

Motivating creativity through appropriate assessment: lessons for management accounting educators

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Abstract

Creativity is important whenever the problem is unstructured and novel and effective solutions are required. Such heuristic problem solving is increasingly recognized as an important skill for management accountants. This paper presents a concept of creativity and a model of the creative process from the psychology literature that will be of value to business educators from all disciplines. Specific examples are provided from management accounting to demonstrate how the educator can appropriately structure teaching activities to develop necessary domain relevant skills and introduce extrinsic motivators to 'push' students through the 'perspiration' phases of the creative process while avoiding extrinsic motivators that might decrease intrinsic motivation in the problem identification and idea generation phases.

Key words: Student motivation, management accounting education.

Introduction

The importance of teaching thinking skills, including the ability to identify novel and effective solutions to unstructured problems, has long been considered an important goal for educators. It is particularly important for educators who are seeking to prepare graduates for the changing role of the management accountant (hereafter MA) in organisations facing an increasingly competitive environment¹. The importance of teaching such skills to MA has been well recognised by practitioners and academics for some time now (Albrecht and Sack 2000; Siegel and Sorensen 1999; Siegel 2000; Saemann, Crooker, and Kreissl 2007; Xydias-Lobo, Tilt, and Forsaith 2004; Maher 2000; Tan, Fowler, and Hawkes 2004). Many MA educators may be unfamiliar, however, with the concept and development of creativity. This paper provides a definition of creativity that is particularly appropriate for MA and describes a model of the creative process that has valuable insights for educators seeking to foster creativity.

Creativity is an essential element in problem solving. Various approaches have been promoted to develop problem solving skills including case studies and problem-based learning (Cullen, Richardson, and O'Brien 2004; Marriott 2004; Wynder 2004; Kennedy and Sorensen 2006; Bonk and Smith 1998). An important question is how to structure such learning experiences to promote problem solving ability. In the psychology literature a substantial body of research has developed that specifically addresses the factors that can be managed to facilitate and motivate the creative process and so the accounting educator can learn much from a review of this literature. Importantly, creativity theorists note that the process must be managed carefully to avoid 'killing creativity' by incorrect use of extrinsic motivators (such as assessment) that interfere with an individual's natural desire to be creative.

This paper provides a discussion of the nature of creativity and the determinants of the creative process. These components, i.e., creativity relevant skills, domain relevant skills, and motivation, are identified as necessary and sufficient for creativity in any domain (Amabile 1996). The development of domain relevant skills, such as specific MA analytic tools, and motivation are identified as being within the ambit of the MA educator. Importantly, it is argued that an awareness of these components, and their influence on the creative process, is necessary for MA educators when creativity is desired.

The Concept of Creativity

There are a number of definitions of creativity in the psychology literature (Runco 2004; see Sternberg and Lubart 1999). More importantly, educators will have their own implicit definition of creativity that will influence their acceptance of creativity as an important skill to be taught (Kleiman 2008). In contrast to the popular view in which creativity is characterized as merely weird or non-conformist, an appropriate definition for MA educators focuses on the process culminating in a novel and effective solution to an open-ended problem. The importance of both novelty and effectiveness is reflected in the following definition. Creativity is "... the ability to produce work that is both novel (ie original, unexpected) and appropriate (ie useful, adaptive concerning task constraints)" (Sternberg 1988). This definition is widely accepted in the creativity literature (Amabile 1996; Sternberg 1999). Furthermore, it is consistent with the previously mentioned objectives for MA educators. A cursory review of MA textbooks reveals, however, that students are rarely encouraged to generate novel solutions; the majority of questions focusing on calculation and analysis/ evaluation.²

¹ Creativity is also an important skill for other accounting roles, as noted by field researchers (Al-Beraidi and Rickards 2003) and accounting educators (Samkin and Francis 2008).

² Although an anecdotal observation, it is supported by a review of Chapter 11 – Decision Making and Relevant Information in *Cost Accounting: A Managerial Emphasis* (13th Edition) by Horngren, Datar, Foster, Rajan, and Ittner (2008). This is a popular, typical MA text. Even a cursory review of the questions reveals an emphasis on calculation and analysis of options. Conspicuous in its absence is the lack of questions that focus on generating novel and unique alternatives.

