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David Saiia
Duquesne University

Granger Macy
Ithaca College

Maureen P. Boyd
University of Buffalo- SUNY

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Meaningful learning in management: recombining strands of knowledge DNA through engaged dialog and generative conflict

David Saiia[1], Granger Macy[2] and Maureen P Boyd[3]

[1]AJ Palumbo & JF Donahue Schools of Business Administration, Duquesne University, Pittsburgh, PA, USA; [2]Ithaca College; [3]University at Buffalo – SUNY

Correspondence:
David Saiia, A J Palumbo & J F Donahue Schools of Business Administration, Duquesne University, Pittsburgh, PA 15282, USA.
E-mail: saiia@duq.edu

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Abstract
This paper explores how meaningful learning objectives in management classes are pursued when the focus is on classroom activities and strategies that foster transformative thought, adaptive growth, and commitment from both instructors and students to achieve meaningful learning. To this end, we offer a metaphor and a context for this approach to learning. The DNA of learning metaphor details effective pedagogical practices and encourages instructors to take a more challenging and possibly transformative approach to their course design and classroom experiences.
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Introduction

There are elements of learning that are readily measured: a definition, a ratio, some historical fact or even a brief recitation of a theory (note, e.g., resource-based theory or issues pertaining to agency). Evaluation and synthesis of these facts and concepts in scenarios, as occurs in management classes, can move the learner from simply recalling information to increasingly complex thinking. For example, a case study could have the student apply multiple theories and concepts to analyze an issue in a complex and dynamic situation.

Meaningful learning must be more than recalling a definition or calculating a ratio. Business professionals of the future must be capable of performing multilayered and multilevel analyses to understand complex, interrelated issues that can impact on the environment, societal, and business spheres, as well as on the personal spheres of their own lives. What then does meaningful learning look like in the classroom?

Meaningful learning situates facts and theories within context, seeks to understand their import, and provides guidance for future action within a complex and changing environment. Meaningful learning involves ''the process whereby knowledge is created through the transformation of experience'' (Kolb, 1984: 38).

Therefore, meaningful learning connects with and builds upon students' funds of knowledge: that is, their socio-cultural and personal experience (Moll, 1992). Furthermore, if we accept that learning is the process of creating knowledge then knowledge is the result of the transaction between the person, the content and the context. It involves ''reading the world'' (Friere, 1982) and absorbing and applying curriculum content to real world contexts, issues, and problems (Atwater *et al*., 2008). Kolb (1984, see also literary theorist, Rosenblatt, 1978) consciously names the word *transact* as opposed to *interact* to capture the ''more fluid interpenetrating relationship between objective conditions and subjective experience, such that once they become related both are essentially changed'' (p. 36). Meaningful learning is, therefore, potentially transformative and most often occurs when knowledge learned through experience combines with knowledge frames learned through content (Vygotsky's notion of spontaneous and scientific concepts, 1984: 194). Classroom activities can activate both spontaneous and scientific concept formation, which in turn can provide meaningful learning experiences where content knowledge and experience are applied.

It is our intention in this paper to explore the notion of meaningful learning and to examine one classroom context in which meaningful learning occurs: an undergraduate capstone strategic management class. To facilitate this understanding we use a metaphor borrowed from the model of DNA replication to represent the process of creating meaningful learning. We call this the ''DNA of meaningful learning'' with the intention of focusing on the transformative potential of the learning experience. In the following sections, we will explain this approach to meaningful learning, describe an exercise that exemplifies several of the desired learning states and outcomes, and elaborate further on the structure of meaningful learning offered in this paper. One objective is to provide a memorable metaphor, which would highlight the transformative and generative nature of a meaningful learning experience.

The DNA of meaningful learning

The double helix structure of DNA is an elegant figure, that is, deceptively simple in form but very complex in function, much the same as good teaching. In simple terms, DNA replication is the process by which the genetically encoded information within its structure is duplicated. During this process, one strand of DNA detaches from its double helix structure and pairs with matching but opposite bases. In this way, an identical copy is made of the opposite strands. While in theory the replicated strand should be identical, variation does happen. In sexual reproduction, DNA from the male and female recombine to make new complete but slightly different strands of DNA. The advantage of sexual reproduction is in the controlled variation of characteristics within systemic ranges thus height, weight, speed, even complex traits such as intelligence are effected by the matching of the DNA strands to the proper site on the partner strand.

Likewise, when students enter a course, whether they are freshmen or graduate students, they bring with them their personal, social, and content ''funds of knowledge'' through which they interpret course work to make sense of what is heard and experienced. In terms of our metaphor, they have their own ''knowledge DNA'' that they bring with them. Instructors' funds of knowledge include course content knowledge and life experiences; instructors select their own strand of ''knowledge DNA'' that they intend to share with these students through the course experience. The classroom context affords multiple opportunities and formats to share information and generate knowledge as information combines with content and experience for students to further their understanding of the subject being taught. However, not all instruction allows for students to combine what they know with the content being shared and to actively construct new knowledge.

