PEER-LED TEAM LEARNING
LEADER TRAINING

CHECKING ASSUMPTIONS: USING ARGYRIS AND SCHON'S THEORY OF ACTION SCIENCE

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Learning a difficult subject is hard, but learning that subject around a group of strangers is even harder. Imagine you are a Chemistry student sitting in your Chemistry workshop. You are nervous about answering the questions because you are not sure of the answer. Not only that, you don't want to be ridiculed by your fellow classmates nor do you want to be corrected by the workshop leader in front of everyone. That would be too embarrassing. So, you decide to work by yourself in a little corner, stay silent during discussions, and start to lose interest in the subject.

This scenario depicts a model discussed by Chris Argyris and Donald Schon as part of their theory of Action Science (1974). They postulate that people have an *Espoused Theory* as well as a *Theory-In-Use* for most situations in life. The espoused theory is the mental map people have of what they think they will do or how they think they will react to certain situations. The theory-in-use is people's actual behavior or action when they are exposed to the event.

Why do these two ideas exist? Do we not do what we think we will do? Too often people don't execute what they had planned. This is the gap between the espoused theory and the theory-in-use.

Argyris and Schon claimed that the effectiveness of reaching a goal (or carrying out one's idea) is based on an individual's "Mental Models." They suggest that people use different models, but they characterize two main models, termed Model I and Model II. People using Model I thinking usually try to maximize winning and minimize losing, discourage open discussions and exchanges of ideas and inquiry, are defensive and competitive. This results in isolation and apathy.

Using Model II thinking allows sharing control towards reaching a goal, designing situations where everyone can participate and experience success and failure, and encouraging public testing of ideas, in other words, engaging in checking one's assumptions. In working as a team, Model II methods are more fitting in a workshop environment. They facilitate trust within the group, allow shared control among participants, encourage evaluation and constructive criticisms, minimize defensive relationships, and circulate valid or truthful information.

Crafted to help increase individual and organizational effectiveness, the theory of Action Science represents a unique approach to learning. It aims to help reduce individual and group ineffectiveness caused by defensive interpersonal and organizational relations by removing barriers to change (Toby, 2003). Furthermore, it helps reduce anti-productive defensive routines as group members carry out an array of tasks to reach a goal. The effectiveness of reaching this goal depends on which 'Mental Model' a group or individual uses.

"Mental models often get us into trouble when they are untested, this is particularly true in groups settings when everyone is walking around with their own ideas of how the world works without sharing them with others" (Borgatti,, 2001). This situation holds particularly true in workshop. A workshop leader may be going through a problem on the board and some students may have a particular way of doing a problem. This situation presents some predicaments. One student has an easier way to go through a problem, a shortcut so to speak. If that student never speaks up to share her idea, she will never be able to verify if the shortcut works in every situation. If the shortcut doesn't always work, the student may get an answer wrong under those circumstances, something that could have been avoided had she spoken up in workshop. If the shortcut does work in any situation, the student's act of not sharing the idea is still detrimental because by explaining the shortcut to the others in the group, she can truly see if she understands what is going on. Thus if the shortcut works but the student remains silent, the other students in the group will never know of it.

Argyris suggests that the theories which can be deduced from peoples' action (theories-in-use) fall into two categories – one which inhibits double-loop learning (Mental Model I) and those which enhance it (Mental Model II) (1985). Argyris claims that virtually all individuals involved in his studies operated from values consistent with Model I. He further suggests that most of our social systems are Model I. This assumption implies predictions about the kinds of strategies people will employ, and about the resulting consequences. Although Model I strategies may work in certain situations, their use seems counterproductive in a setting like workshop. As peer leaders, we must develop and facilitate discussions by presenting the appropriate questions to help get our students thinking and talking. This role is not to be confused with that of an instructor, delegating individual tasks in order to reach a common goal. Instead, we are part of a group in which everyone contributes equally to the equation, a group where everyone is involved in the learning process, a group that helps each individual student understand the material better. Since these goals cannot be accomplished from a Mental I standpoint, a change must be made to a Mental Model II strategy of learning in order to have an efficient workshop, and establishing a comfortable and cohesive atmosphere is crucial. The more personal interactions the workshop students have with each other as time goes on, the more they will care about each other's successes and failures. Creating this environment can be as easy as grouping students together and supporting their interactions with each other on problems, so they view each other as peers rather than just random people in a class. This atmosphere not only helps increase individual interactions, it also increases the effectiveness of the group.