Consistent with this definition, and an important contrast to the view that creativity is limited to a few gifted individuals, is the view that everyone is capable of generating a creative product (Weisberg 1993). Environmental factors will interact, however, with individual differences and influence the creative process (Amabile 1996). Focusing on the creative process, and the factors influencing that process, highlights the implications for MA educators.

Guilford (1950) made an important contribution to our understanding of creativity when he distinguished between convergent and divergent thinking processes. Convergent thinking is similar to conventional notions of intelligence in which existing knowledge/information is synthesized to arrive at the single most appropriate answer. Accounting educators have been criticised for an inordinate emphasis on such convergent thinking (e.g., Albrecht and Sack 2000) and such an approach is still evident in MA textbooks. Convergent thinking is important and an essential dimension of the MA student's education. It is, however, incomplete with regard to the creative process.

Guilford argued that creativity is expressed in terms of divergent thinking and this lead to measuring creativity in terms of the number of fundamentally different solutions that were generated (e.g., Torrance 1974). This emphasis on divergent thinking and novelty is consistent with the typical layperson's conception of creativity but problematic when the solution must be both novel and effective. While novelty is important in organisations seeking competitive advantage, resources must be judiciously applied to those ideas that will satisfy the economic imperative (i.e., increase revenue or decrease costs).

Many of the theorists who have modelled the creative process incorporate both divergent and convergent thinking processes (for example, Amabile 1996; Ford 1996). There is a role for divergent thinking in order to recognise previously unnoticed problems and in exploring possible responses. However, convergent thinking is also important as relevant information is identified and brought to bear on the problem. Creative solutions must also be validated in terms of the organisation's objectives and communicated in a convincing manner. The recognition that both divergent and convergent thinking is important in the creative process is important for educators because the way in which problems are presented and evaluated will impact on a student's thinking processes. The following sections describe the creative process and consider the implications for facilitating and motivating that process in the classroom.

The Creative Process

Creativity was initially studied as an intellectual or personality trait. The emphasis was on the creative individual and the nature of creativity was considered to be a 'black box' (Barron and Harrington 1981). More recently, however, there have been various attempts to describe and model the creative process so that it can then be effectively managed (e.g., Basadur 1994; Ford 1996; Mumford et al. 1993; Mumford et al. 1991). Amabile (1996) describes four phases in the creative process, namely: 1) problem identification, 2) preparation, 3) response generation, and 4) validation and communication. Other theorists describe similar phases, for example, preparation, incubation, illumination, and verification (Wallas 1926) or preparation, production, evaluation, and implementation (Hogarth 1980). In this section Amabile's model of the creative process is presented to provide a context for the subsequent discussion of how MA educators can motivate and facilitate their student's creativity. Amabile's model was chosen because she has devoted particular attention to the positive effect that expected evaluation and rewards can have when applied appropriately to the various phases of the creative process.

The first step in the creative process is to identify that a problem exists (Runco and Chand 1994). The problem may be presented to the individual, or recognition that a problem exists may be generated internally. Getzels and Csikszentmihalyi (1976)

suggest that 'discovered problems' are more likely to be solved creatively than 'presented problems'. Furthermore, always presenting the student with a predetermined problem ignores the importance of problem identification skills. Two common approaches, problem based learning and case studies, can be contrasted in this regard. Whereas problem based learning emphasizes the importance of student's identifying the problem for themselves, case studies tend to be more focused and direct the student to address specific issues/problems.

Furthermore, MA courses can be unnaturally rigid in the application of specific tools due to the topic-by-topic approach to studying MA. This can lead students to see problems within the lens of the particular topic only. This is difficult to overcome. It is at least partially addressed, however, by drawing connections between topics and demonstrating the different perspectives, and consequent solutions, that result from alternative analysis. Students can then be encouraged to practice multi-tool analysis through unstructured assignments require the student to choose the most appropriate approach and apply multiple analytic techniques.

