Fostering Development of Agile Thinking Skills

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This research explores potential psychological and neurological impacts of teaching-to-repeat (i.e., methods that rely heavily on content memorization and recitation). The researchers argue that behavioral assumptions implicit to these methods produce educational outcomes that inhibit development of agile thinking skills valued by managers and marketing practitioners. Further, evidence reported by neuroscience researchers now reveals the possibility of persistent neurological effects that may oppose these capabilities as well. Applying these neuroscience findings, we propose and illustrate an alternative method we call teaching-to-vary that fosters the development of business graduates with agile thinking skills.

INTRODUCTION

While the growth in the number of students in colleges of business has been called nothing less than phenomenal, business graduates increasingly are criticized for their lack of relevance in today's marketplace (Diamond & Robinson, 2008). Criticism of business education extends to all levels. MBA graduates are characterized by corporate recruiters as lacking the ability to deal with today's problems, and described as "… unable to step outside of their comfort zones to explore new ways of thinking and doing." Employers commend graduates for their degree of specialized knowledge, yet find them unable "… to face today's problems and to acquire new knowledge" (Wankel & DeFillippi, 2006: 387).

Similar problem are reported at the undergraduate level as business students consistently score lower than those from all non-business fields on the Collegiate Learning Assessment tests of writing and reasoning skills. Paradoxically, those with undergraduate business degrees also score lower on the Graduate Management Aptitude Test (GMAT), used to determine admission to graduate business programs, than do those with undergraduate degrees in virtually all non-business fields. Reviewing specifically the failures of marketing education to produce skills valued by marketing practitioners, Finch et al. (2013: 65) warned that if change was not forthcoming "we could see social science graduates succeed, with increasing frequency, in competitions for entry-level marketing positions." Armstrong (2011: 2), referencing meta-analyses of business and marketing curricula, summed up the situation as

follows: "… much of the material that is taught in universities has no value in the real world. The material that is taught in some fields is often unsupported, incorrect, or harmful."

Chia and Holt (2008: 471) characterize discussions of the difference between business school outcomes and practitioner-valued capabilities as follows:

"The debate brings into focus both the nature and impact of formal knowledge realized through management research and the apparent lack of practical skill, self-critical insight and awareness instilled in students of such knowledge… (Mintzberg, 2004)."

Addressing issues of form and content in professional business education, they offer the following observations – "So, in being trained as a professional there is risk that business school students simply ape what is required of them rather than creatively engage with the problems of practice" (Chia & Holt, 2008: 472). These outcomes have been attributed to an over-emphasis on representational knowledge that "stymies any sense of management as an immersed perceiving, coping, and sense-making process …" (Chia & Holt, 2008: 473). Harrison, Leitch, and Chia (2007: 339) offer a similar conclusion, advising "business schools to move beyond the rule-based, procedural imperatives underlying competence and best practice so that proficiency and genuine mastery of the art of management [and marketing] become realizable."

In search of such a solution, we begin by exploring teaching-to-repeat (the dominant category of instructional methodologies used today) to reveal the implicit assumptions involved in such methods. In application, it appears that these assumptions, taken together, contribute directly to the negative learning outcomes described above. We then present findings from neurological research, and apply them to offer an alternative methodological category, teaching-to-vary. In opposition to the assumptions of teaching-to-repeat, teaching-to-vary is designed to practice students in methods designed to develop a comfort level with varying and adapting, and a capacity for agile thinking. In closing we provide suggestions for classroom implementation of the teaching-to-vary approach.

TEACHING-TO-REPEAT: THE IMPORTANCE OF STABILITY AND CONSISTENCY

Behaviorally, the constancy required by teaching-to-repeat fosters an efficient and stable view of the things (e.g., Armstrong, 2011). There is a certain comfort in learning that "If this, then that." But lost to response efficiency in the teaching-to-repeat experience is the development of students' own skills for producing their own answers, to know when to deviate from past methods (or utilize divergent thinking), or how to come up with unique approaches. These are the very skills needed when businesses confront situations that vary from past experience in significant ways (e.g., Finch et al., 2013).

