10 Developing students' creativity

Searching for an appropriate pedagogy

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Introduction

> The search for ways to enhance creativity to help people develop more of their potential . . . is a reasonable question in the absence of compelling evidence that such a search is futile.
>
> (Nickerson, 1999: 392)

The preceding chapters have elaborated teachers' and students' views of the meanings of creativity in higher education contexts that are relevant to them. The primary aim of this chapter is to help teachers and students to 'develop more of their potential'. We are looking at (a) the potential of students to develop their creativity and (b) the potential of teachers to develop strategies to support this.

In order to do this, we have been through our own creative process: questioning, building on intuition, trying out ideas, connecting previously unconnected resources. The results then had to be tempered with a more analytical approach: evidencing, interpreting, refining, elaborating and then checking our ideas with well-informed peers (John Cowan and John Biggs) who used their objectivity and creativity to evaluate our thinking. It was very much a socially constructive process.

We also want to provide practical support where we can, so we have been engaged in selecting, exemplifying, suggesting resources, with a view to operationalising the most useful theories we have encountered (Appendix 10.2). Because this has inevitably left a complex trail of thinking and writing that we did not want to lose, we have incorporated some of the details in Appendix 10.1.

Our hope is that by elaborating the questions that have driven our search for appropriate pedagogies, our responses to these questions, and our search for theoretical underpinnings to substantiate our reasoning, we will help and encourage other teachers to engage in their own searches and sense-making. We have embarked on a journey that we think will lead to creative development – and we want to make our route explicit. We began our journey by asking what we thought were important questions about creativity and its place in a higher education (Figure

10.1, column 1). Our responses to the questions (column 2) have been informed by the theoretical perspectives mentioned in the third column. In this way we have begun to extend and integrate various ideas from the literature and evolve our own thinking. Further elaboration of Table 10.1 can be seen in Appendix 10.1.

These themes are explored in the following section. The final section of the chapter concentrates on the last question and explores a model that may be helpful.

Features of creativity and creative people

Some characteristics of creativity

One of the problems with creativity is that it is difficult to understand and explain. Chapters 4–9 show the rich variety of perspectives on creativity of students and teachers in higher education. One of the purposes of our sense-making for teaching is to try to represent creativity in ways that can be operationalised.

In a list that was generated by the Imaginative Curriculum project, academics associated the following features with creativity and creative people (Jackson and Shaw, this volume, Chapter 8):

- Being imaginative, generating new ideas, thinking out of the boxes we normally inhabit, looking beyond the obvious, seeing the world in different ways so that it can be explored and understood better.
- Being original. This embodies:
  - the quality of newness, for example: inventing and producing new things or adapting things that someone else has invented; doing things no one has done before; and doing things that have been done before but differently;
  - the idea of significance – there are different levels and notions of significance but utility and value are integral to the idea.
- Exploring, experimenting and taking risks, i.e. processes for searching in order to find or discover often involves journeying into the unknown.
- Skills in critical thinking and synthesis – the ability to process and analyse data/situations/ideas/contexts and to see the world differently as a result.
- Communication – often through story-telling that helps people see the world you have created or helps you see the worlds of others.

These characteristics bear a striking resemblance to the characteristics of creativity recognised by the QCA (2004) and being promoted in schools (see Craft, this volume, Chapter 3). The QCA suggest that creativity involves pupils in: questioning and challenging; making connections, seeing relationships; envisaging what might be; exploring ideas and keeping options open; reflecting critically on ideas, actions and outcomes.

Furthermore, when the characteristics of creativity are operationalised in disciplinary practices (Jackson and Shaw, this volume, Chapter 8) they begin to

Table 10.1 The reasoning underlying our strategy for the development of students' creativity

Questions	*Responses*	*Conceptual influences and relevant research*
What are the creative abilities we want to develop?	Traits, abilities and characteristics of creative people and actions.	Perkins' (1981) six trait model of creativity coupled to Imaginative Curriculum findings.
	It depends what level they are at.	Taylor (1959) on levels of creative engagement and Dreyfus and Dreyfus (1986) on levels of skill acquisition In HE – in this volume, Edwards *et al*., Chapter 6, Fryer, Chapter 7, Jackson and Shaw, Chapter 8, Dineen, Chapter 9.
How do creative abilities at different levels fit into HE learning?	They form a set of abilities along with others required by successfully intelligent people. Success in a domain requires an appropriate balance of these	Sternberg and Lubart's (1996) triarchy of abilities. De Corte's (2000) explanation of expertise in a domain. Taylor (1960) on levels of creative engagement. Dreyfus and Dreyfus (1986) and Dufresne *et al*. (1995) on the skills, knowledge and behaviour that move a person from novice to expert.
How does a person achieve a successful utilisation and balance of their own abilities?	Through self-regulated learning . . .	Zimmerman (2000) and Zimmerman and Schunk (2004).
	. . . supported with feedback to improve learning.	Nicol and MacFarlane-Dick (in press).
How does a learner learn to self-regulate? What are the relationships and limits of self-regulation and cognitive apprenticeship with respect to creativity?	Through cognitive apprenticeship. Some processes seem to be tacit and invisible or emerge when there is no focus. Nevertheless, creativity relies on other modes of thinking for its execution.	Collins, *et al*. (1991).
What type of teaching and learning systems might encompass self-regulation and cognitive apprenticeship while promoting creativity?	One that emphasises and pays attention to the relationships between student, teacher and task.	Polanyi (1966) Schön (1983) and Claxton (1997). Dunne, in Jackson *et al*. (2004) adapted here specifically for creativity. Biggs' (2002, 2003) notion of constructive alignment.

resemble the features seen in generic models of creativity such as the well-known 'Snowflake' proposed by David Perkins (1981) which include:

- High tolerance for complexity, disorganisation and the messiness of life.
- Ability in problem finding and discovery modes of being.
- Mental mobility and ability to change perspectives.
- Willingness to take risks and the ability to accept and learn from mistakes.
- Skill in critical thinking, enabling ideas to be evaluated.
- Strong self-motivation and self-determination to accomplish goals.