Of particular importance is the ability to identify and respond to the root cause of a problem, rather than symptoms (Rostar 1994; Subotnik and Steiner 1994; Goldratt and Fox 1986). As noted by Tomas (1999, p 36) "...problem symptoms are often mistakenly identified as problems, resulting in wasted efforts at solving something that was not a problem." Various management accounting tools exist to help identify problems and discern the root cause, such as statistical process control charts (SPC) and fishbone diagrams (Ishikawa 1985). MA textbooks are beginning to include these tools, usually within the context of quality management (for example, Horngren et al. 2008, p. 671). More traditional MA tools, such as standard cost variance analysis, can also be important in ranking problems based on potential cost savings. It is important, however, to recognize that these tools are not complete, either in terms of conceptualizing the problem, or arriving at a solution. Through appropriate instruction in the complimentary nature of the various tools, and their relative contribution to the creative process, students can be encouraged to think beyond stereotypical conceptions and pursue a problem to its conclusion.

When a problem has been identified, the next phase is preparation which includes building up or reactivating relevant information through analysis. The way in which an individual combines and reorganises information in the preparation phase plays a crucial role in the generation of responses (Mumford, Supinski et al. 1997). Finke, Ward and Smith (1992) note that the combination and reorganisation efforts can bring new features to the forefront that may lead to a reconceptualisation of the initial problem. Therefore, the problem may be redefined, leading to a very different solution, depending on the way in which the information is analysed, hence the importance of recognizing the application of multiple analytical processes to any given problem³. Amabile (1996, 1997) notes that this is one of the 'perspiration' phases of the creative process that individuals may seek to bypass, moving too quickly to the more intrinsically motivating idea generation phase.

Alternatively, however, there is the danger of 'paralysis by analysis', in which educators and students never get past the calculation/ analysis stage. Educators and students may feel more comfortable with analysis because of the misconception that there is a single, unambiguous answer. In contrast, business problems are typified by a lack of structure and many possible solutions. There are two related consequences. Firstly, a problem can, and often should, be analysed from multiple perspectives. Secondly, that there is often more than one possible solution and so the process of generating possibilities should not be ignored.

³ This point is clearly illustrated in Shank and Govindarajan's case study which distinguishes between a short run, relevant cost and a strategic cost analysis (Shank and Govindarajajan 1988)

The response generation phase determines the extent to which the solution will be novel which may be particularly important in creating competitive advantage. Devoting too little time in class to response generation limits the number of novel alternatives since obvious ideas are usually generated (Runco and Sakamoto 1999, p. 74). Here it is important that both the student and the educator suspend critical judgement. Brainstorming (Osborn 1953) is one technique that has been proposed to increase the number of responses. It involves creating a non-threatening atmosphere to avoid inhibitions. This can be a time consuming process, however, and reductions in contact time with students may lead educators to curtail this important activity. Furthermore, brainstorming benefits greatly from group interaction (Furnham and Yazdanpanahi 1995) and so is most effectively conducted in tutorials.

The final solution will be chosen from the ideas that have been generated. There is some support (Milgram et al. 1978; Kachelmeier, Reichert, and Williamson 2008) for a positive relationship between the quantity and quality of responses. More ideas are not necessarily better, however, especially when they are ill-conceived or impractical. Control may be necessary to "...prevent entities that are continually seeking innovations from squandering resources and superfluous novelty." (Chenhall and Morris 1995, p. 487). Similarly, students and educators must take the next step to distinguish between good and bad ideas. MA tools, such as activity-based costing, provide for such evaluation based on the likely financial effects of possible solutions which can then be considered in combination with qualitative factors.