Meaningful instruction can happen in the classroom or online or in any intentional setting that the instructor determines to be appropriate for the generation of a particular ''strand of DNA.'' The chosen ''classroom'' is then the institutional site for the co-construction of new knowledge DNA. Too often, because courses are not designed to facilitate a knowledge exchange, the two strands of ''knowledge DNA'' fail to recombine in transformative and meaningful ways. Moreover, if a course is not designed with multiple opportunities for engaged student learning that taps into the student's unique ''knowledge DNA,'' then the transformative potential of that course will not be activated, or possibly ever achieved.

The DNA metaphor reminds us that we have to design course experiences that facilitate knowledge exchange and new knowledge formation by

attempting to elicit, nurture, and promote higher order thinking skills in our students. Such knowledge exchange and formation are likely to occur in an environment that (1) offers current, explicitly relevant content, and experiences (Friere, 1982) and (2) values, acknowledges, builds upon, and makes socially significant, student contributions (Kolb, 1984; Bloome *et al.*, 2005). In such an environment, management knowledge is constructed and reconstructed using personal experiences in an integrative relationship between faculty and students that values both the existential and essential components of knowledge (Atwater *et al.*, 2008). The goal of this process is to produce potentially transformative classroom experiences for both the students and the instructors.

The DNA metaphor as applied here may be novel, but the ideas and theory that underpin this conceptualization are not. Scholars of management and of educational theory have long talked about validating stakeholder input and acknowledging the available funds of knowledge within a constituency (Freeman, 1984). In *Teaching as a Subversive Activity* (1969), authors Postman and Weingartner identified ''outdated canons'' of education. Most importantly, they noted the need to move beyond the idea that one and only one right answer exists. Thus, the logical completion of that thought is that absolute answers cannot be absolutely right. Individual viewpoints and situational factors must be honored. Students should understand that the outcomes of business and society problems, for example, are the product of complex socio-technical systems; therefore, cause and effect relationships are often ambiguous and non-directional. It is important that future business leaders attain the cognitive flexibility to balance this ambiguity, cope with it, and yet make effective decisions. Our classrooms and our assessment mechanisms cannot induce a one right answer, dichotomous mindset. The long-term success of businesses and the sustainability of society require that our future leaders be competent in higher order critical thinking skills.

A meaningful classroom experience

An example of a class activity that captures the *DNA of meaningful learning* in a business management classroom is the group member auction. This exercise was created by the first author for undergraduate senior students in Strategic Management. At the time of taking this class, these students are sending out their résumés (or Curriculum Vitae: CV) to find jobs and internships as they begin their transition away from Business School and into the workforce.

Typically, this class is taught in 75 minute time periods. This activity fits well into this extended block of time.[1] This exercise is designed for the first class period or early in the course so that all members of the class can be assigned to a group for later assignments. But this exercise also takes what could be a clerical task and transforms it into a market simulation with an introduction to the meaning of the external environment. It also demonstrates how a collection of skills can create competitive advantage and how strategy can emerge from the interaction. The group member auction is developed using the following steps:

1. Assignment distributed over e-mail
2. In-class role play
3. Debriefing activities
   (a) A lecture on market formation
   (b) A student-led discussion
   (c) A teacher-led discussion

Assignment distribution

Students are informed by e-mail that they should prepare a ''mini-CV'' based on questions provided by the instructor that highlight relevant skills needed for successful engagement in the class. In addition to contact information, the mini-CV asks students to write answers to the following questions:

- Expectations for this class?
- Area(s) of interest in business?
- What makes you unique?
- What skills can you offer to a work group?
- Why should a firm want to hire you?
- What is your idea of the perfect job?
- Hobbies?

In the assignment, students are also specifically informed:

- *KEEP IN MIND – this information should be thought of as an advertisement – what are your best qualities* – this will help determine your group for the semester. THIS IS IMPORTANT – it will be read aloud in class.

Those students who did not prepare a mini-CV in advance are asked to produce one as we set up the role play in class.

Role play

On the day of the activity the instructor determines how many initial, temporary groups will be appropriate for the class size and content and starts by randomly assigning students to that number of groups. One ''leader'' is selected within the groups and then the groups are disbanded. These newly elected leaders then become the auctioneers that facilitate the bidding on the manpower as articulated through the mini-CVs. As a senior level class, these students are assumed to have enough experience with bidding behavior to be able to operate in this simple exchange. Too much information prior to the experience could stifle the spontaneity of the exercise.

These leaders are given ''corporate assets'' – usually around 15 hard candies and two small distinctly different candy bars. The hard candies are regular currency and candy bars are trump markers. The objective is to create the best group possible. The tension and seriousness of the task is created by letting the class know that these are the groups they will have for the whole semester. The leaders rotate the responsibility for reading the mini-CVs. They are instructed to read them as if he/she is the person in the resume. As an incentive to the reader, he/she gets a 45% commission on the sale. The other leaders bid if they want that person for their group. Thus, there are real consequences from this auction. The commission proceeds may be used in a future bid. The remaining amount bid, is ''paid'' to the new group member as a ''skills-bonus.'' The ''money'' leaving the auction allows three things to happen. First, it creates some expectation in the other students and helps them focus on what skills seem to ''sell.'' Second, it constricts the ''monetary'' supply in the simulation and creates market competition signals. Third, the students enjoy the candy while the activity plays out and helps them focus on what is rewarded.

