Title: Bridging the gap between theory and practice in creativity education

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Thursday 29th August 2013

Track 2, Session 7 15.45 to 16.15 Athene M Building (M1-19)

Framing the problem:

The problems faced by professionals in their working lives rarely have one set answer, therefore, in order to be successful, these individuals must be able to respond with open-ended problem solving skills (Baillie & Walker, 1998). As Universities are the institutions charged with training these professionals it is most important that they provide their students with the skills necessary to solve these ever changing problems. The ability to successfully tackle this myriad of unspecified problems has commonly been conceptualized as creativity. The importance of encouraging the development of creativity has been emphasised in areas as diverse as economics (Hervani & Helms, 2004), business management (Driver, 2001) and accounting (Wynder, 2004). Creativity is also frequently linked to innovation, which is seen as essential in entrepreneurship, making it a key topic within business education (Dewett & Gruys, 2007).

Despite the fact that encouraging student creativity is seen as an essential element in preparing them for workplace challenges, research has found that support for creative students is hard to come by (Cropley & Cropley, 2005, 2010). For academics, finding resources relevant to their discipline can be difficult. While engineers can access a rich and diverse set of publications with information on teaching methods, resources, in-class tasks and assessment methods, there is much less available for those (for example) teaching history, mathematics or chemistry. Where do you turn for support if you are an academic in a discipline that does not have a tradition of creativity research, how do you find out which theories of creativity are relevant to your area and how can you access teaching and learning resources? Our research was designed to address this issue with a view to developing resources that would be useful right across a third level institution.

Specifically, our goals in undertaking this study were: to develop a resource for academics that i) provides an evaluative summary of the literature on creativity education, ii) offers examples of the application of theories of creativity to taught modules, iii) suggests appropriate mechanisms for student assessment/evaluation. Where possible we wanted to draw on literature from as wide a range of academic disciplines as possible.

Method

The literature review was undertaken between October 2012 and July 2013 and involved searching for key words related to creativity in peer reviewed academic literature (including ERIC, PsycInfo, Google Scholar, Compendex, Springerlink and the Directory of Open Access Journals).   The review focused on identifying key theories of creativity applicable to learning in third level education (undergraduate and post-

graduate), empirical studies of teaching creativity in third level institutions, methods of assessing creativity in third level education, identification of examples of discipline specific and inter-disciplinary modules that have aimed to teach/nurture/encourage creativity. Information on literature and web searches were supplemented with interviews with academic colleagues who were teaching modules that were relevant to creativity or entrepreneurship. Today's presentation will focus primarily on the literature search. We are now working on the development of a model of classroom practice in creativity education to further help colleagues who want to make use of the findings of our literature search.

Theories of creativity

There is no shortage of written material on creativity, as in every walk of life it is seen as an ideal to aspire towards. For example, most people have heard of deBono's work on **lateral thinking** (a problem solving technique that encourages generating novel ideas e.g. Random Entry Idea Generating Tool: The thinker chooses an object at random, or a noun from a dictionary, and associates it with the area they are thinking about) and Osborn's work on **brainstorming** (Osborn's work emphasised the power of groups for generating ideas). Both brainstorming and lateral thinking are ideas designed to encourage creative thinking that have grabbed people's attention. Both could be classified as pragmatic approaches to creativity because they are concerned primarily with developing and facilitating people to produce creative ideas.

The majority of people are much less familiar with **theories of creativity** that attempt to understand and explain why some people or organisations are more creative than others or how the process of creativity works. I will mention just three theories to give you a sense of their diversity, it is likely that these will be much less familiar to you than lateral thinking and brainstorming. I have chosen these three because all have been applied to the study of creativity in third level education.