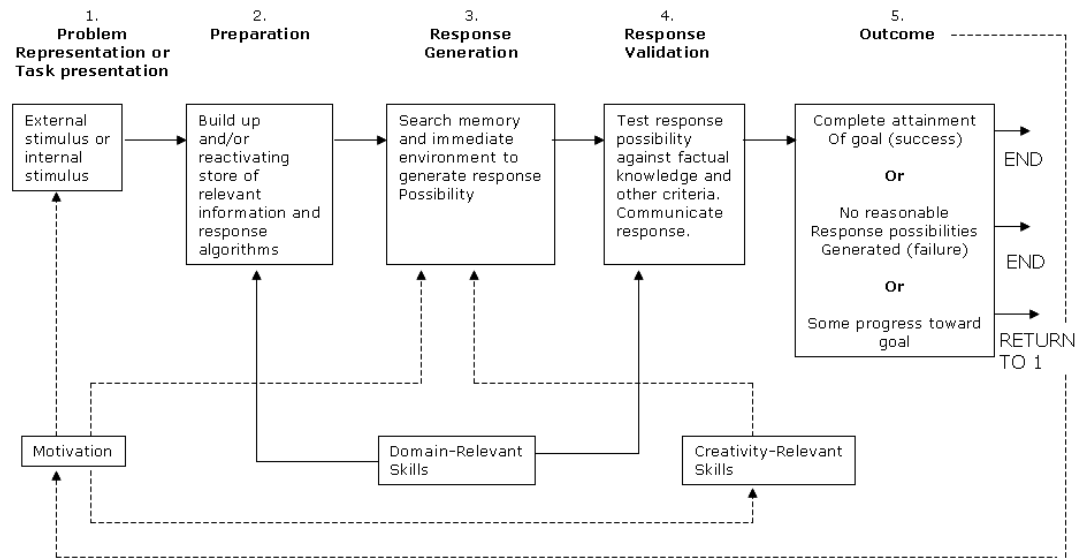
As noted by Amabile (1996, p. 96), the validation and communication phase "... determines the extent to which the product or response will be useful, correct, or valuable" and, therefore, the extent to which the product or response is truly creative. Recall that based on the definition of creativity adopted in this paper, critical evaluation of the effectiveness of the proposed solution is also critical. Furthermore, ideas must be communicated in a manner that will allow their novelty and potential benefit to be recognised by others. This ability to convincingly communicate ideas is certainly critical in the business world generally and in MA specifically and highlights the importance of teaching and exercising communication skills in MA courses.

4. Factors Influencing the Creative Process

Amabile (1983b, p. 358) argues that "... creativity is best conceptualised not as a personality trait or as a general ability, but as a behavior resulting from particular constellations of personal characteristics, cognitive abilities, and social environments." This view is shared by the leading creativity theorists (Runco 2004; Amabile and Khaire 2008; Basadur 1994; Ford 1996; Mumford, Whetzel, and Reiter-Palmon 1997) who emphasise changing the environment in order to promote and facilitate creativity. It is particularly relevant for educators wishing to establish an environment that supports creativity by being aware of and managing the factors that promote or inhibit the students' creative process.

Amabile's (1983b, 1996) componential model of creativity specifically recognises the importance of domain-relevant skills, motivation and creativity relevant skills. She argues that these components are necessary and sufficient for creative production in any domain. The following discussion considers each of these components in more detail, with domain-relevant skills and motivation of particular relevance to this paper.

Figure 1:
Amabile's Model of the Creative Process



(Source: Amabile, 1996, p. 94)

Creativity Relevant Skills

Creativity relevant skills are an important determinant of creative performance identified by Amabile (1983b, 1996). Although it is argued that creativity relevant skills and attitudes can be developed through instruction and training (e.g., Kabanoff and Bottger 1991; Guastello et al. 1998; Clapham 1997; Clapham and Schuster 1992), the emphasis of this paper is on managing the educator's role in facilitating the acquisition of domain relevant skills and motivating creative behaviour. A brief description of creativity-relevant skills is appropriate, however, so that educators can understand the impact that their students' strengths and weaknesses have on the creative process.

An individual's creativity-relevant skills are said to be influenced by his or her cognitive style, work style, and personality. Cognitive style captures consistent and stable differences between people in the way they obtain, sort, organise and recall information (Sternberg 1997; Myers and McCaulley 1988). An individual may be predisposed to approach a problem in a particular way based on his or her cognitive style. While some argue that particular cognitive styles are more or less conducive to creativity (Guastello et al. 1998; Tierney 1997; Noppe 1996; Blissett and McGrath 1996; for example, Foxall, Payne, and Walters 1992), Nickerson (1999) argues that critical and creative thinking are independent dimensions, and that both are important for creativity. Note that this is consistent with the previous arguments that convergent and divergent thinking are both important in the creative process. Similarly, Kirton (1976; 1984) distinguishes between innovator and adaptor personality types, but argues that both are capable of demonstrating creativity.