The students not in the ''bidding'' roles are the ''labor pool'' and audience. As they listen for their mini-CV, they are given the task of taking notes about what attracts the highest bid and how the auction proceeds. The bidders are instructed to keep their eyes on the reader and not back at the ''labor pool'' to avoid any signals.

Debriefing activities

As noted previously debriefing occurs in three different steps; a debriefing lecture, student-led discussion, and instructor-led discussion.

The *debriefing lecture* that immediately follows the auction is a concise introduction to terms and concepts about bidding behavior, market formation, strategic response, and use of resources. It is useful to point out how the bidding generally begins in a new market, the probing to find a market price, and the various spikes in price that occur because of the recognition of certain traits and/or a possible individual/friend they think they know represented through the mini-CVs. The purpose of this element is to get the students thinking through the experience to create connections with new concepts, their shared experience, and what they already know.

The *student-led discussion* follows. Students are asked questions about what the students noticed happening in the auction. There are three categories of questions, which are written on the board to encourage this discussion. The categories and specific questions used for discussion include the following:

1. *Bidders' questions, bidding, and motivation*. ''Why did you bid so much for this member rather than some other?'' ''Why were you bidding against me?''
2. *''Labor pool'' questions about bidding preferences and member choices*. ''Did the bidders know who they were bidding on or was it attractive characteristics?'' ''What skills were attractive?''
3. *Student questions to the instructor about the auction, how it worked and how to improve it for the next time*. ''We should have more time to do the auction next time.'' ''How can you ensure that people are not cheating?''

Hints of conflict can surface here. Some may accuse others of ''padding'' their mini-CVs (the instructor may even ask if this was an issue – it is intended to be ''student led,'' therefore, instructor should create the conditions to get the students to fuel the discussion). The students may also address how the bidding happened and how some bidders used their resources to get certain members, while others tended to hoard resources and end up with unspent resources after the bidding ended.

The *teacher-led discussion* attempts to summarize the student discussions and provide closure for the exercise by connecting external market behavior related to business strategy and the role that leaders played in the auction. While the students ask and respond in their discussion, the instructor should be taking a few notes, not only about what is said but also about what is not said, what seems to be

missing, or possibly what is being implied. There will frequently be some mini-CVs that seem quite attractive that were bid low. It is useful to tactfully explore why this occurs. Sometimes it is the wordiness, awkwardness or unbelievability of the skills listed. At other times, it may be the cycle of the class market. It is also interesting to note how the different bidders approached the market.

Student reactions to the exercise

Despite the fact that this is a challenging exercise, student reaction has been consistently positive. Each semester students comment via e-mail, course feedback, and in person as to the value of the exercise. In Fall 2007, Saiia formally surveyed all 69 students enrolled in his capstone Strategic Management course. He posed two open questions: *What was your general impression of the exercise*? and *What are the pros and cons of the group selection process*? He also invited optional further comment. The overall response indicated that students found the exercise challenging, interesting, and exciting although a minority also found themselves to be uncomfortable participating in the exercise. Such responses are not inconsistent with reactions to role plays or behavioral simulations in general. The full results and a further discussion can be found in Appendix.

In the following section, we will use the group member auction to explore the structure of meaningful learning and show how the DNA genetic code of TCAG exists in this exercise so as to provide a framework for designing and replicating effective pedagogical exercises in the business school classroom.

The code of DNA learning

So what is the ''genetic code'' of meaningful learning? We suggest that meaningful learning in management can be conceptualized using the structure of the DNA helix. A DNA helix usually does not interact with other segments of DNA allowing the DNA to function as a safe repository for information. However, chromosomes interact when they recombine. In DNA recombination, the chromosomes exchange genetic information using the TCAG code and produce new gene combinations. This is important in the evolution of new proteins (Pál *et al*., 2006) and recombination also supports DNA repair in the cell's response to double-strand breaks (O'Driscoll and Jeggo, 2006) this helps to ensure continuity of what works and has been successful.

As the double helix is the basis of the regeneration of life and the development of new proteins, this structure is used here as a metaphor for the regeneration of knowledge, self-examination, and understanding. In the following section, we use the DNA metaphor and the ''TCAG'' genetic code to describe successful combinations of course experiences that stimulate meaningful student learning.

Table 1 contains the letters used in the TCAG genetic code. For the sake of narrative and metaphoric consistency, we have adapted this code and have suggested a set of desirable learning experiences that classroom activities should strive to engender and that also fall into the ''TCAG'' sequence of the genetic code. The focus here is not on the type of instructional approach, but rather on the student and teacher interactions elicited during the classroom learning experience. It may be that our metaphor succeeds or fails on a deeper bio-chemical level, but we believe that it does succeed at the pedagogic level.

