Thinking Creatively About Strengths-Based Strategies

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We are living in an era of unprecedented global change and knowledge proliferation. We need new ways of thinking about the challenges facing our global village. Thinking creatively about these challenges has the potential to strengthen individuals, communities and organisations. Creative thinking strategies can help people and leaders at all levels to use new approaches to existing challenges. Now more than ever we need conceptual tools to help us break free from the constraints of habitual thinking. In this session a new research based model for creative thinking is proposed. The StrateGEE® model provides an approach or framework to thinking creatively. It helps people to initiate and sustain the kind of thinking process that will yield creative and innovative responses to problems. The model identifies four different kinds of thinking used during creative problem-solving; mechanisms by which cognitive resources may be synergistically and creatively deployed; and ways of combining knowledge and thought processes to produce creative outcomes. Conceptual tools such as the StrateGEE® Model are useful aids or scaffolds for creative thinking by providing an heuristic approach to the creative problem-solving process.

Introduction

Research into creative thinking and creative problem-solving has received renewed interest with the advent of the knowledge economy. There is a considerable emphasis on corporate innovation brought about by accelerating competition and the application of new technologies. One characteristic of this current drive for innovation is the combining of disciplines and knowledge bases. “The combination of artistic and technical skills or of professional knowledge and interpersonal ability will be increasingly important to maximising the value of ‘intellectual capital’” (Seltzer & Bentley, 1999:14). Conceptual tools and scaffolds that may aid this process of using knowledge resources synergistically could prove extremely useful for those faced with the challenge of producing creative solutions to either existing or new problems.

This paper presents one such conceptual tool called the *StrateGEE® model for Creative Problem-Solving*. It identifies four different kinds of thinking engaged in during creative problem-solving as well as explaining the mechanisms by which cognitive resources may be synergistically and creatively deployed and combined to produce creative outcomes. It incorporates some of the well known strategies used in creative problem-solving such as brainstorming, perspective-shifting and synthesising but adds to and goes beyond these to place them in a broader context. The model therefore is a ***compilation of many strategies*** designed to help with the generation of new ideas, as well as the exploration and evaluation of these ideas. It also incorporates the important role of strategic thinking which guides the whole process. Unlike some approaches to creative thinking which focus primarily on idea generation; this model scaffolds the ***entire*** problem-solving process from conceptualisation through to final outcome recognising the fact that if original ideas are to be valuable then they must also be applicable and useful.

The nature of creative problem-solving

Creative problem-solving is by nature ill-defined. There is no single correct answer but rather a multitude of possibilities. Similarly there are no specific rules, algorithms or predetermined steps by which to proceed. Creative outcomes are more likely to result from breaking the rules rather than following them or using novel associations that produce unexpected results (Smith,1995). Creative problems do not have right or wrong answers only better or worse. They evolve or emerge incrementally through a combination of factors (Butler and Kline, 1998).

Individuals engaged in solving problems requiring original outcomes gradually ‘build-up’ their responses by revisiting previous knowledge states. In well-defined problems, if the person revisits previous knowledge states after going down an unproductive path (ie. goes back to where they made a mistake in applying the rules) then " all that the subject knows is that the path just explored does not lead to the goal state. The problem-solver does not have an enriched understanding of the state he or she is returning to" (Goel and Pirolli,1992, p.425). By contrast, in creative problem-solving, each subsequent application of cognitive resources, is enriched and informed by previous states allowing an incremental evolution (Weisberg, 1988). Creative problem-solving does not occur in discreet stages but rather creative products are built up gradually, as the creative problem-solver continually adjusts the emerging product towards its final form (Jay and Perkins, 1997). To do this, cognitive components must be able to be combined in various ways to allow this building up to occur. We shall see how this works in the following section.