Knowledge Management model (KM) (Yeh, Yeh & Chen, 2012)*: This model attempts to explain creativity in organizations. There are several types of knowledge management models of creativity but three components are common to them all: people, processes, and technology. The model has been used most frequently in organizational improvement. For example, knowledge management may be used to improve organizational effectiveness, through a process of selectively applying knowledge from previous experiences to current or future decision making activities. In the same vein, KM involves making deliberate efforts to expand, cultivate, and apply available knowledge in ways that add value to an organization. In an educational setting, KM can be thought of as the process of knowledge sharing and creation via technology, in which learners first organize and internalize explicit knowledge into tacit knowledge and then convert tacit knowledge to explicit knowledge via interactions among different "ecological" systems.

Diamond model of creative processes (Tassoul & Buijs, 2007): This model tries to explain the **process** of being creative – how ideas are formed, developed and solidified. According to the diamond model, creative processes move between divergence and convergence. Thus creativity begins with a new idea that involves

discarding or breaking up old ideas based on concrete and reflective exploration of new alternatives and knowledge (this is the divergent part of the cycle). Then the new idea is abstracted and adapted to the needs of the through processes of clustering idea selection and evaluation (convergence).

Investment Theory (Sternberg & Lubart, 1996): This theory attempts to explain individual differences in creativity and had its origins in the psychologist Sternberg's theory of intelligence. According to investment theory, creativity requires six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking (particularly a preference to think in new ways), personality, motivation, and environment. In its original formulation Sternberg's theory, creativity, together with critical/analytic skills and practical skills together made up the range of skills that contribute to human intelligence.

While all these theories vary in important ways it is also clear that they share common features and one of these is the inclusion of the personal characteristics of the individual as an important component of the creative process. For example within each of these theories that an individual can only be creative in a particular area if he/she has sufficient **knowledge**.

The fact that many theories of creativity focus on how the individual gains, uses or shares knowledge is one of particular interest to those involved in third level education because it provides a potential avenue to explore how we impart knowledge to our students, how we encourage them to gain and to use knowledge.

It is important for us to focus on theories rather than simply to adopt practical approaches (although these can be useful too) because theories provide an explanation for creativity that can then be tested empirically. We can implement aspects of a theory of creativity in class and then test whether or not it has changed student learning. For example, the three theories of creativity just mentioned have all been applied in third level learning. Here are examples:

Applying theories of creativity

1. *Knowledge management theories* have frequently been applied to third level education in order to determine how best to ensure the kinds of knowledge acquisition that will facilitate student creativity. Theories of knowledge management are typically interested in how students acquire, internalize, share and use their new knowledge. The theory emphasises the importance of teacher behaviour and in particular teaching efficacy. An example of a KM model in practice in third level education can be seen in the work of Yeh, Huang and Yeh (2011) who were interested in teacher training for creativity. In their research the goal was to integrate the three key processes of KM (knowledge sharing, knowledge internalization, and knowledge creation) into a blended training program to improve university students' creativity. Their classes involved encouraging students' **knowledge sharing** by getting them to share what they knew with others through, for example, observational learning; they also sought to improve students' **knowledge internalisation** (in this context internalisation refers to getting students to put their knowledge into practice) and they tried to do this by making students more self aware and reflective through providing

them with feedback on their performance and by encouraging students to constantly practice their skills. The third element of their teaching method involved encouraging students' **knowledge creation** (analysing, expanding and applying knowledge through, for example, the use of mind maps and group discussions). They designed and implemented a 17-week course for pre-service teachers. Evaluation of the course showed that it improved participants' professional knowledge and personal teaching efficacy in their teaching of creativity. Moreover, this study showed that blended learning, guided practice, observational learning, group discussion, peer evaluation, and feedback are important mechanisms underlying this success.

2. *Diamond model of creative processes.* Lassen & Neilsen (2011) applied the diamond model of creative processes (Tassoul & Buijs, 2007) to third level education by combining it with experiental learning theory (ELT) to increase student creativity. A combination of the ELT and the diamond model proposes that experiential activities can result in improved creativity if appropriately structured. Their account of using ELT to enhance creativity begins with i) **concrete experience** but in this case experience that challenges and evokes unusual responses (seen as an example of divergence); this is followed by ii) **reflective observation**, which may involve convergence as the individual draws on their existing knowledge and previous experiences; iii) new ideas emerging from the process of observation and reflection are then merged with **abstract conceptual frameworks**; iv) the frameworks then act as a guide for future **action and experimentation**. Empirical work on this has been done with both undergraduate and graduate students in topics as diverse as supply chain management (Lassen & Neilsen, 2011), MBA training (Dewett & Gruys, 2007) and engineering design tasks (Lemons, Carberry, Swan, Jarvin, & Rogers, 2010).