These codes describe four fundamental states that foster the reproduction of authentic learning and knowledge creation. Each state involves a distinctive process and produces an important outcome for the learner. The transaction state refers to the essential components of student–teacher relationships that facilitate a transformation of information to knowledge. The captivation state refers to the sense of connection or involvement that the student must feel with the learning experience. The activation state refers to the active mental processes needed to truly understand and engage with concepts introduced through the class activities. The gestation state refers to the reflection that must occur to truly incorporate the knowledge

Table 1 The genetic code of meaningful learning

States	*T transaction*	*C captivation*	*A activation*	*G gestation*
Processes	Tension	Critical thinking	Action	Gravity
	Tolerance	Connectedness	Analysis	Genuineness
	Trade	Conflict	Agitation	Group
	Talk	Creativity	Assessment	Gusto
Outcomes	*Transformation*	*Commitment*	*Adaptation*	*Growth*

DNA offered through class experiences with the funds of knowledge brought to class by each student. The culture of the classroom as shaped by teacher–student interactions will determine the likelihood of these DNA strands combining to create new strands of knowledge DNA.

The following sections will briefly elaborate on important characteristics of these four states and then explore how these new strands of knowledge DNA can be created.

Transaction

The transaction code represents the fundamental exchange between student and teacher. For this exchange to be effective there must be a sense of reciprocity or mutual accountability embedded in the transaction. The outcome of this transaction is that both the teacher and the students should be transformed. This transformation occurs in relationship with others when the learners are exposed to the *tension* of confronting other learners and the *tolerance* that is needed to be open to new ideas. This also requires the learner to actively *talk* and *trade* information to fully engage in the classroom discourse rather than passively experience the classroom environment.

In the group member auction presented previously, this transaction component can be seen clearly as we find the students engaged first in the talk and information trade aspects of this stage as a market of actual transactions takes place. This then leads to a tension as their information and characteristics are considered by other teams. And finally a tolerance is required in observing the outcomes of the process. This exercise clearly shows students that they have been given the trust to act on their own and to make their own choices.

In essence, the transaction state suggests that the teacher and the students are mutually accountable to each other for the creation of a collaborative learning environment. There is widespread agreement that the instructor can foster or stifle student responses (see, e.g., Cazden, 2001; Boyd and Rubin, 2006). So instruction, such as it is, should promote an ethos of involvement and respect by approaching students as individuals, phrasing questions to encourage discussion, and making space for student interpersonal relationships.

To encourage knowledge trade, we are not trying to limit our students or teach them to carefully recite learned responses within a teacher-controlled environment. Instead, students should be encouraged to explore, take risks, and be responsible learners to activate the DNA of learning. Students must recognize their own accountability in the learning process. They should not only use accurate information and think deeply about what is being discussed, but they should also request justifications and clarifications; and recognize and challenge misconceptions within the classroom and beyond. Such accountable talk (Resnick, 1995) is marked by student–student interchanges as students adopt traditional teacher discourse roles such as asking questions and facilitating interpretation as they become participants in the co-construction of knowledge.

Captivation

The captivation state refers to becoming captivated by the topic and ideas of the course. The students get captivated in the call to knowledge. It is a process of engagement. Once mutual accountability is created, the members of the learning community should co-create an extended dialog throughout the course. The outcome of this state is a *committed* learner *connected* to others in the learning community through *critical thinking* in a mutual process of inquiry and *creativity* to produce new knowledge. Again, the nature of the team auction exercise *captivates* students to engage with it. They realize that the success of the semester may depend on the outcome of the simulation. They become committed to the exercise, connected to their fellow students, and they use critical thinking and creativity to identify an appropriate set of members for their team.

In his writing on learning organizations, Senge (1990) observes the need to encourage dialog and authentic discourse. In dialog ''language functions as a device for connection, invention, and coordination'' (Kofman and Senge, 1994: 18). Dialog assists a learning community in developing a fuller understanding of others' viewpoints and a greater awareness of the limitations of their own viewpoints. Dialog is a key learning process in moving learners toward accepting or creating new knowledge. Dialog derives its strength from psychological processes by helping participants move beyond their own personal schemas and limited understandings.

> Dialog is built in conflict, a conflict of ideas and feeling. Conflict is the gadfly of thought. It stirs us to observation and memory. It instigates to invention. It shocks us out of sheep-like passivity, and sets us at noting and contriving…. Conflict is the *sine qua non* of reflection and ingenuity. (Dewey, 1922: 300)

It is important, however, to make a fundamental distinction based on whether conflict occurs in an

intrapersonal or interpersonal state (Macy and Rea, 2005). An intrapersonal state is psychological, a result of two or more ideas or emotions held by one individual which are mutually contradictory. In contrast, an interpersonal state refers to conflicting ideas motives or emotions held between individuals. In considering the importance of conflict to learning we are focusing on the conflict between ideas or concepts that are, or appear to be, mutually incompatible whether they are interpersonal or intrapersonal. The goal in creating meaningful learning is to induce intrapersonal, psychological conflict within students in the service of knowledge building that will resolve those conflicts and create learning.