Another way to reduce ineffectiveness involves a shift from using Model I to using Model II methods in order to come together as a group and resolve difficult problems. If students were to come to workshop and work on problems unilaterally (as they would under a Model I approach), what would be the purpose of workshop? Working alone can easily be done outside of the context of a workshop setting. Thus, the purpose of peer-led team learning is to foster group involvement and interactions. Since Chemistry lectures generally have large numbers of students, there is very little time to devote to every student's concerns or ideas. In workshop, however, students have a voice and this group voice aids greatly in the learning process. There is more than one way to approach obstacles that occur in life and this is certainly the case for problems that occur in chemistry. This is why Mental Model II is so effective in workshop. By sharing control in reaching a goal, students are able to reason productively and specify the strategies required to produce desired results and the conditions necessary to maintain them (Anderson, 1994). In workshop this can be seen as a student explaining a problem to his or her peer and explaining his strategy in involving the problem which may be easier to understand than, for example, the textbook's method. In Model I, this strategy would likely have never come to light.

Borgatti's (2001) site also explains some of the tools used in Action Science, namely the Ladder of Inference and the Left-Hand Column. The Ladder of Inference is "an exercise that helps us learn how to move from observable 'data' and experiences, to selected 'data,' added meanings, assumptions from the data & meanings, conclusions that are drawn, beliefs from these conclusions, and actions based on these beliefs." The ladder of inference asks us what we really believe and how our beliefs may affect how we as leaders view and interact with the students in our group. Not surprisingly, by participating in this exercise we see how our beliefs affect what data we select to see next time. For example, I have a track runner in my class. If I believe that athletes are dumb, this generalization may lead me to believe that this particular student will not do well in the class.

The Left Hand Column technique is a useful way of improving communications skills by "articulating what we normally do not say." The exercise consists of filling in the chart below (see the following example from Borgatti, 2001) under the columns 'What I'm thinking/feeling' and 'What is said.'

What I'm thinking/feeling	**What is said**
Student: Why am I here, this is stupid.	Student: I'm confused about this meeting Professor
	Professor: I wanted to review your paper and the assignment.
Student: I don't see what the big deal is, I think the paper is fine	Student: What's your concern?
	Professor: Your argumentation is weak. I want you to review these theories.
Student: The Prof. is so demanding, I wish this were over.	Student: uh, huh….

From Borgatti, S. 2001.

The Ladder of Inference and Left-Hand Column technique are very useful feedback mechanisms if we can analyze what the student is saying based on what he or she is feeling. The better we as peer leaders understand these differences, the better the learning environment in workshop.

As previously stated, Mental Model II also encourages public testing of ideas and strategies. Thus students are given the chance to question the credibility of each other's ideas. On the surface, this may be seen as an opportunity to criticize or as a potentially embarrassing situation, but in actuality, by maintaining interpersonal openness, levels of trust and individuality increase among group members (Anderson, 1994). This sense of openness allows group members to freely challenge, test, and correct the claims, if necessary because the group as a whole will benefit from such discussion. Thus, in the example presented earlier of the student explaining a problem to his peer, the peer can question the validity of the student's strategy and by doing so, both students are able to clearly understand what is going on in the particular problem

After understanding these basic principles of Action Science, it is clear how this theory relates to Chemistry workshop. As workshop leaders, we are told that our role is not that of a teacher but rather a facilitator helping the students understand the material better. This role makes the workshop leader a member of the group which is taking on the challenging task of understanding Chemistry together. The goal of Action Science is "to promote the ability to identify the dynamics of a situation and comment on them as they unfold in a conversation by offering direct advocacies and questions into the discussion" (Borgatti, 2001). Thus we as leaders must develop and facilitate these conversations by presenting the appropriate questions to get our students thinking and talking.

The following is a firsthand account of a workshop leader using Argyris and Schon's technique (Mila Susnjar).

Guiding students in understanding the relationship between their behavior and their learning process: this is the essence of true learning. How could we as workshop leaders, who are students ourselves, help others to truly learn? During the two-day Orientation prior to the start of the Spring 2005 semester, we discussed espoused theory. It struck me as interesting for a variety of reasons, one being the basis of much humor – finding the incongruities in life. From this interest, I began investigating the topic and found it had applications that could provide real help to people in general.