Perhaps more important in determining the level of creativity than cognitive style is work style (Coutu 2008). Thomas Edison is noted for saying that creativity is 1% inspiration and 99% perspiration. Amabile (1983a, p. 74) also emphasises the importance of persistence and hard work. As previously discussed, certain phases of the creative process (i.e., information search and validation/ communication) are referred to by Amabile as the 'perspiration' phases. Recognising the difficulty that

some students may have in motivating themselves to complete these important phases, MA educators can increase creativity by focusing rewards and penalties appropriately. For example, breaking up an assignment into its component creative phases, with deadlines and rewards/ penalties for the less intrinsically appealing phases, can be an effective approach to facilitate creativity. On the other hand, less structure and discipline/evaluation can be associated with the problem identification and idea generation phases.

Students will come to the classroom with varying levels of creativity relevant skills, some of which are stable personality differences. Despite being more or less predisposed to certain phases of the creative process, it is argued that all students are capable of creativity and a student's creative potential can be maximized through the development of necessary domain relevant knowledge and appropriately structured evaluation.

Domain Relevant Skills

Amabile (1983a) refers to domain relevant skills as including "... factual knowledge, technical skills, and special talents in the domain in question" (Amabile 1983a, p. 67). Furthermore, she contends that, "... in general, domain relevant skills can only lead to an increase in creativity - provided that the domain-relevant information is organized appropriately" (1983a, p. 71). In particular, she argues that knowledge must be organised according to general principles rather than a collection of algorithms that are only suitable for specific circumstances. At its worst the problem of learning algorithms rather than principles is exemplified in the common student difficulty in dealing with any change in problem-structure to that which was demonstrated in the lecture or tutorial. Given the unstructured nature of business problems it is critical that students learn these general principles. Such an emphasis is consistent with the arguments for deep, rather than surface learning (Biggs 1989).

MA provides a number of analytic tools to increase understanding of the problem and stimulate the search for solutions (Imai 1986). Training in these tools and techniques provides an important basis for creativity. It is important, however, that the educator emphasise the general principles underlying the tool so that students can apply it in the varying circumstances that face modern business. An inability to distinguish between general principles and firm-specific application can be seen in the Balanced Scorecard literature where implementation failure is often attributed to the tendency to adopt 'boilerplate' scorecards without adapting them to the organisation's strategy (Banker, Chang, and Pizzini 2004).

Domain relevant skills are particularly important in the preparation and response validation phases (Amabile 1996; Amabile 1983a). Acquiring and accessing domain relevant skills is important in the preparation phase as the individual develops an understanding of the problem, which in turn stimulates the generation of alternative responses (Mumford et al. 1998). Domain relevant skills are also important in discriminating between ideas, in the validation and communication phase, based on their likely consequences. The various MA calculations of cost consequence can, therefore, be seen as important domain relevant skills, and their critical role in the creative process is clear. Without such domain relevant skills uninformed and undisciplined response generation is unlikely to produce effective solutions, or be communicated in a convincing manner. Note that this view is in contrast to a view often held by the layperson and some creativity theorists – that knowledge of a domain impedes creativity.

Weisberg (1999, p. 226) summarises the conventional 'tension view': "The relationship between knowledge and creativity is assumed, therefore, to be shaped like an inverted U, with maximal creativity occurring with some middle range of knowledge." This view is particularly evident amongst the Gestalt psychologists who distinguish creative (or productive) thought from reproductive thought (Wertheimer

1982; Scheerer 1963). Similarly, as previously noted, Guilford (1950) argues that creativity is achieved through divergent thinking that involves breaking away from previously established ideas. At the extreme, such approaches see creativity as the result of a totally random process. For example, Campbell (1960, p. 381) argues that real creative gains in knowledge "... must have been the products of explorations going beyond the limits of foresight and prescience, and in this sense blind." Such an approach would suggest that accounting education has the potential to focus and rigidify thinking, thereby decreasing creativity.

The view that domain knowledge can be an impediment to creativity has been challenged by a growing body of theorists (e.g., Hayes 1989; Gruber 1981; Bailin 1988; Weisberg 1999). For example, Sternberg (1988, p. 137) notes that "...it is impossible to have ideas about something if one knows nothing about it. One needs knowledge to extend from in order to see how to apply or extend it creatively." Newell and Simon (1972, p. 82) refer to this knowledge base as the "... network of possible wanderings", a problem space that determines the bounds of the possible solution pathway. The analytical tools taught in MA can be seen as the means of mapping additional pathways, thereby increasing the 'network of possible wanderings'.