However, in the classroom, many instructors do not understand this distinction and believe that conflict should be avoided and is destructive to the learning process. They are confusing intrapersonal and interpersonal conflict. Indeed, interpersonal conflict focused on the individual, rather than the concept has often been found to be destructive (Amason, 1996). However, concept centered conflicts are essential for meaningful classroom outcomes and organizational learning (e.g., Wickland and Brehm, 1976; Nemeth, 1995; Chan *et al.*, 1997; Palincsar, 1998; Jehn and Mannix, 2001). Conceptual conflict is helpful, even necessary, for knowledge building, optimal decision making, and attitude formation based on careful consideration of all the evidence (Kozlowski and Ilgen, 2006).

In previously discussing reactions to the group member auction, we noted that some students experienced discomfort with the exercise. Such discomfort is often the first sign of intrapersonal conflict. This *conflict* prompts them to *connect* to the event and to think *critically*. The market created in class is also a form of conceptually based interpersonal conflict; specifically, which skills will translate into favorable group selection for the upcoming semester. As in any market situation, it is not as comfortable for some as it is for others and there is some tension created as the competition surfaces and the bidders (and the potential group members) begin to pay close attention to who will be in their groups.

Activation

The goal of the activation state is to begin an *adapted* thought process where the learning community becomes open to deeper and more reflective understanding. Dialog alone is not enough. Learners must *access*, *analyze*, and *assess* the subject matter. Only in this way can they truly question and develop their thoughts and understandings. In the group member auction students must access, analyze, and assess appropriately in order to act and create an effective team. They consider how various characteristics, including their own, get to influence the bidding. Students may also consider actions based on their analysis of the simulation in order to adapt in the future.

Activation comes about through full engagement in conceptual conflict as a result of effective dialog. In captivation one's personal fund of knowledge is engaged, analyzed, and drawn into relationship with others. In activation, knowledge becomes actionable, or at least potentially actionable. Activation is primarily generated by examining the action implications of conflicting ideas, often on a personal level. Specifically by considering, ''How does this idea work in practice?''

We find that students can become highly activated by the group member auction. As we noted in the *captivation* stage, students may be drawn into a state of intrapersonal conflict. They are drawn into *action* as they become personally involved in an attempt to *analyze* and understand the reaction to their mini-CV. The initial conflict can now be understood as an outcome of not taking their assignment seriously enough; or perhaps they have not put enough effort into developing their skills and capabilities. And then in the student discussion, they are again become *activated* in trying to use other student reactions to make sense of their own reactions. The net result of this is that they begin to consider possible actions that might help them to *adapt* in the future.

Argyris noted the frequent discrepancy between espoused theories and theories-in-use (1982). Bridging the difference requires what he called *Model II* learning (Argyris, 1982). In Model II learning, learners become aware of the practical action-based implications of espoused theories and reflect on the effectiveness of their existing theories-in-use, or practices. This awareness in the students can be accomplished both retrospectively and prospectively. Thus, in the activation stage discrepancies between theory and their own practices become highlighted and then later resolved in the gestation phase.

Gestation

In the gestation state the learner becomes aware of the *gravity* or importance of the learning and processing their learning in a relevant *group*. The

literal and figurative outcome of this state is *growth*. Growth occurs as the learner becomes *genuine* or authentic about the subject and approaches learning about the subject with *gusto*.

Again, the team member auction induces students to *gestate* by reflecting on their behavior and the outcomes of the exercise. Processing this exercise as a group helps students to grow as they consider their impact on the exercise and understand the importance, which requires a *genuine* approach to the issues and approaching the subject with *gusto* as they can see the real life implications of the learning. Students have a deep learning experience that may cause them to assess their own strengths and to achieve a new appreciation of their student-peers.

Reflection continues to be a core learning process in the *gestation* state. It involves personally considering and evaluating apparently conflicting ideas, ideas that may have emotional meaning for students. Reflective processes are important to engender deep student learning (Griffith, 1999; Mazen *et al.*, 2000; Smith, 2001). Reflection closes the loop in enhancing learning through dialog and careful listening (Raelin, 2007). Thus, evaluation and reflection are the core processes of *gestation* and require candor and openness in the learner (Argyris, 1982: 169). *Gestation* has the capacity to alter practices and behaviors on a fundamental level creating the possibility for double loop or second-order learning. Students must be *genuine*, open to both their strengths and shortcomings to be successful in this stage of knowledge creation. This requires careful and honest analysis and assessment – that addresses personal funds of knowledge and challenges what we think we know. In the process, students attempt to adapt old thought processes and behaviors into more realistic and effective ones.

For those students who experience discomfort in the group member auction, the *gestation* phase could conceivably lead to significant *growth*. In *gestation*, students may begin to appreciate the *gravity* of the situation as they reflect on the potential of this market to be representative of their own efforts in the job market. This requires them to be *genuine* and not attempt to hide behind easy rationalization.

