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Introduction

Inquirer, BMCC'S Teaching and Learning Journal, provides an opportunity for faculty to share successful and innovative teaching strategies with their peers. In this issue, you will find a wealth of thought-provoking and inspiring ideas from our dynamic multidisciplinary teaching and learning community as we continue our search for the best teaching methods and materials for our students. The articles are testimony of the authors' passion for what goes on in the classroom and a stimulus for reflection and critical questions about what they do and how they do it.

A number of articles describe unique teaching methods. Jonathan Scott uses the rich diversity in the classroom as a means to focus students' attention on world conflicts. Karla Odenwald, stimulated by the importance of persuasive writing in American education, develops an interactive method for teaching the argumentative mode of writing. Brahmadeo Dewprashad describes activities in his chemistry workbook that foster cooperative learning and also help students to connect abstract concepts to their every day lives. Joe Bisz elaborates a method that empowers students to take ownership of their learning and writing. Dolores DeLuise and Maria DeVasconcelos draw on pedagogical theories and practical classroom observations to develop an innovative method for teaching conclusions in their composition classes.

Another group of writers provides insight into projects they are involved in. Klement Teixeira shows what goes into developing a new math course that fulfills the college's mission. June Gaston tells about a unique mathematics project that helps to identify and train leaders in the field. Furthermore, readers will learn about core concepts in certain disciplines. Helen Dalpiaz illustrates in a vivid manner an important distinction in the nursing profession. Rochelle Holland's article opens a window into the counseling of single mother college students. Rolando Jorif 's provocative paper enlightens readers about circumstances predicating the end Shakespeare's *Romeo and Juliet*, challenging students' tendency to side with the lovers. Yeghia Aslanian and Diana Judd reflect on the classroom experience. Aslanian ponders the qualities of an effective teacher and good teaching. Judd muses on the future of traditional classroom teaching in the face of the advent of on-line courses and other technologically enhanced pedagogies.

The last group of papers focuses on the faculty's connection to the global world. Leonid Khazanov reports a summer experience on a Fulbright Hays trip to China. Carmen Martinez-Lopez outlines a strategy to internationalize faculty and curriculum at BMCC. Hilario Barrero shares his experience teaching our students abroad. And Igor Zaitsev offers a broad-ranging discussion of teaching science in a multicultural classroom.

Enjoy!

Mabel Asante
Matthew Ally

World Literatures and Class Struggle

Jonathan Scott
English

BMCC's English 201 course is fascinating for several reasons. First, it is the second half of a two-semester sequence—the first half is English 101—which every matriculating student at the college must take; second, it is a general introduction to literature; and third, there is no template for the course and thus the way an instructor approaches it is highly variable and open to an almost infinite variety of pedagogical styles and techniques.

On the third aspect, the same could be said of many 200 and 300 level courses at the college. Yet the difference with English 201 is that it is not a special topics course nor is it geared to a certain long-term, i.e. four-year college, major, such as education, accounting, nursing, political science, history, or psychology. Rather, English 201 is a general studies course, with no specific topic or focus other than the further development of students' reading, writing, and researching skills.

As an undergraduate student in Detroit, English 201 was my favorite course and it inspired me to become an English professor. That's to say that BMCC's open-ended English 201 is not anomalous; in fact, it is typical of most college curricula in which, for students to graduate, they must take at least one introduction to literature course. Almost always this requirement is satisfied by the college's English II course.

In the course, some professors teach their favorite novels or writers, while others offer their students the widest possible range, in sixteen weeks, of literary theory, genre, and form. In all events, the English II course is one of the most amorphous in terms of structure. Therefore, the concrete shape that an English II teacher gives to it requires a great deal of forethought and systematic thinking. It also provides a fertile ground for experimentation and discovery. What follows is an account of a recent experiment I conducted in my English II course, to which I gave the subtitle, "World Literatures and Class Struggle."

One of the great virtues of general education at BMCC is our astonishingly diverse student body, from which is expressed not only a fantastic plurality of languages, estimated at more than a hundred, but also international experience. In any given BMCC classroom there might be an Eritrean student sitting next to an Ethiopian student, which is impossible today in Ethiopia itself, for complex political reasons. This was the case in one of my last classes. This semester I have an Israeli student sitting next to a Yemeni student, another highly unlikely scenario in the world as it is now. Doubtless every BMCC professor has a similar story. But perhaps the most familiar story at BMCC is of a Haitian student in the same classroom as a Dominican student, which is not only unheard of on the Caribbean island of Hispañola but a possibility that has been deeply repressed for many centuries, and that continues to be the source of bloody social and political turmoil in both Haiti and the Dominican Republic.

Working from this premise—that the typical BMCC classroom features some of the most unthinkable national and ethnic intermixing in the world today—I designed an English II course. My assumption was that this kind of course is open to a great variety of literary choices, and that my own, consequently, would be a reflection of my particular interests and knowledge. At the same time, I could not, in good faith, leave out the Haitian-Dominican relation, and so that became my point of departure, even though I have little expertise in either the rich Haitian or Dominican literature traditions. I decided on the classic Haitian novel by Jacques Roumain, *Masters of the Dew,* translated from French and Creole by Langston Hughes, and a new novel by the Dominican-American woman writer Loida Maritza Pérez entitled *Geographies of Home,* written in English.