Further, when stability and consistency are preferred, consideration of possible conflict among ideas and perspectives is not encouraged. This serves to actively discourage questioning. Consequently, whether or not by intention, "teaching-to-repeat" serves to impede questioning and avoid revelations of potential conflict between new ideas and accepted conclusions. Through its "answers" perspective on learning it offers consistency with familiar approaches and "accepted knowledge." Provision of predetermined answers offers closure.

In contrast, questioning of accepted responses invites variation from "accepted norms," thereby threatening stability. Moving away from one perspective and toward another requires openness to the possibility of change. In turn, this necessitates a willingness to consider perspectives that may be different. To move from one perspective to another or to challenge one perspective from another perspective is to involve oneself in change. And change represents conflict with stability of the sort implicit in teaching-to-repeat. So behaviorally when teaching-to-repeat methods are applied in the education of future business practitioners, these methods serve to reinforce stability, discourage questioning, and condition consistent, predictable views and approaches.

From the behavioral, we now turn to the neurological and what that research reveals about the potential of neurological effects of repetition. We apply these in a repetition-based educational context to more fully demonstrate the issues involved.

REPEATING AND BRAIN NEUROLOGY

Developmentally the brain is driven by a preference for neurological efficiency and utilizes the processes of pruning and conditioning to achieve that goal. Synapses are the brain's connections in which patterns or experiences are stored. If a connection ceases to be used, pruning occurs and the connection is discarded, "freeing resources for connections that matter" (Breznitz & Hemingway, 2012: 109). The brain, then, develops along lines of consolidation around developed patterns, connections, or experiences, increasing the emphasis of the left hemisphere. These patterns allow one to navigate environments continuously along familiar paths, even though the means or paths used for navigation may not be optimal. This prejudice toward developed patterns, toward assuming that what worked in the past should work in the present and beyond, causes tendencies toward less-than-optimization, which is illustrated by the psychological phenomenon of *satisfying* and the mental rigidity and automaticity which accompany it. We "…stop searching when we find a solution that is good enough. Satisfying, together with partial reinforcement of seemingly 'good enough' solutions, lead to mental rigidity" (Breznitz & Hemingway, 2012: 51). Following its preference for efficiency, the brain in turn moves toward greater levels of automaticity. "… (A)utomaticity despite being efficient and often useful, precludes innovation and change. It is inappropriate in situations that are different enough from the past situations to require new thinking" (Breznitz & Hemingway, 2012: 32).

Another part in the neurological processing that we call "thinking" is played by the corpus callosum, which controls the communications between the two hemispheres. While little is known about the corpus callosum, it is believed that it can play the role of both activating and/or inhibiting brain regions (e.g., Bloom & Hynd, 2005; van der Knaap & van der Ham, 2011). From an evolutionary perspective it seems to have developed to allow the brain to operate more efficiently (i.e., Aboitz & Montiel, 2003). Assisting in the brain's processing of information, the corpus callosum becomes conditioned to inhibit accessing the right hemisphere and aids in the process of pruning or eliminating weak brain connections that aren't frequently activated by use (e.g., Garrido et al., 2009; Larson & Smith, 2011; Grill-Spector, Henson & Martin, 2005). In time, the right hemisphere shrinks along with corpus callosum (e.g., Fling et al., 2011). So the implicit behavioral biases in teaching-to-repeat, biases favoring familiar patterns; toward stability and conformity; and in opposition to conflict or moving away from accepted norms are compounded by experiential and efficiency biases of the brain itself.

Clearly it is not enough to criticize teaching-to-repeat. Educators have long recognized behavioral advantages and limitations of such educational methodologies. But given newly revealed neurological implications, perhaps the question for business educators should be, Can different methods be used more productively? What alternative methods can be used to produce outcomes more in keeping with the preference for agile thinking expressed by those who employ business graduates?

We propose consideration of one alternative approach, teaching-to-vary. It is founded upon the use of full brain methodologies, designed to work toward, not against, improved hemispheric balance and toward, not away from the development of more original and adaptive decision-making capabilities.

