are able to realign their conceptions of knowledge, self-hood and their personal position in relation to others. One in which students are able to challenge the orthodoxy of traditional approaches to teaching and begin to see themselves as the constructors of their own learning through reflective praxis.

Conclusion

Constellation 3 perhaps signals a shift away from a pedagogy based on epistemological enquiry towards one of ontological enquiry in which students engage with their own identity as learners in a world of uncertainty. The model offers a way forward in the design and delivery of practice-based curricula, one that has a real-world value to students. Constellation 3 opens the door to the adoption of a range of tools offered by contemporary approaches to project management, such as those offered by Agile methodologies. It engages with the question of 'what it is to do a project' in a way that recognises the particularities of this concept.

What it means to facilitate this kind of learning will depend upon a whole cluster of factors that include the types of knowledge engaged with, the values engendered in facilitation and the extent to which students are encouraged to develop student–student interaction through such programmes. It is suggested that the use of Constellation 3 will facilitate the structuring of a dialogic space where all forms of knowledge, problem solutions and situations are questioned. This approach accepts, as a fundamental precept, that meaning is constructed through critical dialogue and an encounter with uncertainty.

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