The idea behind the snowflake model – that different individuals possess 'creative' traits or talents in different measures all contributing to their unique profile – is also relevant to our enquiry into supporting and developing creativity in students. This connects very nicely with the idea that creativity is part of a person's identity; their way of being and becoming (see Oliver *et al*., this volume, Chapter 5 and Dineen, this volume, Chapter 9 to learn what students say).

Domains and levels where creativity is found

Creativity exists and operates on a continuum from inventions and interventions that change the world, through those that change a domain (like physics), to those that have local and personal significance: 'a sort of "personal effectiveness" in coping well with unknown territory and in recognising and making choices' (Craft, this volume, Chapter 3). In higher education, as in schools education, we are primarily concerned with the latter but we must aspire to prepare people to take on challenges at the level of creative change in their chosen field of endeavour.

It is important to recognise the significance of level; there will be differences in creative responses between those students who are just starting at university and those just leaving to go into employment. If universities are doing their job properly, when students complete their programme they should be able to apply their creativity at a more advanced level of complexity then when they started (i.e. they will have developed a number of creative abilities and be able to use these in combination with the knowledge and skills they have developed while at university). We consider that a higher education that has not achieved this has not fully developed students' potential. We certainly hope that they do not leave displaying *less* creativity than when they arrived or that they are less inclined to creative enterprise than before their higher-education experience.

It is interesting to compare what writers about creativity and expertise say about level – and this comparison does anticipate and provide a link to our next question. An example of each is given in Table 10.2 – interestingly, both examples propose five 'steps'.

There are many interesting features about these two lists and it is instructive to try to map one on to the other. Here, however, we want to highlight two key points; about the conscious following of rules and the role of intuition.

Table 10.2 Steps in creativity, knowledge, understanding and skill acquisition

Taylor (1959) The Nature of Creative Process	*Dreyfus and Dreyfus (1986)* Mind Over Machine
Five levels of creative engagement (of an artist)	Five stages of skill acquisition from novice to expert
Primitive and intuitive expression – as in children and untrained adults.	**Novice** – following learned rules.
Academic and technical level – skills and techniques leading to expression.	**Advanced beginner** – knowing what to do in a particular situation.
Inventive level – experimentation with academic level, pushing boundaries.	**Competence** – recognising important factors in a complex situation and making decisions based on them.
Innovative level – breaking boundaries, being original, still based (unconsciously) on academic level.	**Proficiency** – intuitively responding to patterns.
Genius level – ideas defy explanation.	**Expertise** – knowing what to do, fluid performance.

In both schemes the fourth and fifth levels are associated with unconscious decision-making, but *only* after a person has gone through the earlier levels. While rule-following characterises the earlier stages, rule-bending/breaking and creating new rules characterises more advanced stages. Furthermore, Dreyfus and Dreyfus (1986: 36) claim that conscious use of rules by an expert can lead to 'regression to the skill of the novice, or, at best, the competent performer'. Experts operate at a level of high involvement, not rationally but intuitively.

Intuition appears at the very first level of the description of artistic engagement and in the final stages of the skill-acquisition model. Here it might seem that the coincidences between the models break down, but this is not necessarily so. We believe that intuition and insight are relevant in all situations and at all levels. People are creative and intuitive already because of existing experience (especially children perhaps) but to be creative and intuitive in a particular domain or a particular skilled practice depends on an earlier process of developing the skills and experiences of that practice.

We now want to investigate further the notion of the differences between expert and novice performance. We aim to make explicit some of the processes that need to support students' development towards the expert end of the spectrum.

Dufresne *et al*. (1995) provide a fascinating model of knowledge, cognition and learning developed to explain the differences in the way novices (students) and experts (e.g. teachers) store and use knowledge in a domain (their domain was physics) for the purpose of problem working. Their explanations and visual representations of the clustering and linking of different sorts of knowledge in different problem-working contexts for novices and experts are noteworthy for the way in which operations that we associate with creativity – like exploration and visualizing and representing problems – are embedded within notions of analytical and reasoning processes.

Table 10.3 Summary of expert–novice differences in any domain (Dufresne *et al*., 1995)

	Experts	*Novices*
Knowledge characteristics	Large store of domain-specific knowledge	Sparse knowledge set
	Knowledge richly interconnected and hierarchically structured	Disconnected and amorphous structure
	Integrated multiple representations	Poorly formed and unrelated representations
Problem-solving behaviour	Conceptual knowledge impacts problem-solving	Problem-solving largely independent of concepts
	Performs qualitative analysis	Manipulates equations
	Uses forward-looking concept-based strategies	Uses backward-looking means and techniques

Table 10.3 summarises some of the differences between experts and novices that cognitive research has studied and revealed (Dufresne *et al*., 1995). We can perhaps begin to see how the creativity of an expert used to access and 'play' with the large stock of different sorts of knowledge will result in very different outcomes from the creativity of a novice with a smaller and more limited range of knowledge types.

Dufresne *et al*. (1995) refer to their own research in which they have shown that it is possible for students to learn how to develop 'expert-like' strategies. Does this mean that students are able to draw on their creativity and intuition at an earlier stage than we usually give them credit?

What does all this mean for higher education?

Creativity in the context of complex learning

Higher education prepares students for learning that is complex. John Biggs (in Jackson, 2002: 4) associates creativity with the extended abstract (EA) thinking skills like hypothesising, synthesising, reflecting, generating ideas, applying the known to 'far' domains, working with problems that do not have unique solutions. These are all outcomes that we hope to achieve from a higher-education curriculum. These sorts of outcomes enable us to relate an existing principle to previously unseen problems and ultimately go beyond existing principles to discover new things (Biggs, 2003: 49).