THE CASE FOR MORE AGILE THINKING

To deal with the complexity, dynamism and ambiguity of today's world, Lazarra et al. (2010) found that "people must possess mental agility and the ability to adjust quickly yet accurately. Therefore, there is a need to train adaptive expertise to perform successfully" (Lazzara et al., 2010). Neuringer (2002: 672) points to the desirability of being able to respond to situations in a novel way as well:

"Behaving in an unusual, variable, or unpredictable manner is sometimes functional. An individual may sample new paths to reach a goal, invoke varied strategies when competing with an opponent, and generate novel combinations of images and concepts when doing scientific or artistic work."

In collegiate marketing education, the need to instill capabilities for functioning in dynamic environments is pronounced. Yet here too, concerns have been expressed. Finch et.al (2013) surveyed marketing practitioners to identify areas in the marketing curriculum where the gap between importance

and performance were the greatest. The biggest gaps identified were in what they termed meta-skills (i.e., skills that transcended the field of marketing) such as the ability to identify, formulate and solve problems or to adapt to change. Even more significant, they reported that such meta-skills outweighed marketing knowledge in the marketplace and should form the core of any marketing curriculum.

"This validates the assertion by the panel that a new graduate who demonstrates the priority meta-skills will be more competitive in the marketplace when compared with the one who possesses only marketing knowledge. By extension, it is recommended that learning outcomes linked to meta-skill development take priority over marketing knowledge outcomes in both program and course development" (Finch et al., 2013: 65).

These findings would seem to both confirm and extend those of Walker et al. (2009) who examined employers' perspectives on what college graduates would need to make a successful transition to becoming professional marketers. A key finding of this research is that graduates need to understand more than the "what's" and "how's" of marketing. But in the varying business situations they must navigate, they must also be prepared to demonstrate agility in choosing the "which" and the "when," as the path itself is a dynamic one. However, as Neuringer asks:

"Where does such variability come from? Why can some individuals 'be loose,' avoid ruts, and engage in novel actions, whereas others seem set in their ways? How do we increase or decrease variability when it is important to do one or the other – to behave in a nontraditional or creative way when that is needed, and to repeat practiced, predictable response when situations so demand" (Neuringer, 2002: 672)?

This flexible, adaptive thinking has come to be more commonly referred to as mental or thinking agility. Koutstaal (2012: 12) offers an extensive review on discussions of mental agility in her book titled The Agile Mind. She finds that debates in the literature have largely been "about whether skill in process or skill in content was most important in problem-solving," concluding that mental agility encompasses both, and that both are necessary for navigating diverse and variable situations. From her perspective, mental agility is the ability to move back and forth along a continuum from automatic (habitual) processes to controlled (more involving, engaged thinking) processes and at the same time, be able to move back and forth along a continuum from concrete to abstract content (or information). Yet while Koutstaal's mental agility perspective offers an encompassing description of the agility phenomenon from a psychological perspective, it, like the work of those she criticizes, neglects the neurological aspects of agility.

Combining perspectives from neurology and from psychology, the following definition is offered as a more comprehensive attempt to describe mental agility or thinking agility (here simply referred to as agility):

> ***Agility*** is the inclination and ability (skill) to more fully utilize existing brain connections/neuro-networks across hemispheres and also to continuously create new ones. These new brain connections/neuro-networks allow differing forms of content to be formed or utilized via differing means of processing. Agility involves not only the movement/synchronization along existing brain connections/networks but also the inclination and ability (skill) to continuously create new ones – that is to *vary* – while developing a greater tolerance to the psychological/physiological tensions created through utilizing higher energy usage to create the new connections.

Agility so defined involves both *seeking* new forms of representation, and developing an inclination to continue progress through seeking, resisting or avoiding automatic acceptance of already formed representations. The movement within the agility phenomenon is characteristically stochastic and driven (motivated) by an unsettled-ness, a discomfort or tension resulting from leaving the established groove of repetition (e.g., Von der Malsburg, Phillips, & Singer, 2010).