Gobeil and Phillips (2001) have empirically demonstrated that student knowledge is an important determinant of effective case use. Similarly, in two separate experiments using MA tasks, Wynder (2007, 2008) demonstrates that domain relevant knowledge is an important determinant of creativity. This suggests a staged approach in which domain knowledge must first be acquired so that it can be effectively applied in the creative process. Furthermore, Wynder (2007, 2008) found that the effectiveness of process versus results-based control (evaluation) depended on the level of domain relevant knowledge. This suggests that the educator's assessment regime must be considered carefully in order to motivate the development and exercise of that knowledge.

Motivation

Nickerson (1999, p. 420) argues that motivation is the most significant determinant of creativity. Motivation to exert effort on any task may come from enjoyment of the task itself (referred to as intrinsic motivation) or, alternately, the individual may see the problem as a means to an end, for example, receiving a reward or needing to respond to pressure from an external source (extrinsic motivation). There is some support for the commonly held view that creativity is primarily determined by intrinsic motivation, and negatively impacted by extrinsic motivators (see Amabile 1996 for a review). Rogers (1954) argued that creativity requires an 'internal locus of evaluation' in which the individual is not concerned with external evaluation. Similarly, Crutchfield (1962), and Koestler (1964) have both argued that extrinsic motivators inhibit creativity. Such a view, however, holds little opportunity for MA educators seeking to increase creativity amongst their students.

An alternative view that is gaining increasing acceptance is that extrinsic motivators can increase creativity if they are appropriately structured (Amabile 1996, 1997). These developments are of particular concern to educators since extrinsic motivators (e.g., evaluation and rewards) figure heavily in the classroom environment and will be present whether they are explicit or implicit. The importance of intrinsic motivation, and the possible impact of extrinsic motivators, is considered in the following section. A summary of the determinants of creativity is presented in Table 1.

Table 1:
The Determinants of Creativity

Domain-Relevant Skills	Task Motivation	Creativity- Relevant Skills
<u>Includes:</u>	<u>Includes:</u>	<u>Includes:</u>
Knowledge about the domain	Attitudes toward the task	Appropriate cognitive style
Technical skills required	Perceptions of own motivation for undertaking the task	Implicit or explicit knowledge of heuristics for generating novel ideas
Special domain-relevant talent		Conducive work style
<u>Depends on:</u>	<u>Depends on:</u>	<u>Depends on:</u>
Innate cognitive abilities (related to the domain)	Initial level of intrinsic motivation toward the task	Training (in creativity-relevant skills)
Innate perceptual and motor skills	Presence or absence of salient extrinsic constraints in the social environment	Experience in idea generation
Formal and informal education		Personality characteristics

Source: Adapted from Amabile (1996, p. 84).

Promoting Creativity in the Classroom

Much has been written about extrinsic and intrinsic motivation in relation to assessment and its effect on creativity (e.g., Torrance 1965; Torrance 1972; Prabhu, Sutton, and Sauser 2008). As previously discussed, intrinsic motivation refers to the reason the individual approaches the task, i.e. whether they are motivated to complete the task for its own sake (an intrinsic motivation), or by an outcome that is extrinsic to the task (e.g., rewards/ punishment). Intrinsic motivation arises when the task itself is a source of interest, enjoyment, self-expression, and personal challenge (Amabile 1997). Individuals will be intrinsically motivated if the task increases their feelings of competency and self-determination (Deci 1975). These feelings of competence and self-determination will, in turn, be influenced by task characteristics, such as skill variety, challenge, autonomy, and feedback (Hackman and Oldham 1976). Thus, by unleashing a student's inherent desire to experiment and create, case studies and problem-based learning can be a powerful means of engaging their interest (De Volder et al. 1989). Furthermore, individuals are more likely to be motivated when they identify strongly with their work; therefore it is important that realistic problems are used that the student can relate to.