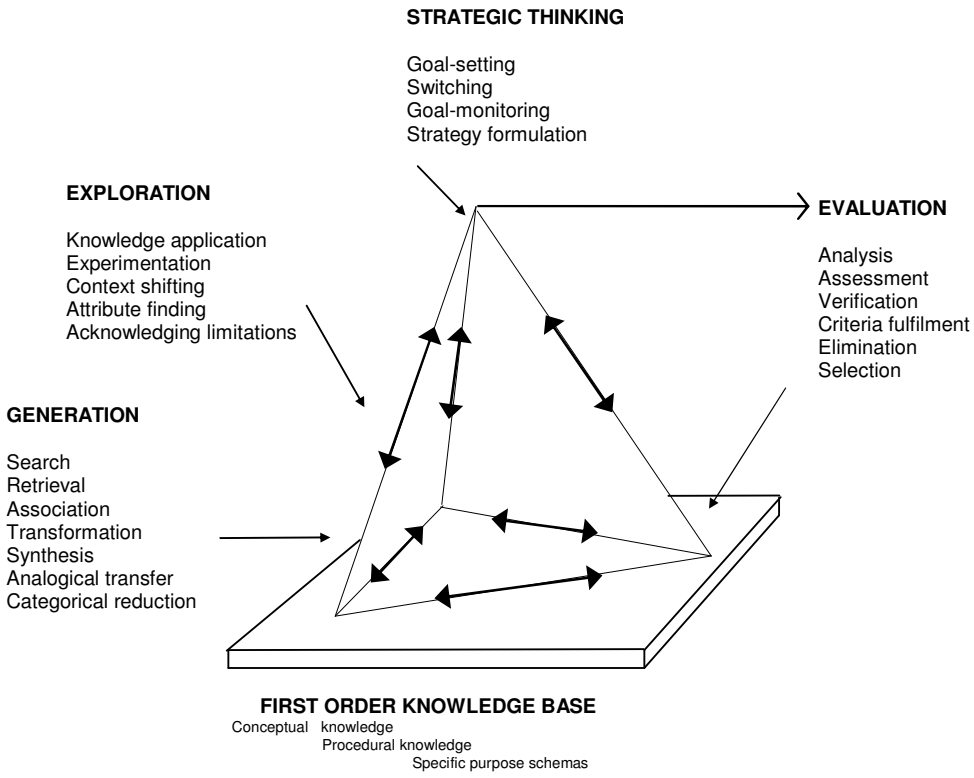
The StrateGEE model for creative problem-solving

This model may be thought of as an 'heuristic' for creative thinking. An *heuristic* is a 'rule of thumb' method of tackling a problem which does not guarantee a particular outcome. In other words it provides a starting point and some signposts

The model is conceptualised as a hierarchy in keeping with the understanding of knowledge structures from the cognitive literature where higher level, general schemas act on or operate on lower level, specific ones (Anderson, 1982; Stevenson, 1991). Broadly defined, a schema may be considered to be an organised structure of knowledge consisting of a rich network of interconnected elements in memory (Marshall, 1995).

Without schemas, memory would be a vast collection of isolated facts, which would need to be combed through every time information was needed. In other words schemas help to organise memory by providing an efficient storage and retrieval mechanism. Schemas contain knowledge of both facts and skills which are connected in memory networks which aid in the retrieval and acquisition of knowledge (Glaser and Bassok, 1989). According to cognitive theory a person has different levels of schemas. That is why the model has been represented as a hierarchy.

The model also identifies a number of thought actions that are often associated with creative thinking. They are found in the box listing Generation strategies. Most people have at some stage or another engaged in brainstorming to help generate solutions to a problem. That's great, but what then? Many people usually identify brainstorming as a creative thinking strategy – which it is, but it is only one small part of the process if a genuinely useful outcome is to come about. For an idea to be useful it needs to be followed through and thought through to refinement. That is where the other boxes with the other thought actions become relevant. That is why this model which is a compilation of many strategies is such a useful scaffold. Lets have a look at the different aspects of the model more closely.



The StrateGEE Model for Creative Thinking

How does it work?

The platform

Let's start with the platform – the base on which everything else rests. This represents our knowledge base – everything we know. We've been accumulating knowledge and information our whole life. It is all locked away in

our long term memory somewhere. We know an ENORMOUS amount, much more than we realise. Think about what a complex task it is to drive a car. Remember how difficult it was as first? Now it is such a familiar activity that has become so automated that there is plenty of attention left to have a conversation while driving. But think about all the complex tasks that you do now with ease. What an enormous store of knowledge is locked away there. Often when it is locked away we can't access it simply because we just don't think of it or don't know how to access it. Wouldn't it be great if we could find a way of calling up that knowledge in the service of creativity and innovation?

One way that most people are familiar with is brainstorming. The knowledge in the Knowledge Base may be accessed by a conscious and systematic search or it may be preconsciously activated and called into active, working memory by way of its conceptual ties and associations to a concept being consciously utilised. Conceptual ties are the result of schema formation. Thus schemas are knowledge structures that enable individuals to relate concepts or procedures that are linked in some way within the knowledge base.

The important point here is that schemas are *active* memory structures in the sense that their structures are able to accommodate and integrate new information (Keller and Keller, 1996). Schemas are therefore constructed progressively as new information about interrelationships between objects, situations and events is assimilated. In this sense they are 'modifiable' and 'adaptive' (Gott, 1989) because they allow the integration and accommodation of new information and related experiences, by linking knowledge, both declarative and procedural (Gott, 1989), into increasingly coherent chunks of information. A progressively constructed schema would therefore be a structure which accommodated the organisation, connectedness and interrelationships among objects, situations and events. Thus schema acquisition is an active, constructive, and cumulative process occurring over time (Shuell, 1986).