But creative abilities do not stand in isolation. They have to be blended and connected to other sorts of ability and capacity. Indeed, the act of blending and utilising different abilities, knowledge and capacities to achieve a goal is itself a creative act. Sternberg and Lubart's (1995) triarchic model of abilities offers a perspective on the position of creativity with respect to other abilities that learners have to use:

> Successfully intelligent individuals succeed in part because they achieve a functional balance among a 'triarchy' of abilities: analytical abilities, which are used to analyze, evaluate, judge, compare and contrast; creative abilities, which are used to create, invent, discover, imagine; practical abilities, which are used to apply, utilize, implement, and activate. Successfully intelligent people are not necessarily high in all three of these abilities, but find a way effectively to exploit whatever patterns of abilities they may have.
>
> (Sternberg and Lubart, 1995)

This quotation provides a context in which to view abilities and it avoids a narrow stereotyping of creativity, because, as one respondent to our studies commented, it 'exceeds the idea generating technique'. It was clear from the responses of academics that this integrated view of creativity is more in tune with their notions of complex learning in the higher-education context than lists of characteristics of creativity.

Sternberg and Williams (1996) point out that creativity must be appropriately balanced with analytic and practical skills:

> Everyone, even the most creative person you know, has better and worse ideas. Without well-developed analytic ability, the creative thinker is as likely to pursue bad ideas as to pursue good ones. The creative individual uses analytic ability to work out the implications of a creative idea and to test it. . . . The creative person uses practical ability to convince other people that an idea is worthy.
>
> (Sternberg and Williams, 1996: 3)

The key point that Sternberg and his colleagues are making is that there is a need for the blending and balancing of abilities to suit the context. The role for creativity will be different for different people, and different for the same person in different contexts. It will need to be supported appropriately by the other abilities if it is not to result in behaviour that stays at a simple level of 'zany' or 'off the wall'. Our job as educators is to create challenging situations for learning where learners are able to draw on and balance different abilities and discover for themselves how they can use their creativity in particular learning contexts. However, the final responsibility for engaging in this way rests with the learners themselves. This necessitates the development of learners who are independent and self-motivated and learning environments which encourage students to move from dependency to independency (Dineen, this volume, Chapter 9).

People who are successful and become expert in their chosen fields are good at drawing on and balancing their specialist knowledge, talents and abilities, and motivating themselves to achieve the goals that are subordinate to their chosen activities. De Corte's (2000: 253) explanation of expertise in a domain (in his context, mathematics) helps us to understand how they achieve this balance. He identifies four categories of aptitudes, namely:

- A well-organised and flexibly accessible domain-specific knowledge base.
- Heuristic strategies for problem analysis and transformation.

- Metacognitive knowledge and self-regulating beliefs.
- Positive beliefs, attitudes and emotions related to the domain.

We have already seen how the first two of these categories are transformed through different levels of practice. The third category gives us an indication of how this might happen. We are going to use the model of self-regulation developed by Zimmerman (2000) and others to help represent some of the complexity of how we achieve utilisation and integration of a repertoire of abilities in problem working.

Creativity and self-regulation

Being creative involves both conscious and deliberate acts and things that are done or understood which do not seem to be the product of deliberate thinking and action, for example the sudden insight or flash of inspiration. But people make decisions about thinking and behaving in certain ways in a particular situation, as a result of which new ideas, products and performances are more likely to emerge. They are regulating what they do through their knowledge of the domain and their previous experiences of working in the domain in similar situations or extrapolating what they know into a situation they are encountering for the first time. It seems relevant, therefore, to examine the well-researched model of self-regulation developed by Schunk and Zimmerman (Schunk and Zimmerman, 1994, 1997, 1998; Zimmerman, 2000; Zimmerman and Schunk, 2004), and others, to see how creativity might be involved in self-regulation and vice versa: 'self-regulation refers to metacognitive, behavioural and motivational processes and beliefs used to attain personal learning goals in specific contexts' (Zimmerman, 2000: 221).

For Zimmerman and colleagues, there are three sources of control underlying self-regulation: personal, behavioural and environmental. Each of these sources is also changing during learning, and each source must be self-monitored and adjusted using feedback mechanisms constructed by the learner. For more on this, see Zimmerman (2000: 222) and also Nicol and MacFarlane-Dick (in press), who consider what is required to support such a process. Highly self-regulated people are strategically flexible, environmentally resourceful and perceptive of personal agency. Creative people have these qualities in abundance, as we saw earlier.

There are three phases of self-regulation, all of which engage learners' processes and beliefs:

- *Forethought* – thinking about tasks, problems and contexts ahead of action.
- *Performance* – when ideas and strategies feed into actions as they happen.
- *Self-reflection* – replaying and mentally re-experiencing the performance.

Creative people will recognise some of the processes that will be engaged during these phases of self-regulation.

Forethought: Because of the beliefs they hold, creative people are good at

using their imaginations to create projects that interest and motivate themselves; that give them a sense of purpose. They have an intense curiosity to understand and explore something that helps them turn things they have to do into things they want to do well. They set themselves challenging goals and are able to orient their goals towards mastering something as opposed to simply achieving an objective or fulfilling a task – they are as interested in the process as in the outcome. They are ambitious in their goal setting and imaginative and original in the strategies they employ to achieve their goals.

Performance: Self-observation will help a creative person to monitor performance and the conditions that surround and influence it. This process (also called 'reflection in action') enables people to adjust their actions and performance in response to their observations on the impact they are making. The performance is the place where creative ideas are turned into real things, e.g. writing, designs, constructions, performances, conversation, playing football, teaching!

*Self-reflection***:** This phase combines imagination for re-experiencing the performance and perhaps considering how it might have been, with the more critical processes of evaluation and self-assessment.