In contrast to completing a task for its own sake, extrinsic motivation is the motivation to engage in an activity to meet some imposed requirement or receive some reward or recognition that is external to the task itself (Lepper, Greene, and Nisbett 1973; Crutchfield 1962). Extrinsic motivation is inexorably connected with assessment structures that are an inescapable aspect of educational programs in general. Amabile (1997, p.18) argues that when the right kind of extrinsic motivators are used appropriately they can lead to a motivational synergy in which "strong levels of personal interest and involvement are combined with the promise of rewards that confirm competence, support skill development, and enable future achievement." Recognising the effects of these extrinsic motivators is necessary to predict the impact of various options in constructing the assessment regime. Extrinsic motivators have a direct effect on an individual's performance, they may also have an indirect affect as they influence intrinsic motivation.

One of the reasons why extrinsic motivators may affect intrinsic motivation is that they change the reason for completing the task. It is argued that a sense of personal

control is important to intrinsic motivation (DeCharms 1968; Deci, Gilmer, and Karn 1971). In the presence of extrinsic motivators the individual may feel compelled to perform the task to achieve some goal, in which case the locus of causality (the reason for acting - Heider 1958) shifts from within the individual to the extrinsic motivator. When the individual is motivated by the external goal they no longer feel self-determining and intrinsic motivation may decrease (Hirst 1988, p.96).

Figure 1 indicates that extrinsic motivators will be more appropriate where the creative phase is characterised by programmed efforts and convergent thinking rather than novelty. This is the case in the preparation and response validation stages. Amabile (1997, 1996) explains why extrinsic motivators may be necessary at this phase of the creative process. Although individuals may have an inherent desire to express their creativity (McGregor 1966), she argues that the preparation and validation/communication phases require "... periods of painstaking and often tedious attention to quality and detail" (1997, p. 24) , are less enjoyable and therefore may require extrinsic motivators to 'push' the individual to perform the necessary activity (e.g., acquiring domain relevant knowledge or going through the painful process of discriminating between and abandoning fruitless ideas). This may be achieved through imposing deadlines and specifically evaluating performance in these 'perspiration phases'.

Similarly, Sternberg and Lubart (1995, 1992) argue that creativity is primarily determined by motivation inherent in the task itself (i.e., intrinsic motivation), but that this can be enhanced by extrinsic motivators that increase an individual's concentration on the task. Furthermore, Deci (1975, p. 142) notes that all rewards (such as grades) have a controlling aspect and an information aspect. Extrinsic motivators can provide important signals of competency and provide direction as to how success can be achieved.

In a study involving undergraduate management accounting students, Wynder (2007) found that an evaluator's emphasis on the preparation phase of the creative process did provide the necessary motivation to acquire relevant domain knowledge, with a subsequent increase in creativity. It is important to note, however, that the beneficial effect was limited to those individuals with low relevant domain knowledge. Indeed creativity decreased when individuals with a high level of relevant domain knowledge received evaluation focused on the preparation phase of the creative process. These findings suggest that great care should be taken when devising assessment strategies to recognize the existing level of relevant domain knowledge. The following section considers these implications in greater detail.

Implications for assessment strategies

Tan and Kao (1999) found that accountability increased performance in complex tasks, but only when individuals had the requisite knowledge and ability to complete the task. It is important, therefore, that sufficient preparation is encouraged, and facilitated, prior to beginning the response generation stage. Assessment can be a powerful tool in directing the student's preparation efforts and identifying areas where further preparation is necessary prior to attempts to generate solutions. For example, a test of declarative knowledge prior to commencing the creative problem solving activity may be a useful means of motivating the necessary preparation and identifying any gaps in knowledge that might limit the student's ability to generate and validate an effective solution.

Wynder (2008) demonstrates that an evaluation structure that focuses on response generation will only result in more ideas if an individual has sufficient relevant domain knowledge. He also discusses the practical benefits of focusing evaluation on the validation phase of the creative process. In an experiment involving the provision of relevant and irrelevant cost driver information, individuals with relevant information about cost drivers and an assessment structure that focused on outcomes were

encouraged and able to appropriately discriminate between their ideas and submit those with the greatest financial impact.