It stands to reason therefore that the person who has a well stocked mind with knowledge and interest in a diverse variety of fields is likely to have a greater vocabulary out of which creative ideas may emerge. A number of studies has shown that creative people consistently describe themselves as having a wide range of interests. Edgar Allen Poe for example believed that his lasting fame would not be for his literary works but rather for his contributions to cosmological theory. Seltzer and Bentley (1999) argue that for success in an economy "defined by the innovative application of knowledge ……learners and workers must draw on the entire spectrum of learning experiences and apply what they have learned in new and creative ways" (p.9). The mechanisms by which knowledge may be combined in new creative ways for creative outcomes is discussed in the following sections.

The pyramid

Directly interfacing with the knowledge base are the three categories of Generation, Exploration and Evaluation, characterised by sets of procedures, which access and operate on the knowledge and skills contained therein. *Procedures* are cognitive steps defined by the function they serve in the problem space. The procedures in these categories may be conceptualised as second order thinking for two reasons. Firstly they are consciously applied as part of the heuristic process of creative problem-solving and therefore constitute controlled cognitive activity. Secondly they operate on and utilise first order thinking and are therefore of a higher level. Existing knowledge and skills from the knowledge base provide the raw materials out of which a creative solution is constructed as a result of being operated on heuristically by second order procedures. Thinking at this level is characterised by high cognitive load because of the search for novelty. In the following sub-sections each of the categories of second order thinking and their procedures are examined in turn to illuminate their various roles in the process of creative problem solving followed by an explanation for the separation of the procedures into generic and domain-related procedures.

Generation

Generative procedures, marshal the mental raw materials which promote creative thinking. Generation therefore is responsible for bringing new information problem space. As such it is akin to the commonly used term - *divergent thinking* which is viewed as an essential component of creative thinking. It may be defined as, the ability to make remote associations between topics (Mednick, 1962); an active search that can free information in memory from the context and cues with which it was remembered so that it can appear as a novel response to the problem (Brown, 1989); the promotion of unconventional possibilities, associations and interpretations (Guilford, 1968 in Finke, 1995); the development of tentative possibilities rather than data, speculation rather than conclusions. It is characterised by the tolerance of ambiguity, the ability to hold contradictory ideas simultaneously and the maintenance of flexible constructs (Dowd, 1989).

Examples of Generation procedures are :

- Search (Yashin-Shaw, 2001) -A seeking out of possibilities to inform or enrich current thinking.
- Retrieval (Finke et al, 1992)- A direct transference of specific concepts from the knowledge base into working memory for the purpose of expanding or illuminating the current problem.

- Association (Finke et al, 1992) - The mental connection of either disparate or related ideas, freed from their normal contexts.
- Contrast (Yashin-Shaw, 2001) - A juxtaposing or setting in opposition of two disparate concepts so as to enhance their differences for artistic, dramatic or other particular effect.
- Synthesis (Finke et al, 1992) - A combination or blending of two or more ideas or concepts.
- Analogical Transfer (Finke et al, 1992) - A correspondence and mapping between similar features of concepts and principles that are otherwise dissimilar.
- Categorical Reduction (Finke et al, 1992) - Simplifying a concept or image to its fundamental, basic form

The above procedures used in various combinations enable problem-solvers to retrieve, synthesise and metamorphose concepts, ideas and information in novel ways to enhance the potential for creative outcomes.

Exploration

Exploration takes place during creative problem-solving as emergent features worthy of further exploitation and development are identified, extracted and manipulated. Exploratory activity is differentiated from generative activity in so far as it is more directed and organised and where possible outcomes are assembled from the information called up into the problem space.

Examples of Exploration procedures are :

- Knowledge application (Yashin-Shaw, 2001) - The application of specific knowledge, procedural or conceptual, in order to develop a particular idea.
- Context shifting (Finke et al, 1992) - The transference of the idea or concept being considered into a different context as a way of gaining insight.
- Attribute finding (Finke et al, 1992) - The search for emergent features and recognition of the developing characteristics of the product in progress.
- Acknowledging limitations (Finke et al, 1992) - Identifying real or possible constraints, shortcomings or difficulties of the emerging product.

It is the application of exploratory procedures which nurture inventive thoughts to fruition. Many creative ideas would never have been more than fanciful dreams if the problem-solver had not subsequently applied their knowledge to experiment with the new idea in various ways.

Evaluation

Generation and exploration are often the kinds of thinking immediately associated with creative problem-solving, however of equal importance to creative outcomes is evaluation. *Evaluation* determines the value of emerging or developing creative ideas and helps to refine the final product. Without evaluation, product demands and constraints could never be accurately met. Failure to evaluate potential and existing solutions and developments during the creative process could also result in inadequate solutions being accepted or creative possibilities not being fully refined. Thus evaluation is an essential component of the creative process if a final product is to be achieved.