Zimmerman and Schunk (2004) draw the distinction between proactive and reactive self-regulators. Reactive learners avoid forethought and attempt to regulate functioning during and after performance, whereas proactive learners engage in forethought in order to improve the quality of subsequent actions. It is tempting to speculate that it is the proactive self-regulators who are more likely to make use of their imaginations and creativity to achieve their goals.

Cognitive apprenticeship to support self-regulated learning

So far, we have identified some of the creative attributes and processes that we want to develop in students, along with the need to consider them in the contexts of their domains and levels. How does a learner learn to self-regulate and harness their creativity?

The short answer is through lots of experience and practice of self-regulating themselves and observing how others regulate themselves, including their teachers! We are suggesting that a good route to the development of self-regulatory capability and creative awareness and skills is through the process of a cognitive apprenticeship (Collins *et al*., 1991). These authors explore traditional apprenticeship phases of modelling, scaffolding, fading and coaching, and consider how far the metaphor can be extended to cognitive work. They found three important differences:

- In cognitive apprenticeship, the process of carrying out a task to be learned is usually not so easily observable as in traditional craft-based apprenticeships, so the teacher's thinking must be made visible to the students and the student's thinking must be made visible to the teacher. By bringing these tacit processes into the open, students can observe, enact, and practise them with help from the teacher and from other students.

- In a traditional apprenticeship, tasks emerge naturally in the setting in which they are needed. Learning is entirely relevant and related to the situation in which it is needed. That is often not the case in higher-education learning environments where so much learning is abstract and divorced from real-world environments. There are moves to create 'authentic' learning and these are helpful in making cognitive apprenticeship more meaningful and, we believe, more likely to promote creativity.
- In craft-based apprenticeships the skills are inherent to the task itself, e.g. carpentry, plumbing, etc. In cognitive apprenticeship the skills are intended to be transferable from one problem-working situation to another. This requires students to develop metacognitive and self-evaluation skills so that learners become able to generalise the skill, to learn when the skill is or is not applicable, and to transfer the skill independently when faced with novel situations.

The idea of creative apprenticeship has been developed and is successfully being applied in school education (Craft, this volume, Chapter 3). We are proposing that the sorts of creative development that higher education can support is best achieved through the model of cognitive apprenticeship.

Relationships between self-regulated learning, cognitive apprenticeship and creativity

For some readers, the above might appear *too* cognitive for a discussion about creativity. It might seem to ignore some of creativity's more esoteric aspects and also to deny the type of experiences that we can all recognise:

> the truth is that our ideas, and often our best, most ingenious ideas, do not arrive as the result of faultless chains of reasoning. They 'occur to us'. They 'pop into our heads'. They come out of the blue. When we are relaxed we operate very largely by intuition.
>
> (Claxton, 1997: 49)

Claxton believes that intuition has been inappropriately disdained, and describes 'a body of research which shows that intuition is more valuable and more trustworthy than we think' (Claxton, 1997: 50). In promoting self-regulation and cognitive apprenticeship, we are not denying the role of intuition – indeed, it has already emerged in our discussions about level. It is also very important to recognise that some creative processes seem to belong to the tacit dimension (Polanyi, 1966) and to result in professional decision-making that cannot be defined in textbooks. Here Donald Schön's (1983) ideas of reflection-in-action as performed by reflective practitioners usefully combine the notions of self-regulation and intuition. John Cowan's (1998) expansion of the distinctions between different types of reflection – for, in and on action – seem to correspond to the phases of forethought, performance and self-reflection that we have already discussed, without ruling out the notion that a creative practice may be occurring.

> In all such artistic processes, including those which occur in educational situations, there are critical moments of feedback, of taking stock, of applying general principles (and of deliberately and consciously going against some accepted principles or criteria) all of which involve reflective thought and judgement.
>
> (Cowan, 1998: 31)

So yes, creativity may sometimes be tacit and invisible (which may cause problems for assessment) and may appear to come 'out of the blue', but intuition, like imagination, tends to be balanced with critical thinking (a point also acknowledged by Claxton, 1997). It is not always (nor often) a case of either/or.

Effective teaching and learning systems

Dunne (in Jackson *et al*., 2004) is developing a model for an effective teaching and learning system based on the best empirical evidence derived from a systematic review of the research literature that focused on the effects of reflection and action planning on students' learning outcomes – key components of self-regulation. The model highlights the complexity of the factors and interactions that influence students' learning outcomes.

We are making the assumption that these are important characteristics for most teacher-facilitated learning environments and therefore important in our own search for an appropriate pedagogy to support the development of students' creativity. The significance of this model is that it is grown from best empirical evidence of situations that had measurable beneficial impacts on students' learning, i.e. it is grown from teaching and learning practices that are known to be effective in achieving intended learning outcomes rather than theories of what effective practice ought to be

> this model suggests is that every learning and teaching situation ... is underpinned by a complex set of conditions relating to the inter-relationship between student, teacher and task. It also suggests that any teacher, to gain maximum impact, must be deliberately aware of these relationships and the ways in which they are likely to impact on any kind of provision and any learner response. This could be of particular interest in the context of ... innovation in general, where – for example – students may not be motivated to try out new ways of working, where they may not have adapted appropriate cognitive and metacognitive strategies, and may find this difficult without support, and may hence lose perceptions of efficacy – again impacting on motivation.
>
> (Dunne, in Jackson *et al*., 2004)

We would expect that the components of an effective teaching and learning system to support development of students' creativity would be connected and aligned in the sense of John Biggs' notion of constructive alignment (Biggs,

1999, 2002, 2003). One thing that we would like to emphasise in this complex set of relationships, is the crucial issue of teacher–student relationships (see Dineen, this volume, Chapter 9). A useful perspective on this was provided by one of our peer reviewers.