Attaining this state, a student should come to understand that problems often are fundamentally based in one's own accepted mental models, rather than on the actions of others. The personal awareness of this principle, however, is often difficult to attain. And without this awareness, an individual can fall into the ''one right answer'' mindset. He/she may see ideas in terms of right *vs* wrong, or self *vs* other; locked into a dualistic black and white, colorless mindset. Developing a gestation state is a key to enhancing a student's learning through conflict, evaluation, and reflection. With practice, the classroom can help to create reflection and improve communication and critical thinking skills. These skills applied within the learning community in respectful and appropriate ways can help learners appreciate the full spectrum of colors in multilayered, multilevel issues of modern society.

In the following section, we seek to complete the metaphor by showing how designing courses to facilitate information exchange can mimic the process through which DNA shares, recombines, and creates unique genetic information.

Recombining the DNA strands

As we consider recombining the learning code for DNA we must realize that meaningful learning is an active, complex, relationally based process that requires mutual accountability, dialog, conceptual conflict, and reflection. It is an organic process that evolves with its participants. What we suggest here is more like improvisation than ''instruction'' or orchestration.

Responsiveness and flexibility should be designed into the course structure so that each course can be an evolving and generative experience. In order to engage the unique character of a given class, the instructor should try to connect with each student, appreciate what each has to offer, and create the appropriate TCAG learning states. Such responses cannot be mandated; but require participants who are motivated to learn deeply. Therefore an instructor's choice of instructional approach should strive to *transact* as a learning community, to *captivate* and *activate* the learners in that community and to encourage new ideas to *gestate* to achieve more meaningful learning.

The instructional approaches adopted in the classroom shape the patterns and types of teacher–student and student–student interactions likely to occur (Friere, 1982; Cazden, 2001). How content is presented can affect how it is understood, used, and applied as a theme or a concept. Since management education anticipates application, this insight is critically important.

> Confronted by this universe of themes in dialectical contradiction, men take equally contradictory positions: some work to maintain the structures, others to change them. As antagonism deepens between themes which are the expression of reality, there is a tendency for the themes and for reality itself to be mythicized, establishing a climate of irrationality and sectarianism. This climate threatens to drain the themes of their deeper significance and deprive them of their characteristically dynamic aspect. (Friere, 1982: 92)

Friere notes the potential of conflict to radicalize positions and stifle potential learning. It is essential to engage this conflict generatively in order to create new strands of knowledge DNA rather than rigid, radicalized perspectives. When attempting to create a learning environment in the classroom, instructors have a palette of instructional approaches to draw on. Regardless of the technique, however, the ultimate goal is generative conflict, if we are to enhance our students' capabilities as learners.

In the following section, we examine four common instructional approaches and consider their capability for generating learner growth. Each of these approaches (role play, lecture, student-led discussion, instructor-led discussion) was woven into the group member auction and each has the potential to create a form of interpersonal conceptual conflict. Furthermore, each instructional approach can orient the learning community into particular discourse norms to facilitate the co-creation of knowledge. These approaches will have differing degrees of effectiveness to captivate and activate students depending on the subject matter and context. Below, we define these instructional approaches and briefly indicate the patterns of discourse interaction and knowledge exchange that traditionally result from their practice. Finally, we comment on the role each instructional approach played in the group auction experience.

Role play

A role-play is a potentially powerful means of inducing conflict by creating a direct engagement with other students and possibly with the students own internal beliefs about their own behavior. In this sense, it can activate all processes in the DNA model. A role-play is a behavioral simulation wherein students take a particular role to rehearse or to act it out in interaction with others. Role-plays can be conducted by one participant alone, in dyads, or in larger groups. Large group role plays, such as the group member auction, are often called simulations because the participants collectively recreate a team situation or an organizational setting.

In a role-play students attempt to take the perspective of other persons or entities, and must read and research facts from their assigned role. This process exposes the individual to a different viewpoint and offers an aspect of intrapersonal conflict as the individual interacts with others who are also playing a role. The overall level of potential conflict is high as the individual must both think and act as another and may be drawn into a contentious relationship with another. The student is more physically involved in the process than in previous techniques.

As we saw in the group member auction, this can be a difficult practice for many students as there may often be personal lessons for students in the exercise. Therefore, the role-play technique requires sensitive facilitation in order to achieve a positive learning outcome as the student may experience internal conceptual conflict. If self-awareness of this process can be attained, the participant may generalize and be able to reframe future conflicts as conceptual rather than relationship based. This moves the learning firmly into the ''gestate'' DNA process and can become highly meaningful. However, the difficulty may cause students to depersonalize their role and thus do little more than superficially act out the role without reference to personal knowledge or understanding. Therefore, as with many of these techniques, the facilitator must be fully engaged if the full potential of the DNA of learning is to be expressed. In this case, the students must be encouraged to use the role-play as a way of shedding reputation related constructs that might normally inhibit the exploration of a contrary view.