As mentioned throughout this essay, Chris Argyris and Donald Schon's Action Science Theory, which includes mental models also was reinforced from our own experiences with taking the Peer Leader Education class at the City College of New York to prepare us to be more effective workshop leaders. One topic that came up from research was that of using metaphors. Metaphors, like analogies, are an anecdotal way to create meaningful links between concepts and ideas that may not appear similar at first or to help bring together the familiar and the unfamiliar. From researching Argyris and Schon's theory, the technique of using metaphors to bridge students' knowledge to his or her effective demonstration of that knowledge (getting a good grade on a test) appeared to be a promising idea.

So, how was I, a student with my own responsibilities, going to develop something that could help other students? Through my interest in the topic, while researching online, I found an exercise that I could modify and try with the students in the workshop I led. The exercise was the "Perception is Reality" which used mental maps (Holland, 1998). It reminded me of an exercise we had done in the two-day pre-semester Orientation, where we had been asked to find the shortest route to a certain location. In this exercise, the students were asked to draw a map of a specific location that they would all be familiar with (e.g., the cafeteria.) After we finished the exercise, we compared maps and discussed the differences. Since this was not a test and because the topic was something innocuous like where the cafeteria was, the students did not feel uncomfortable in any lack of ability to draw. We then discussed the idea if it were possible for someone who did not know where the cafeteria was to find it from the maps we had drawn.

From this experiment, the students gave feedback that stated that they certainly did know where the cafeteria was, but that there were aspects to the maps that each had drawn that could be considered confusing. I then pointed out that sometimes it is possible for us to believe we know something (espoused theory) and that our execution does not match up (theory in action.) These mental maps are the metaphors that can be used to bridge the gap between espoused theory and theory in action.

Following this experiment, a topic from Chemcase (Peterson, 2003) was given to the students and they were asked to make a concept map for the topic. Then, individually, the concept map that was provided on the Chemcase website was given to them, so that they could identify any "mistakes" or missing ideas. The PLTL

Workshop Model is basically encouraging students to teach themselves. Everyone makes mistakes, but not everyone learns from them. It is important to learn how to use mistakes to your advantage – similar to how jazz musicians play. Sometimes a performer plays a note that is just plain "wrong," but you are expected to add extra notes to make it eventually work out and sound "right." Students gain confidence from learning from their "mistakes" in workshop so that they learn how to solve problems with their intellect, not simply by memorizing steps.

Overall, as advice I would suggest "direct the problems, not the solutions." Engage the students in working on how they want to solve a problem. Let them go down wrong paths – extricating themselves is more important than just memorizing a series of steps to solve for the correct answer.

Given the above considerations, it is clear that learning, especially in a workshop setting, should fall under the Mental Model II category as opposed to Mental Model I. By establishing bi-lateral control, basic assumptions behind views are confronted, hypotheses are tested publicly, and the learning experience is constantly evolving via group involvement. The end result should be increased effectiveness and a group of students with an increased appreciation for one another and a better knowledge of the subject at hand.

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References

Anderson, L. (1994). Argyris and Schon's theories on congruence and learning.(Espoused theories and theories-in-use: Bridging the gap (Breaking through defensive routines with organization development consultants). Unpublished Master of Organizational Psychology Thesis, University of Qld. URL: http://www.scu.edu.au/schools/gcm/ar/ascii/argyris.txt. Downloaded on April 7, 2005.

Borgatti, S. (2001).Action Science/Inquiry History. Online at http://www.analytictech.com/mb021/action_science_history.htm downloaded on 2/19/05.

Argyris, C. (1985) Strategy, change & defensive routines. Boston: Pitman.

Holland, P. (1998). Mental Map of Alabama: Perception Is Reality?. URL: http://www2.una.edu/geography/statedepted/lessons/mentalmaps/mentalmaps.html. Downloaded on April 5, 2005.

Peterson, L. (2003). Drug Pathways and Chemical Concepts. URL: http://chemcases.com/pheno/concept4.htm. Downloaded on April 5, 2005.

Toby, A. (2003).Action Science Network. URL: http://www.actionscience.com/actinq.htm. Downloaded on March 29, 2005.

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