3. *Investment theory:* Investment theory (Sternberg, 2006) suggests that creativity requires the coming together and interaction of: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment (Sternberg & Lubart, 1996). Investment theory has primarily been applied to primary and second level education, however it is a theory that is worth considering because it has attempted to address issues not addressed in the other theories mentioned. For example, it has addressed whether methods of instruction tailored to the abilities of students can significantly aid their learning and more recently it has addressed the issue of creative leadership. The focus on methods of instruction is most relevant to today's paper. This aspect of theory was tested by Grigorenko, Jarvin and Sternberg (2002) in work with high school students who were placed in one of three instructional groups based on whether their academic strengths were analytic (classes involved discussion of higher order concepts e.g. the position of minority racial groups in society), creative (classes involved producing short scenarios based on emotions identified in a written piece on racism) in a or practical (students work in small groups to persuade others of a point in the story). In all cases the students outperformed those with traditional teaching methods in conventional end of course exams.

What can we learn from these examples of theories of creativity? The lesson that we have taken from it is that despite the diversity of the theoretical frameworks, all

believe that what happens in classrooms matters for students learning and creativity (note link here to Hennessey & Amabile's (2010) conclusion that while creativity has trait qualities it is also a state, influenced by the environment). What is more, they have demonstrated empirically that this is the case by collecting data on student performance. This emphasis on the classroom (and instructional activities – because they did not all happen in classrooms) and its importance allows us to bridge the gap between these theories (and other theories that emphasise learning activities) and a broad range of empirical studies of creativity that have not set out to test any specific theory but that have, nonetheless, gathered data on the relationship between the classroom environment and creative performance.

The classroom environment and creativity

What can research tell us about the types of classroom environment that encourage student creativity? In this section we highlight just a few of the relevant findings as there is not time to cover them all in any detail.

- *Lecturer as facilitator.* The concept of the lecturer breaking from the traditional role of instructor and taking on more of a facilitator's role was a fairly common theme among the studies we reviewed (Sun, 2012). Good example of physics lectures in Baillie and Walker (1998) where a method of socratic dialogue was used to stimulate student enquiry into their approach to learning. For example, instead of just focusing on presenting students with physics content, in these seminars, students were asked to report what they found difficult about learning physics and their answers were recorded. When all students' responses had been recorded it became apparent that there was a pattern – in this case the pattern was that students were overwhelmingly focusing on shallow learning. The overall objective was to allow students to take the maximum advantage of their learning opportunities – they regarded creativity as inherent in the process of learning. This mechanism for facilitating student learning, was therefore seen as an exercise in promoting creativity.

- *Reflection* - Reflection can be described as "intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations" (Boud, Keogh, &Walker, 1985, p. 19). Reflection emerges time and again in studies as essential to the creative process – regardless of discipline. For example, Ringel (2003) describes using a technique of reflective writing with graduate social workers to encourage them to step back from their role of experts and to consider their relationship with clients in order to allow space for creative thought (this process involved writing a term paper answering a series of questions that required students to reflect on their practice with clients). She concludes that as students were allowed to express their spontaneity and to experiment with a more fluid, non-structured approach, they started to experience a greater sense of creativity and to trust their intuitive abilities in their work with clients.

- *Motivation and Feedback:* Motivation was also frequently highlighted as important for developing creativity (e.g. Hennessey & Amabile, 2010). Intrinsic

motivation, defined as the drive to do something for the sheer enjoyment, interest, and personal challenge of the task itself (rather than for some external goal), is conducive to creativity, whereas extrinsic motivation is generally detrimental (however, the situation is not simple and in some circumstances external rewards can encourage creativity). Liu et al. (2012) found that providing students with a level of independence and choice resulted in increased motivation and value for the task.