Conveniently, role-plays do not require a script and with creativity can be made into a broadly used learning tool. Role-playing can also be used effectively in combination with the debate method in more conceptual knowledge domains, by having students act the part of different theorists who disagree with each other over the analysis of a particular situation or case. Use of this method might induce the most conceptual conflict when students are assigned the roles of theorists who hold theories that contradict students' naïve theories.

Lecture

Lecturing is the most common form of instruction at the college level, in part because it is widely

viewed as an efficient way to transmit knowledge across a wide range of subjects. While a well crafted and delivered lecture can inform and enthrall listeners, it is a one way transmission of information and fails at even the first DNA stage in the transact process to create a space for mutual accountability between teacher and student for the creation of learning. At its best, a lecture can both support mastery of factual information and skills and inspire a change in mindset or increased passion for learning of a topic. There is transformative potential through a lecture, although other experiences are needed to capture that potential. At its worst, a lecture is an information dump (Fink, 2003) which rarely promotes retention of material, application to real life or personal contexts.

In the group auction experience a debriefing lecture occurrs immediately after the role play. It serves as a conduit to bring together the very personal experience of the participants in the group auction, and the practical experience and the business content knowledge of the instructor. The lecture provides the vocabulary and framework for students to transfer the shared classroom experience of the role play to the broader context of the market place.

Student-led discussions

In student-led discussions, students adopt traditional instructor roles. Student leadership of discussions is a very general technique that can be used with paper assignments or cases, with an assigned leader or without. By transferring the responsibility for maintaining discussion from the instructor to the students, this method suppresses the hierarchical power structure that is present in instructor-led discussion. Effective student leadership of discussions is thus a more powerful means to engage student openness and foster personal insight. Thus, a more meaningful learning experience is possible for those individuals that offer personal observations wrought from personal knowledge brought to the class and personal experience happening in the classroom.

That is, opportunities to engage in conceptual conflict may be enhanced when the instructor is not always there to mediate as students can no longer look to the instructor for cues. In this way, the third state to ''activate'' students in the DNA process can be engaged. As the instructor role in the interaction is reduced, students can feel freer or ''activated'' to present divergent opinions, allowing for greater information exchange and learning among students. At its best, students become facilitators of interpretation as they restate or question other students, and relate the topic or issue to their own experiences in order to assist understanding. Students respond to each other's questions and challenge each other's ideas by telling why they agree or disagree (Almasi, 1996). Evidence suggests that this approach enhances student learning and is viewed positively by students (Kremer and McGuinness, 1998).

At its worst, student-led discussions are off task or dominated by one or two students. If instructors have not modeled appropriate behaviors or been explicit about expectations, students can replicate the norm of other classes: recitation type exchanges or individual conversations. They will thus miss out on the ''transact'' and ''captivate'' stages of the DNA model and never make it to the ''activate'' stage, which is possible in the approach.

In the group auction experience students are able to articulate their perspectives not only on how the auction is transacted, but also how individual players comport themselves. As mentioned earlier, some students will feel regret about not completing their homework with greater care and effort, while others will accuse classmates of CV padding. These are expressions of both interpersonal and existential conflict representing very teachable and sometimes risky moments in the classroom.

Instructor-led discussion

Leading discussions is the second traditional standby (after lecturing) for college professors (Fink, 2003). While overall, this technique offers a limited ability to engage conceptual conflict, it is a good step in accomplishing two instructional goals. First, it moves away from the lecture or ''chalk and talk'' based learning and actively engages students with the content. In this form of discussion the instructor can elicit student opinions and interpretations of course concepts or assigned readings. The instructor may assign questions in advance to prepare students for discussion, or may engage students without prior preparation. Secondly, the instructor models how to conduct substantive discussions. She directs the scope and cognitive level of the discussion through the types of questions posed. Good teachers go beyond *what* to *why* and *how* and pose thoughtful follow up questions that foster critical thinking. Furthermore,

the instructor shapes what counts as learning and knowledge in this classroom by building on (or ignoring) student contributions.

With teacher-led discussions, there is a greater likelihood of moving into a DNA model of learning with a transactional process that has the capability to captivate and connect with students. At its best, instructors ask questions that recast, extend or challenge student responses. Such contingent questioning (Boyd and Rubin, 2006) reflects active listening on the instructor's part and a willingness to incorporate, elaborate on, and validate student contributions. At its worst, instructor-led discussions are recitations where all exchanges go through the instructor. Such teacher dominated discourse norms (IRE/F: teacher initiation, student response, teacher evaluation/follow up) elicit factual knowledge recall as opposed to application or analysis of concepts, or knowledge construction.

A main drawback to instructor-led discussion is that the instructor remains firmly at the center of the class. This causes students to look to the instructor for cues. Students may seek to accommodate or confirm their ideas, or at least the expression of those ideas, so that they will be agreeable to their instructor and score ''points.'' This in turn may limit students' movement towards the ''activate'' process in the DNA model as they try to second guess the instructor rather than actively engage the concepts on a personal level. This tendency can lead to a class discussion that may be little more than a superficial exercise in conflict. Such discussion is less likely to result in lasting conceptual change since the deeper structure of the problem representation is ignored.