Learner characteristics	Teacher activity	Task
Any approach, or motivation towards a task, or learning in general is dependent on the learner's: • Attitudes/values towards learning *in general, or particular types of learning* or towards particular tasks. • Conceptions/beliefs of what it means to learn, to be a learner in any particular context. • Physical disposition, e.g. fatigue. • Possession of a repertoire of skills appropriate to the tasks. • Possession of a repertoire of cognitive strategies appropriate to performing any particular task. • Possession of metacognitive strategies, i.e. knowledge and awareness of their own cognitive processes. • Ability to actively control and manage their own cognitive and metacognitive processes (executive control). • Perceived self-efficacy.	Any approach, or motivation towards a task or learning in general is dependent on the teacher's mode of presentation of the academic task/learning processes/reflective approaches, and consolidation through: • Appropriate structuring of knowledge bases, dependent on a detailed knowledge of the academic content to be learned. • Attention to appropriate learning strategies for students, dependent on a knowledge of cognitive and metacognitive processes and how learners can be encouraged to use these. • Ability to predict and deal with variety of student's cognitive abilities, motivations, etc. • Ability to demonstrate and model approaches to required outcomes. • Ability to promote thinking through questioning and challenging. • Attention to written instructions and examples that reinforce spoken instructions. • Providing timely feedback, verbal and/or written, or computer-based. • Ability to match assessment to the intended learning outcomes.	Any approach, or motivation towards a task or learning in general is dependent on the teacher's: • Demands – level of difficulty. • Perceived appropriateness. • Manner of presentation. • Representation and opportunity provided for intended learning outcomes. • Modes of assessment and criteria that are matched to intended learning outcomes.

Figure 10.1 The complex interactions and interdependencies between teacher, learner and task. (Developed by Elisabeth Dunne from the results of a systematic review of the empirical evidence that reflection combined with recording and action planning improves students' achievement. (source Jackson *et al.*, 2004)).

> My experience . . . is that the relationship between tutor and student is of critical importance, depends upon features which I have still to pinpoint and seems to depend on those vital early exchanges which can make or break the quality of the relationship. It's a relationship in which students feel able to reveal and discuss innermost ways of thinking, and tutors can empathize and at times demonstrate congruence, from their own experiences . . . their effect in initiation, rejection, doubts, acceptance, enthusiasm at the outset, is critical to successful learning.
>
> (John Cowan, pers. comm., 2005)

We can very readily relate this complex set of relationships and interdependencies to the idea of the cognitive apprenticeship (Collins *et al.*, 1991), the basis for our pedagogic model to support development of students' creativity. Figure 10.2 attempts to contextualise the complex set of relationships identified by Dunne (teacher–student–task – which we take to include environment and context) within a model of a teaching and learning system that is purposefully designed to promote students' creativity.

A strategy for developing students' creativity

The pedagogic model outlined above is a simple visual representation of a complex process, set of conditions and relationships pertaining to the environment for learning. We need to convert this into something that can be operationalised by a teacher. Each teacher will search for and invent their own way of doing this in a way that is appropriate for their context. Our search has led us to the following assumption-led strategy.

- That higher education encourages the acquisition of domain-specific knowledge and skills. Students cannot be creative in a domain if they are not knowledgeable about the domain and/or if they don't care enough about the domain to want to achieve within it.
- If we want to develop students' creativity, we have first to develop our own understandings about what it means in the contexts for our teaching. Through such understanding we can be clearer about the types of creativity we want to encourage.
- A good way to help students learn about creativity is for a teacher to reveal their own creativity and show students what it means to them in their own practice, appreciating that this may be easier said than done.
- But showing students what it means to us is not enough. We have to help them articulate and construct their own meanings of creativity for the contexts in which they are studying and learning. And we have to show them that we value their understandings rather than simply our own. It is these perceptions that shape their beliefs and fuel their intrinsic motivations – widening the range of perceptions is perhaps the most important thing we can do as teachers to develop students' creativity. There are both individual and collective dimensions to meaning-making, which engages directly with