TEACHING-TO-VARY: ON THE ROAD TO AGILITY

It is through the practice of *varying* that skill in agility develops, creating the neurological movement and the creation of new neural connections. At its most basic level, teaching-to-vary is about teaching students to ask new questions instead of teaching students to deliver old answers. Teaching-to-vary asks students to think beyond the given, to view problems from new perspectives, or generate different or alternative solutions, or to craft original responses in changing competitive situations. Students taught in this manner learn and practice the skills to vary, developing agility skills. In teaching-to-vary, the educational emphasis on content is replaced by an emphasis on the development and application of skills. In the teaching-to-vary environment, the reward process must serve to motivate variance along with recognition of the resulting psychological tension that comes from creating difference. Suggested methods for accomplishing this in educational application are discussed next.

REWARD WHAT YOU VALUE, TO GET WHAT YOU REWARD

In teaching-to-repeat, students are rewarded when they demonstrate their ability to "give back" accurately content provided by others. In teaching-to-vary, original thought and application - *varying* - is encouraged, so it is important that reinforcement techniques used reflect this. The following research addresses some of the key issues for consideration in this regard.

Rewards and Motivation

Schwartz (1982) found that rewards within a classroom setting can be counterproductive to variability and can cause a negative effect on the intrinsic motivation. Therefore, activities that are already intrinsically rewarding need not be externally rewarded. Rewards may be decreasingly used to encourage activities that are increasingly intrinsically interesting. This would suggest that using rewards for the purposes of encouraging engagement (extrinsic motivation) with an originally negatively perceived task could be used until a more positive disposition develops (intrinsic motivation). But once this development occurs, the rewards should be discontinued.

Differential Reinforcement Effects

In sports as in business strategy, varying one's responses to an opponent's action may be critical to being able to win. This requires not only having a repertoire of maneuvers/techniques, but also having the ability to use these in varying combinations and/or sequences to out-maneuver one's opponent. Harding et al. (2004) report findings from a series of sport-based studies showing that differential reinforcement procedures can be used to improve this type of variation in performance. Their investigation of differential reinforcement procedures to promote response variability in sports competition found that reinforcement of varying techniques during practice led to an increase in response variability in play, and also led to the extinction of repetition behavior.

Temporal Effects of Rewards

Cherot, Jones and Neuringer (1996) found temporal negative effects with rewards. It seems that the proximity of the reward has an "attractive pull" against variability. In other words, with the approach of the reward, the perceived need for the "varying" in thinking decreases and ultimately shuts down. In this sense, the increasing proximity of the reward acts as a de-motivational element. They also report a variety of other studies that show negative effects of rewards on variability in various types of activities.

Potential Age-Related Differences

Lopatto et al. (1998) examined potential age-related differences in cautiousness, stereotypy, and variability using continuous versus intermittent reinforcement. They found that: (1) continuous reinforcement led to higher levels of stereotypy than intermittent reinforcement for both college students and adults, (2) intermittent reinforcement revealed an age difference in effect where adults showed greater

levels of stereotypy than college students, and (3) utilizing intermittent (differential) reinforcement led to learning varied response patterns for both groups.

These results in conjunction with the findings of Cherot, Jones and Neuringer (1996) suggest that varying responses are more likely to occur with varied reinforcement and that as the reinforcement event approaches the varying will decrease. In contrast, stereotypy or repeated response patterns develop in conjunction with regular or continuous reinforcement. So it would appear that Neuinger was right when he said that "variability is controlled by its consequences," and that "repeating and varying, in part, are learned skills under the control of reinforcing consequences" (Nueringer, 2004: 891).

SUGGESTIONS FOR TEACHING-TO-VARY

Teaching-to-vary requires thought in reshaping rewards away from the patterns adopted as a part of a teaching-to-repeat model in order to encourage the development of more agile thinking. It requires recognition and avoidance of various forms of mental fixedness. In teaching-to-vary, the back and forth or conversation replaces the lecture. The ability to ask a good question becomes more important than the ability to recite answers provided by others. Questions have the potential to create new and varied approaches, so in teaching-to-vary questioning behavior is valued and fostered behavior. Developing *agility*, involves disarming both our psychological and our biological tendencies towards relying on experience and creating instead a sense of comfort or normalcy with the dissonance that accompanies change and difference. It requires an understanding that to teach-to-vary is to embrace, rather than avoid, difference (Hill, 2010; Hill, 2013).