Care must be taken in the application of assessment, however, due to the potential to 'kill' the intrinsic motivation that is so important in the problem identification and response generation phases. Amabile (1996) argues that extrinsic motivators (such as assessment) focus an individual's attention on the reward/punishment and generate a feeling of 'being controlled' that decreases the personal satisfaction associated with completing the task (Deci, Gilmer, and Karn 1971; Deci 1975). Therefore, in the presence of external assessment, particularly when tied to aspects of the task that the individual associates with self-expression, assessment may seem constricting and the individual may do what is required, but no more. For divergent tasks, such as problem identification and response generation, an individual may stop prematurely, before having progressed past the obvious problems and solutions.

Furthermore, Mumford et al (1997) note that goal based definitions of the problem (ie focusing on a particular outcome) force information search along known lines of reasoning. In the accountability literature this is referred to as bolstering (Tetlock, Skitka, and Boettger 1989). Individuals minimise effort by giving the assessor what they want, and then limiting any information search to supporting that position. It is important, therefore, to avoid 'leading' the student into conformance with preconceived solutions. Furthermore, a heavy emphasis on assessing response generation may encourage students to move too quickly into this stage, before they have completed the necessary preparation.

Assessment apprehension, and its effect on generating ideas, is another factor impacting on the quantity and quality of the responses generated. Brainstorming productivity will be lowest in conditions which produce the highest amount of apprehension. Shalley (1995, p. 487) explains that

"... individuals may become reluctant to take risks since those risks may be negatively evaluated. Theorists (e.g., Amabile, 1983) have suggested that in order to be creative, individuals need freedom to take risks, play with ideas, and expand the range of considerations and material from which a solution can emerge."

Therefore, an educator's intervention directed at this phase of the creative process should be non-threatening and emphasise the informational aspect.

Finally, after the student has had sufficient freedom to explore the various responses generated, deadlines and assessment by others (peers or facilitators) is useful to motivate them to engage in the often tedious process of validating and communicating their solutions. Such accountability and evaluation will lead to more cognitively complex solutions when the student is not aware of the evaluator's preference and has been encouraged to explore the problem before committing to a course of action (Tetlock, Skitka, and Boettger 1989)

In summary, based on the creative process outlined above, an appropriate approach to assessment of creativity should include different assessment strategies for different phases of the creative problem solving process. The following principles are suggested:

1. As far as possible, the student should be encouraged and given the freedom to identify and formalise the problem to be examined.
2. Clear expectations should be given as to the nature and criteria associated with effective preparation based on generalisable skills and knowledge. Deadlines and critical evaluation/feedback may also be necessary to motivate individuals to complete this important stage, and to communicate to the student if, and if so where, further effort

should be directed. The end-of-chapter textbook questions are typically useful in this regard and students can be encouraged to have these completed and self-evaluated before coming to tutorials. Precious tutorial time can then be spent in dealing with problems which apply that knowledge gained to generate, validate and communicate solutions to more unstructured problems.

3. The student should be encouraged to identify, develop, and explore a wide range of possible responses without constraint or influence by the facilitator's preconceptions. Brainstorming in tutorials (but only after sufficient preparation has been completed) is a useful technique. For a heuristic problem the possible pathways to an appropriate solution will be unlimited, determined by the student's unique experience, knowledge base, and information search. Students can be encouraged to generate copious ideas without fear of censure.
4. Assessment is necessary in the final stage to ensure that the student critically evaluates their responses and communicates them in a convincing manner. Here MA tools can be applied to critically evaluate the effectiveness of the possible solutions. Students can be assessed on the extent to which their chosen solution is supported by the analysis and convincingly communicated (Allam 2008; Cunliffe 2008; Kleiman 2008; Samkin and Francis 2008).

Conclusion

Although everyone is capable of creativity, the novelty and effectiveness of their solutions will be determined by a number of factors that can be influenced by those who educate. One such area of influence is assessment. One of the fundamental tenets of teaching is that student assessment and learning objectives should be aligned. The focus of the assessment activities and tools has a particularly profound effect as it influences the way an individual thinks and their motivation to engage in phases of the creative process.

As MA educators it is imperative that we have an appreciation of the concept of creativity in order to provide valid assessment of this purported outcome. By focusing external (i.e., peer and teacher assessment) on the preparation and validation/communication stages of the creative process, but also recognizing and providing time for the problem identification and idea generation phases, it is possible to provide the impetus and direction that individuals need to perform these activities.

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