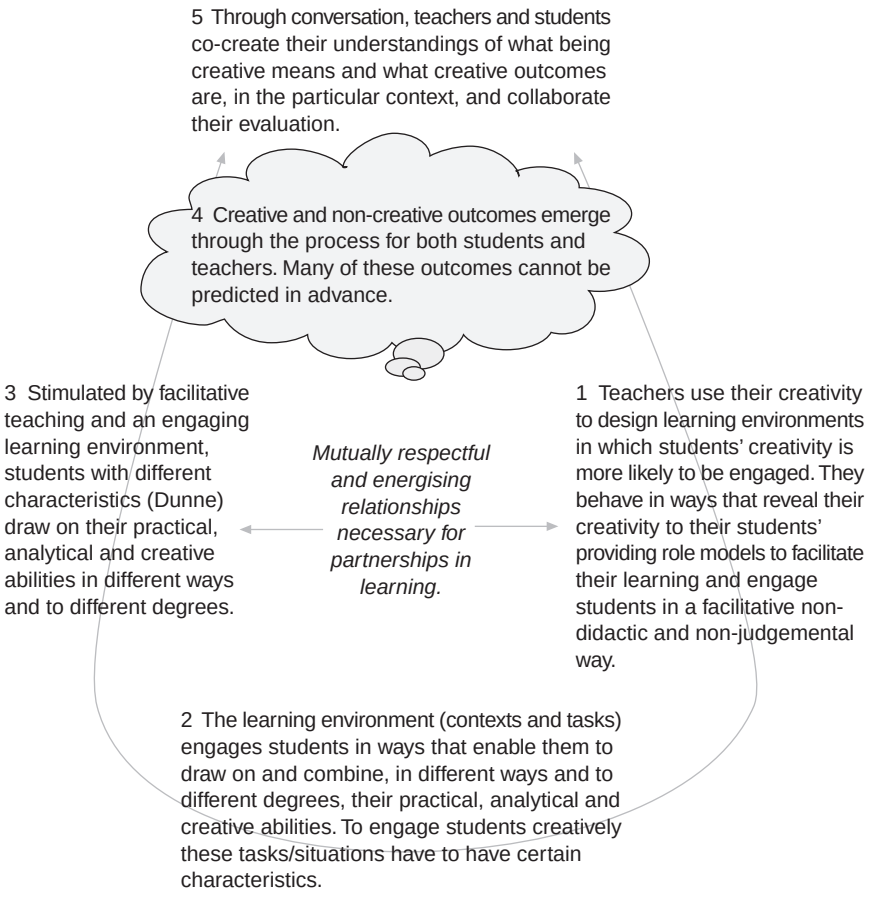

Figure 10.2 Model of a teaching and learning system designed to help students develop their creative potential. It embodies the complex set of relationships and interdependencies elaborated in the model by Dunne Figure 10.1). The whole environment demands a self-regulating approach to learning, and teacher and students collaborate in cognitive apprenticeship (Collins *et al*., 1991).

the extended abstract field of creative outcomes (Biggs, 2003). The use of web logs can be helpful in engaging students and accumulating their understandings, and provides them with a practical illustration of how knowledge can be socially constructed.

- We have to give students opportunities to experience and practise their creativity by creating the curriculum spaces, conditions and experiences that are stimulating, relevant and authentic to their field of study. Challenging problem-working contexts provide favourable environments for practising to be creative.

- We might go further by introducing specific strategies for encouraging students to develop a repertoire of thinking skills that might help them to think freshly about the things that they have to give attention to.
- Finally, we need to develop students' capacity to recognise and capture their own creativities and help them make claims that can be substantiated. They have to be critical evaluators of their own creativity as it is manifested in the learning enterprises in which they are engaged.
- The feedback gained through this strategy should enable teachers to refine their thinking and facilitation skills. The collective learning of students and teacher can be used as a resource for learning and for students in the future

This strategy is consistent and overlaps that proposed by John Cowan (this volume, Chapter 12) for the evaluation of students' creativity.

Information resources to support this strategy

A core purpose of the Imaginative Curriculum project is to develop information resources to help higher-education teachers to think about and operationalise the idea of creativity. The repository for much of this information are the Imaginative Curriculum web pages. These pages are continually being updated so the resources that are identified in Appendix 10.2 will, with time, be extended. Indeed we hope that readers will contribute ideas and materials to the site.

Concluding remarks

In drawing this account of our search for an appropriate pedagogy to a close, we imagine that some readers will be disappointed by us not giving clear, unambiguous advice about how a higher-education teacher might facilitate students' creative development. There are resources like the Sternberg and Williams (1996) e-booklet, the CASE creative thinking skills booklet edited by Caroline Baillie (see this volume, Chapter 11) and John Cowan's excellent description of a process (this volume, Chapter 12) that provide practical ideas and illustrations on how to facilitate and evaluate students' creativity. But we believe that the process of searching and constructing meanings and understandings is important in the development of personal pedagogies, so we have opted to provide an account of our own sense-making and a navigational aid to what we think are useful and stimulating resources, and leave the rest to the professional skills and imaginations of our readers.

Appendix 10.1

The reasoning underlying our strategy for the development of students' creativity in higher education

Important questions about the role of creativity in higher education	*Our responses to these questions*	*Research influences and theoretical underpinnings*	*Pedagogic implications*
Why should higher-education teachers try to develop the creative attributes and potential of their students?	Creativity is an important part of a person's identity and capability. It is central to being and becoming. Higher-education teachers have a moral obligation to develop students' potential so that they become successful and fulfilled learners and achievers throughout their lives in an increasingly fast-changing world.	Oliver *et al*. (this volume, Chapter 5) *'even where creativity was not taught, not considered teachable and not valued in assessment, it was still relevant in defining how the students saw themselves.'* Barnett and Coate (2005) – to be successful in an age and world of uncertainty – the need to develop higher-education curricula to embrace not just knowing and acting but also being.	Creativity has to be explicitly recognised and valued within the outcomes of a higher education. Teachers need to understand what creativity means in their disciplinary fields and to create learning environments and experiences so that students experience and learn to use their own creativity to accomplish their learning goals.
What are the creative abilities that higher-education might develop?	Creative abilities are traits and characteristics attributed to creative people or actions that lead to creative outcomes. A wide range of creative abilities are recognised in	Imaginative curriculum research has revealed a substantial list of abilities and capabilities that academics associate with creativity in disciplinary study and practice contexts (this volume, Edwards *et al*., Chapter 6; Fryer, Chapter 7; Jackson and Shaw, Chapter 8).	Higher education needs to systematically develop knowledge of creative abilities in different disciplinary domains and learning contexts (e.g. problem working or performing contexts). Each teacher needs to develop their

Appendix 10.1 *continued*

The reasoning underlying our strategy for the development of students' creativity in higher education

Important questions about the role of creativity in higher education	*Our responses to these questions*	*Research influences and theoretical underpinnings*	*Pedagogic implications*
	higher education and they vary from subject to subject and the contexts in which they are applied.	There are many syntheses of core creative abilities. Perkins' (1981) six trait model of creativity is one useful example.	understanding of their own creativity in their disciplinary field and working practices.
	Creative abilities are not used in isolation, they are integrated with other sorts of ability and competency.	Sternberg and Lubart (1996) develop the idea of a triarchy of abilities (analytical, creative and practical).	Using models of creativity appropriate for the discipline and context, teachers need to create learning environments and experiences that will enable students to practice and develop the creative abilities that teachers think are important and also recognise those that students' believe are important. These abilities will however be integrated with more traditional academic abilities relating to critical thinking and the practice skills of the discipline.
	Ultimately it is the blending of creative and other capabilities, driven by an individual's motivation and self-belief that makes them successful.	De Corte (2000) offers a useful explanation of expertise in a domain – experts are people who mastered a lot of knowledge and skill and who are highly successful at solving problems in the domain. Biggs (2002) associates creativity with the extended abstract thinking skills outcomes of learning like hypothesising, reflecting, generating ideas, applying the known to 'far' domains', working with problems that do not have unique solutions.	