Research from organizational psychology that may also be applicable to student motivation and learning by Zhou (2008) indicates that the way in which feedback is presented can influence creativity. She suggested that creativity is encouraged by: (a) giving positive feedback whenever possible; (b) delivering both positive and negative feedback in an informational style (with an emphasis on feedback as formative); (c) adopting a developmental orientation when giving feedback—giving employees valuable information that will enable them to learn, develop, and make improvements, implying that they can constantly get better; and (d) focusing feedback on the task, not the person.

- *De-emphasise grades*. Berenson and Carter (1995) suggest that traditional forms of assessment deter students from taking risks. This is detrimental as risk taking is associated with creativity (e.g. Apiola et al., 2012; Cole et al., 1999). Traditional assessment is about pursuing grades. Alternative types of assessment are therefore promoted that reward novel contributions rather than rote learning (Berenson & Carter, 1995). Some suggestions were the use of journals, portfolios, performance assessment, open-ended problems and interviews. In the case study detailed by Cole et al. (1999) grades were also de-emphasised. Instead of standard exams, four factors determined assessment and promoted intrinsic motivation. These factors were students' creative problem solution; their execution of the solution; the amount of work put into the assessment; their written analysis of their creative process.

Critical reflection and future directions

There is no shortage of literature on creativity – we have examples of interesting work from engineering, business, nursing, teacher training, physics, MBA programmes, training in supply chain management, economics, management and accounting. Our work also suggests that there is value in developing a cross-disciplinary approach to the topic because some of the issues for teaching and assessment really do apply across a range of disciplines (e.g. assessment methods). Compiling our learning from multiple disciplines will mean allow ideas to cross from one discipline to another. It may also facilitate the development of inter-disciplinary modules designed to foster creativity among groups of students from different disciplinary backgrounds.

There is still a lot of work that needs to be done. Most of the empirical work on creativity does not assess changes in student creativity separately from the process of assessing student performance at the end of the semester/year. In some cases there are attempts to ask external, perhaps professional, judges to adjudicate

on the quality of student creative output. However, there are still very few studies that have really tried to empirically test whether all these systems of encouraging creativity really do help students to be more creative. We do not know whether encouraging creativity in a classroom translates into greater creativity in professional working life. Lots of studies still need to be done. For example, we need to compare different teaching methods and determine whether some are better than others, we need to follow students from college into their work environment and look at the relationship between their performance in the two settings.

The vast majority of research on creativity is not grounded in any theoretical framework. Why does this matter? Theories help to focus attention on causal relationships – the factors that help to make students more creative. If we have well articulated theories then we use them to design classroom activities and methods of instruction, or to allocate students to different teaching methods depending on their skills.

The next phase of our work is involved in developing a model that will help academics in third level institutions to identify how they can encourage student creativity through classroom practices. We are working on developing a model that applies across disciplines but that provides discipline specific examples.

	Arts/Humanities	Design	Business	Science
Preparation	Tools and language existing literature	Observation Problem definition and understanding	Observation Problem definition and understanding	Investigation, new and existing knowledge
Imagination	Focus on possible not probably, supposition and speculation, engage end user	Idea generation, identify opportunity, no judgement	Idea generation, identify opportunity, no judgement	Idea generation, question assumptions, identify gaps
Development	User feedback, enhancement	Prototyping (model/sketch) Feedback, refinement, enhancement	Prototyping (model/sketch) Feedback, refinement, enhancement, validation (users and competition) pitch presentation, business model, value	Hypothesising, experimenting and predicting, experimentation

			proposition	
Action	Publish work	Develop preferred solution and implement	Develop preferred solution and implement	Interpret results, discovery, dissemination

This model is still in development and we are hoping to bring it to a university workshop on creativity later this year to discuss it with colleagues across the full range of disciplines within the University.

Thank you!

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