In the group auction the role of the instructor-led discussion is to contingently respond to what the students have surfaced through their unique experience of this group member auction that is driven by the qualities and skills that they bring to their mini-CVs and by the interaction of the students in the classroom at that particular point in time. It is always a risk, but the instructor role is to manage that risk and to create positive outcomes for the students by pulling together student personal experiences, the shared class experience, and relevant business frameworks into a coherent whole.

Conclusion

This paper posits that the instructor who can actively engage students in instructional approaches within the TCAG framework has a higher potential to generate meaningful learning with their students. Furthermore, active teaching practices stimulate the instructor's own cognitive process too. Thus, the DNA metaphor of meaningful management learning can come full circle and enhance the instructor's own understanding as well in a true transaction between teacher and student. Through the effective management of the classroom experience and through thoughtful course design, instructors can more consistently produce opportunities for student engagement and meaningful exchange.

By applying the DNA of meaningful learning and expressing its potential through rich classroom experiences, instructors can achieve desirable outcomes that extend beyond easily measured metrics into personally meaningful experiences for both their school and their students. It has been established that having common metrics and benchmarks can lead to good classroom management practices and can help assure that courses produce measurable outcomes. However, teaching to those outcomes does not ensure that meaningful learning in management is happening. An outcome measures the arrival at a particular point in time. But, meaningful learning is about our journey into the future.

Notes

[1]The instructor (first author) tried the group auction experience once while teaching this course in a 50 minute block. This required conducting the exercise over two class periods. Saiia found the time lag between the role play and lecture and discussions lessened the effectiveness.

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Appendix

Student reactions

The following are summaries of the responses reported by the students to the questionnaire distributed in Fall 2007.

Question 1: What was your general impression of the exercise?

- 59% Worthwhile, creative, fun or unique (n=41).
- 44% Effective, fair or authentic means of selecting group members (n=31).
- 13% Related well to course content (n=8).
- 10% Exercise was uncomfortable (n=7).
- 6% Good ice breaker at the beginning of the course (n=4).

Those who found the experience uncomfortable noted, for example, that they were ''uncomfortable because everyone could recognize who it was referring to'' or that it ''can be uncomfortable if nobody wants to bid for you.'' Another student was

''flattered, although I can see how some students would have felt uncomfortable.''

Question 2: What are the pros and cons of the group selection process?

Positives:

- 28% Random, fair means to create groups (n=19).
- 20% Good way to meet new people and not just with friends (n=14).
- 15% Real world experience included stretching the truth on the CVs (n=10).
- 13% Fun, creative, exciting or interesting (n=9).
- 10% Process created diversity within the groups (n=7).
- 6% Not being able to select work partners (n=4).
- 3% Integrated content from the class and real world experience (n=2).

Negatives:

- 16% Having to work with peers with different schedules and styles (n=11).
- 13% Bidding process took too long (n=8).
- 10% Resulted in some awkwardness (n=7).
- 6% Confusing at times (n=4).
- 6% Uncomfortable with the process (n=4).
- 4% Insider information or ''interesting fact'' identified some candidates (n=3).

Question 3: Other comments about the exercise.

Twenty-two students opted for this question. Some responses were similar to responses from previous questions.

- 28% Preferred prior notice that the CVs would be shared in class (n=6).
- 22% Fun, creative, interesting, enjoyable or a good way to start class (n=6).
- 14% Exercise should be continued (n=3).
- 14% Exercise was too long (n=3).

It is clear that some students may feel exposed or uncomfortable, and even ''forget'' that they were informed their mini-CVs would be read aloud at the bidding. The exercise has visceral consequences for those students who did not read the assignment closely or who did not take it seriously enough. Those that have not put the time or effort into their work experience a dose of market reality as they see how the bidders react to the perception of quality. Those who overembellish may also experience some equally unsatisfactory results. This provides a learning point in noting the lack of sentiment or emotion in a strictly market system, and could be noted in the closing remarks.

All students learn a little about their classmates. Furthermore, students now have a common shared experience to which the instructor can refer during the semester as he/she considers the concepts/constructs involving competitive strategy, market forces, external forces, and competitive behavior.

About the authors

David Saiia is Associate Professor of Strategic Management at Duquesne University. He received his Ph.D. from the University of Georgia. When not teaching, he researches sustainable microenterprise in Ecuador. He may be reached at saiia@duq.edu.

Granger Macy is Associate Professor of Management at Ithaca College. He received his Ph.D. from Indiana University. His research interests are in teamwork and transformative learning. He is education track chair for IBAM. He may be reached at gmacy@ithaca.edu.

Maureen P Boyd is an assistant professor in the Department of Learning and Instruction in the Graduate School of Education at the University at Buffalo, SUNY. Her research focus is classroom talk. She may be reached at mpboyd@buffalo.edu.