If a person's creativity is intertwined with other sorts of thinking and abilities, what models of learning might provide us with a conceptual framework to help us understand how creativity features in students' learning behaviours and actions? How does a learner develop the complex learning behaviours, knowledge, skills, attitudes and beliefs that are embodied in the self-regulatory model of learning and being?	Learning, behaving and being is so complicated that it is helpful to have some conceptual reference points to guide the thinking and decisions of higher-education teachers, and to help them understand how a pedagogic strategy might influence students. Higher education is good at developing a person's capacity for complex learning (which includes their creativity) typically in discipline-based contexts. Increasingly, HE has accepted responsibility for preparing students for a life of complex learning in contexts which are not discipline-based. We believe that the development of the attributes, abilities, competencies and self-efficacy embodied in the self-regulation model is best achieved through a cognitive apprenticeship that enables students to	The models of self-regulated learning (e.g. Zimmerman, 2000 and Zimmerman and Schunk, 2004), provide us with a comprehensive framework to help us understand how creativity might be integrated with thinking, performance, motivations, goal setting and critical self-evaluation. Self-regulation applies to all levels of expertise, from the novice to the expert. Collins *et al*. (1991) provide clear and understandable explanations of the idea of cognitive apprenticeship into which concepts of creativity might be infused. See also literature on tacit knowledge and intuitive thinking (Polanyi, 1966, Schön, 1983 and Dreyfus and Dreyfus, 1986).	Teachers would need to develop an understanding of self-regulation theory and test, through their own sense-making, whether it is relevant to their understandings and practice. Teachers would need to be prepared to act as role models for students to reveal their own creativity within the teaching and learning contexts in which they work. They would need to develop an understanding of the cognitive apprenticeship model of learner development and adapt the concept to their own disciplinary contexts and practices.

Appendix 10.1 *continued*

The reasoning underlying our strategy for the development of students' creativity in higher education

Important questions about the role of creativity in higher education	*Our responses to these questions*	*Research influences and theoretical underpinnings*	*Pedagogic implications*
	experience and understand their own self-regulatory behaviours. The literature on tacit processes underlying expertise is also relevant.		
What is entailed in cognitive apprenticeship?	Teacher – creating environment, providing a role model, formative feedback to aid development and self-regulation, coaching and guidance, stimulation. Learner – legitimate peripheral participation, doing, reflecting constructing meaning, using their creative abilities with other abilities and evaluating the effects.	Nicol and MacFarlane-Dick (in press). Various writers on social aspects of learning: e.g. Lave and Wenger (1991), Wells (1999)	Teachers would need to develop an understanding of the sorts of learning environments that challenged and stimulated students' creativity and enabled them to learn through the cognitive apprenticeship model. Cognitive apprenticeship models could be developed in each discipline.

Who evaluates whether someone has been creative or something is creative? And how is evaluation accomplished?	Evaluation is important in the model of self-regulation. It is central to the production of creative outcomes, to the recognition of creativity and to the valuing of creativity within a field. To become creatively successful requires people to develop the ability to critically self-evaluate their own creativity. Developing this capability is therefore an important part of cognitive apprenticeship.	Csikszentmihalyi (1997) elaborates the social–cultural concept of creativity and discusses self-evaluative processes of creative people. Balchin (this volume, Chapter 13) describes the idea of consensual assessment and how it might be used in HE; Cowan (this volume, Chapter 12) describes a pedagogic process to aid development of students' self-evaluation capacities.	In a teaching and learning context every participant – learners and teachers – must be involved in developing understanding of creativity for its evaluation. It is through this process that students and teachers individually and collectively come to understand what creativity means and how it is operationalised in the particular settings in which it is being required. John Cowan (Chapter 12) provides a very useful pedagogic model for how this might be achieved.
What type of teaching and learning system will embody these forms of teaching for successful learning?	A teaching and learning system that is designed to develop students' creative potential should embody the characteristics outlined in this table.	Dunne, in Jackson *et al*. (2004), drawing on best scientific evidence, identifies the complex set of interdependencies (teacher–student–task) that result in successful learning. Our model of a teaching and learning system for development of students' creativity (Figure 10.4) embodies these characteristics and the reasoning in this table.	A teaching and learning system to develop students' creative potential must engage with the features of creativity and the pedagogies that are known to be effective in promoting creativity.

Appendix 10.2

Ideas and resources to help teachers develop their own strategies to develop students' creativities

Some ideas to help teachers developing their own understandings about what creativity means:

- Structured/facilitated group discussions with teaching colleagues, perhaps using the workshop framework provided at: www.heacademy.ac.uk/2804.htm.
- Self-evaluation of one's own courses or teaching practices using a tool to aid reflection: www.heacademy.ac.uk/3016.htm.
- Where they exist, reading one of the Working Papers that describe academics' perceptions of creativity in a discipline: www.heacademy.ac.uk/2762.htm.
- Reading the synthesis of discussions within the Imaginative Curriculum network or notes of workshops conducted on various themes: www.heacademy.ac.uk/2804.htm.
- Preparing a short, reflective, personal account of a teaching scenario (or other example of professional practice like disciplinary or pedagogic research, consultancy or applied practice) in which you feel you have been creative, and using this as the basis for analyzing meanings of creativity. Such an account could provide students with a relevant example of creativity in the practice of teaching. See examples produced by other teachers: www.heacademy.ac.uk/3016.htm.
- Joining the Imaginative Curriculum network and participating in network events and discussions: www.heacademy.ac.uk/1778.htm.
- Wiki sites – and if you can add to them, so much the better! (Wiki = a web application that allows users to add and edit content) en.wikipedia.org/wiki/Creativity and www.crinnology.com/ Main_Page.
- Qualifications and Curriculum Authority (QCA) website resources for school teachers includes review of research literature on creativity in education. www.ncaction.org.uk/creativity/about.htm.