To illustrate implementation of teaching-to-vary in developing more agile management and marketing thinkers, we offer the following, using what Dyer, Gregersen and Christensen (2009) in "The Innovator's DNA" call the five important "discovery" skills of innovators: associating, questioning, observing, experimenting, and networking. Clearly these skills demonstrate the type of agile thinking that practitioners seek, but don't find, in too many of today's business school graduates.

To Practice the Associating Skill

The associating skill involves seeking out new associations by pairing things that aren't typically seen as being related. Here the educator can demonstrate this skill in class as means to relate what is being taught with students' personal experiences – "creative ability to make novel connections with the seemingly irrelevant on the part of educator evokes the learner's sensitivities and encourages the latter's capacity for the imaginative integration of what is learned with personal experiences" (Chia & Holt 2008: 472). In a teaching-to-vary approach, students could also be asked to come up with unique pairings and to provide new product/service categories based upon the pairings. Similarly, students could be asked to consider how concepts (regardless of where they are developed) could be adapted to other fields. For example, how could off-peak pricing policies used in restaurants and theaters be adapted to alleviate rush hour traffic congestion or how could "virtual reality" (the technology used to impose yard markers and other images on the field during a televised football game) be adapted to retail dressing rooms?

To Practice the Questioning Skill

The questioning skill is directed towards challenging (questioning) the status quo (i.e., the familiar, the accepted) to unfreeze it and open possibilities to move in different directions. In a teaching-to-vary approach, for example, marketing students could be asked to take any marketing concept (e.g. the marketing mix via its 4 P's), question its application in varying situations, and then offer alternatives. This could be done with any management or business concept as well. This exercise also serves to illustrate the need to recognize and overcome obstacles — another aspect of teaching-to-vary.

To Practice Observing and Network Skills

Observing and networking skills involve exposing oneself to different environments and sources of information for the purposes addressing cognitive entrenchment and to become more flexible in one's

thinking. Egri (2012) suggests that business students could benefit from participating with other schools or colleges on campus such as with the Fine Arts to aid in nurturing their creativity. Students could be taken to different business settings to observe differences in operations and cultures. They could also be encouraged to join and participate in different online blogs and/or offline associations (e.g., the American Marketing Association and a creative fiction writers' group). It also might be useful after such an experience to invite students to discuss unexpected differences and/or similarities observed among apparently very different types of groups.

To Practice the Experimenting Skill

The experimenting skill is the willingness to take risks. An important point of the development of this skill is development of an understanding that failures are a normal part of the innovation process, rather than something to be avoided at all cost. In a letter to investors, Jeff Bezos, CEO of Amazon wrote (McGregor, 2016):

> "One area where I think we are especially distinctive is failure… I believe we are the best place in the world to fail (we have plenty of practice!), and failure and invention are inseparable twins. To invent you have to experiment, and if you know in advance that it's going to work, it's not an experiment. Most large organizations embrace the idea of invention, but are not willing to suffer the string of failed experiments necessary to get there."

Here, students could be asked to identify several different business ideas developed for one type of situation, and then test them in an entirely different type of situation to see whether they might work beyond the original application. Discussing what has happened at the end of this exercise might provide students with additional insights and perspectives.

CONCLUSION

While these exercises are offered as examples of teaching-to-vary implementation, clearly much research is needed to provide a more complete understanding of the underpinnings of *thinking agility* as well as methods for facilitating its development in the classroom and beyond. We invite our colleagues to help us to expand and refine our understanding of this approach, and its applications. Perhaps our discussions will help us to apply more thinking *agility* to the current state of business and management education and might encourage it too to become more open and flexible. And perhaps this will help to improve the degree of practitioner satisfaction with the preparation of business graduates.

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