Examples of Evaluation procedures are :

- Analysis (Perkins 1981) - Critically examining, by focusing attention on a particular aspect of the solution, the strengths and weaknesses of an outcome, proposal or idea.
- Assessment (Amabile 1983) -To pass a qualified judgment on an idea, concept or outcome by stating its appropriateness, appeal, usefulness or value.
- Verification (Yashin-Shaw 2001) - Confirming and/or justifying a choice.
- Criteria fulfilment (Campbell 1960) - The extent to which the product or an idea meets, exhibits or illustrates the characteristics required in the final outcome, through the application of predetermined criteria, characterising acceptable solutions.
- Elimination (Yashin-Shaw 2001) -The considered rejection of an idea or outcome due to its perceived irrelevance, inappropriateness, uselessness or impracticality.
- Selection - (Yashin-Shaw, 2001) - The decision to retain and include particular ideas and concepts.
- Comparison (Perkins 1981) - The juxtaposition of ideas, concepts or products with the intention of ultimately choosing the most appropriate one or rejecting inappropriate ones.

Without evaluation, creative problem-solving would be severely frustrated, resulting in inferior solutions. The functions of evaluation are closely aligned with the popularly used term of *convergent thinking* which is commonly thought of as the opposite or complement of divergent thinking, concerned as it is with conclusions, deductions, and assessments (Dowd 1989). De Bono (1970) refers to this kind of thinking as vertical thinking because it is selective rather than generative, concerned with practicality rather than possibility and correctness rather than probability.

The apex

The creative problem solving process is monitored by the highest order thinking which is strategic thinking. This function switches and combines the various kinds of thinking for the purpose of creating the desired outcomes. These thought actions allow thinkers to reflect critically on the appropriateness of selected strategies and concepts, employ different ones where necessary and monitor their progress while engaged in tasks (Scandura, 1981; Glaser, 1985). For this reason strategic thinking is placed at the apex of the model because its products are the goals, strategies and dialogue which inform, select and regulate the creative thinking process.

Examples of strategic thinking thought actions are:

- Goal setting (Evans 1991) - An explicit acknowledgment of the need to achieve some outcome or quality
- Switching (Stevenson 1991) - A conscious and intentional change in the direction of thinking
- Goal monitoring (Evans 1991) - A conscious intervention to ascertain the extent to which the thinking will lead to the desired outcomes
- Strategy formulation (Yashin-Shaw 2001) - A forward looking intermediate cognitive stepping stone which may lead to clearer intentions, goals and directions

The strategic thinking function is especially important during creative problem-solving because the conscious search for novelty and originality using existing schemas as building blocks in the heuristic process of producing creative outcomes poses a high cognitive load which requires more strategic cognitive management than the solving of a well-defined problem.

The arrows - Combining different kinds of thinking

With creative problem solving we don't know what the final outcome will look like. So we can't go straight there. If you were given a long division problem you would know the rules to apply to get you to the right answer. And there would be only one right answer. But when you are thinking for creativity, your thinking jumps around all over the place. You may generate some new ideas, explore them for a while but then think you need some more new ideas to enrich the process so you go back to generating, every now and then you may evaluate an emerging solution before deciding that you need to explore it in a different way. The arrows represent the fact that thinking during creative problem solving switches among all the different thinking actions. This feature can be though of as – thinking *interactively* and it happens throughout the *entire* problem-solving process. The arrows are there to remind us that it is good to *combine* the different kinds of thinking. Sure early in the process a creative thinker will do lots of generating; later in the process when a solution begins to emerge the thinker will naturally do more evaluating to ensure that the final outcome is useful and workable. But the thing to remember is to use as many of the cognitive actions as possible. The final product will be the richerr for it.

This notion of cognitive interactivity is an important one for anyone wanting to create a novel response to a problem. By encouraging cognitive activity to shift freely among the categories of thinking and among the thought actions identified in the model then the final result is more likely to be novel and innovative.

Conclusion

The *StrateGEE®* model for creative problem-solving presented in this paper has the potential to provide a valuable conceptual tool by which individuals during creative problem-solving in ill-defined domains may maximise the utilisation of knowledge assets by:-

1. The deployment of knowledge from disparate and diverse locations from within the knowledge base for creative problem-solving.
2. The identification of various cognitive thought actions which may be utilised in creative problem-solving.
3. The identification of a mechanism for combining different kinds of thinking so that cognitive resources may be interactively deployed.

The model thereby provides a conceptualisation that can both scaffold novice creative thinkers and extend those more experienced, while also providing a mechanism for identifying and managing different kinds of knowledge and thinking.

Given that we live in an age which encourages the combining of disciplines, the application of knowledge and skills across contexts and the synthesis of new knowledge with existing (Seltzer & Bentley 1999), a model which illuminates and facilitates such processes can be extremely useful.

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