Leading by example.

'The most powerful way to develop creativity in your students is to be a role model' (Sternberg and Williams, 1996). The best way of showing students that you value their creativity is to show them what it means to you in your own practice.

- Cognitive Apprenticeship: Making Things Visible. www.21learn.org/arch/articles/brown_seely.html.
- 'How should I assess creativity?', this volume, Chapter 12. A practical illustration of cognitive apprenticeship in action.

Some ideas to help students develop their understandings of what creativity means.

The development of students' understandings of creativity is an ongoing process. They need to be able to capture their evolving perceptions and the teacher needs to facilitate the sharing and accumulation of perspectives across the group. This shared knowledge becomes an important resource for all involved in the process. Possible ways in which this might be achieved include:

- Structured/facilitated group discussions, perhaps using the question framework used by Oliver *et al*. In Chapter 5 of this book so that they can compare their results with what other students think.
- The strategy proposed by John Cowan in Chapter 12 of this book for engaging students in a creative discourse with professionals in their discipline.
- Where they exist, encouraging students to read part of the Working Papers that describe academics' perceptions of creativity in a discipline and facilitating discussion around these perceptions – is this the way students' see the world?: www.heacademy.ac.uk/2762.htm.
- Developing a weblog around themes like: my creativity; using my imagination; synthesis.

Creating the conditions and experiences that will enable students to experience and practice being creative and be able to observe you and other students being creative.

What Conditions and Environment Could Support Teachers in

- *Finding Space for 'Creativity' in their Work with Curriculum* by Jo Tait (2002). Empirical study with useful reflective aid: www.heacademy.ac.uk/resources.asp?process=full_record&section=generic&id=59.
- *Designing for Creativity*, Norman Jackson (2002) www.heacademy.ac.uk/3018.htm.
- Imaginative curriculum guides for problem-based, enquiry-led, context-based game-play, role-play and simulations and enterprise: www.heacademy.ac.uk/3018.htm.
- Examples of personal accounts of teaching to promote students' creativity: www.heacademy.ac.uk/3016.htm.
- Higher-education academy subject centre websites accessed via: www.heacademy.ac.uk.
- *How to Develop Student Creativity* by Robert Sternberg and Wendy Williams (1996):
  30-page practical guide framed around the investment theory of creativity. Provides an explanation of creativity and relates techniques you can use to choose creative environments, expose students to creative role models, and identify and surmount obstacles to creativity. Some of the techniques they explore include questioning assumption, encouraging idea generation, teaching self-responsibility, and using profiles of creative people.

- '*CASE Creativity in Art, Science and Engineering: How to Foster Creativity*' by Simon Dewulf and Caroline Baillie (1999). Sixty-four-page colour booklet which gives definitions of creativity, examines creative processes and creativity techniques and provides case studies of creative teaching. Available from the Higher Education Academy £5.
- *The Travelling CASE: Creativity in Art, Science and Engineering.* How to Foster Creative Thinking in Higher Education'. Online., available at: www.heacademy.ac.uk/3271.htm.
- John Welford's Brainware Map for Creative Learning: www.jwelford.demon.co.uk/brainwaremap/.
- Leslie Owen Wilson's ideas and concepts used in her course – 'The creative teacher': www.uwsp.edu/education/lwilson/creativ/index.htm.

Some ideas to help students develop their creative-thinking skills

The goal of many creative techniques is to achieve a shift in the perspectives associated with a problem or situation. Creative thinking techniques utilise a variety of tools and strategies to encourage this change in perspective and generate lots of ideas through divergent thinking processes. They might include the use of objects, sounds, images, habit-breaking strategies (challenging or inverting assumptions), imagination stimulators ('what if?'), search strategies (past experience and analogies or metaphors), analytical strategies (decomposition, problem reframing through 'how?' questions) and development strategies (compare and contrast, integrate). Idea-generating strategies are often linked to evaluative techniques to facilitate convergent or analytical thinking. The Imaginative Curriculum project explored four creative-thinking techniques (Creative problem solving, TRIZ, Medicine wheel and 'Mind and body' techniques) and their application to students' learning through a series of action research projects (Baillie, 2004 and this volume, Chapter 11).

- The Travelling Case: *Creativity in Art, Science and Engineering. How to Foster Creative Thinking in Higher Education,* edited by Caroline Baillie: www.heacademy.ac.uk.
- Innovation House (www.infinn.com/innovationhouse.html). Resources, tools, software, tutorials and information for creative thinking, lateral thinking, problem-solving, creativity and brainstorming.

Some resources to support questioning.

- A Questioning Toolkit from FromNowOn.org. a comprehensive set of strategies for asking essential questions; gives examples of the types of questions students can ask: fromnowon.org/nov97/toolkit.html.
- A framework for developing essential questions for student enquiry: fromnowon.org/sept96/questions.html.

Some ideas to help students develop their capacity to recognise and capture their own creativities and help them make claims that can be substantiated.

> The traditional principle of fair assessment, i.e. that all students are assessed in the same way and compared with each other through normative assessment on the same materials and individually, is inappropriate for the assessment of creative work. What has to be understood is that to treat everyone the same when people are so obviously different from each other is the very opposite of fairness. Instead, students are assessed in their performance against their potential and as a rule on the basis of negotiated learning agreements, largely on work presented by them in portfolios based on their own self-evaluation of their work. No two portfolios are the same and the assessment has to be criterion- and not norm-referenced.
>
> (Elton 2005)

- *Guide to Assessing Creativity,* Lewis Elton (2005).
- 'How should I assess creativity?', John Cowan, this volume, Chapter 12.