But what would be the center of gravity holding these disparate texts together—one written in Haiti during the brutal U.S. Marine occupation (1915-1934), and the other during the 1990s by a young Dominican woman struggling with her social identity while coming of age in Brooklyn, New York?

Likewise, I had decided to teach two texts from Israel/Palestine—one by Palestine's

national poet Mahmoud Darwish, arguably the most important Arab writer alive, his memoir of the 1982 Israeli siege of Beirut, *Memory for Forgetfulness*, and the other by one of Israel's most celebrated writers, A.B. Yehoshua, his short story called "Facing the Forests," which is a canonical text in the Israeli literature tradition.

Again, what would bring the texts together? Would the links be made thematically? Or would the pairing of texts be sociological and historical? One could not do both, not in a writing and literature course with more than thirty students. Indeed, the sheer weight of the literature—not in page length but, rather, in content—required a carefully laid out design. In thinking this through, I arrived at Karl Marx's *The Communist Manifesto.* Not because I'm a communist, although I consider that interpolation a friendly compliment, when it is understood to mean, as Marx stated eloquently, "an association in which the free development of each individual is the condition for the free development of all" (76). No, I picked the *Communist Manifesto* because of what Marx says at the beginning of his argument, an originary theoretical moment of what we now refer to as "world literature."

"The intellectual creations of individual nations," Marx wrote, "become common property. National one-sidedness and narrow-mindedness become more and more impossible, and from the numerous national and local literatures there arises a world literature" (55). According to Marx, the historical agent of this new "national interdependence" was the capitalist class, battling it out aggressively and permanently with the old feudal aristocracy, for world hegemony. In their clash with the old societies, the new capitalists produced an always unfolding yet essentially complete "world literature."

That, then, would be the organizing principle of the course, regardless if one is a Marxist, an anti-Marxist, a neo-Marxist, or a post-Marxist. It doesn't really matter, as long as the concept of a new meeting ground for previously secluded, segregated, partitioned, and isolated national literatures could be grasped concretely, i.e. historically, and used to negotiate critically the eclectic arrangement of world texts now facing the students. For the beginning question is always the same: How in the world did we arrive here together, at the same time, in the same classroom, with roughly the same aspirations and goals—to acquire college degrees—coming from such vastly different places, national places that many students have never even heard of before? Of course this question is rarely asked at colleges where the student body is nationally homogenous and monocultural. But at BMCC this is usually the question of the day, despite going unspoken a lot of the time.

After speaking the unspoken, and then selecting a group of texts that reflect not only this daily unspoken reality of BMCC's student population but also the major conflicts and national interdependencies around the globe today, the task for the teacher is to construct specific writing assignments based on the world literary texts they are reading and analyzing. I offer a schematic description of the process below.

I. *The emergence of a world literature: where did it come from?* **Reading:** Karl Marx's The Communist Manifesto. **Writing assignment:** Define, in your own words, Marx's concept of "world literature," using the text as a reference. From your standpoint, name one instance of an old "national seclusion" that is impossible now.

II. *"National interdependencies": the question of memory.* **Readings:** Mahmoud Darwish's memoir *Memory for Forgetfulness* and A.B. Yehoshua's short story "Facing the Forests." **Writing assignment:** In both texts, the issue of national memory is central and each writer has his own "national memories." Describe, using each text, these national memories, and then explain how they are dependent on each other.

III. *National myths, international realities.* **Readings:** Jacques Roumain's *Masters of the Dew* and Loida Maritza Pérez's *Geographies of Home.* **Writing assignment:** Using the texts, discuss the means by which each writer comes to a definition of their own national, Caribbean identity.

IV. *International women and national and racial oppression.* **Readings:** Buchi Emecheta's *The Joys of*

Motherhood and Ntozake Shange's *Sassafrass, Cypress, and Indigo.* **Writing assignment:** In these two novels, young women protagonists use art to heal themselves from the traumas of national and racial oppression. In your view, how is the act of writing one's own story a good tool with which to heal yourself from an experience of national and racial oppression? Explain, using the texts as your reference.

V. *Conclusion.* **Writing assignment:** Using Marx's concept of "world literature," show how two different texts we have read thus far attain to the status of world literature. Place special emphasis on what they share in common, in terms of being world literature, but also point out their divergences.

These writing assignments are complex, yet they do not tie up students with secondary research obligations; that important task is carried out in separate homework assignments, during the reading of the texts, when students are required to look up maps and to find biographical information about the writers. The difficulty of the assignment is in the use of an abstract concept, "world literature," to understand particular national texts. At the same time, the assignment is "easy" in the sense that this concept, taken from Marx, is extremely close to many BMCC students' own lived experience. This is reflected in the individual student essays that are turned in and graded: students produce in these essays an expansive field of new knowledge—"national" information that many BMCC professors often learn informally as a matter of course in their teaching at the college.

Yet the crucial difference in English II, which could be emulated in other disciplines, is that the students themselves shape the structure of the course through their own compelling existence—as living, thinking, working, learning, and teaching individuals who are arguably in the classroom because of the contradictory logic of capitalism itself.

For example, one student wrote about her national memories of Barbados, which was focused on a series of kitchen conversations she had each morning with her grandmother, over tea. The essay was about Darwish's and Yehoshua's concept of national memory. The student's essay is lugubrious and thoughtful, since, as one discovers toward the end of her story, her grandmother passed away in Barbados but without her beloved grand daughter by her side. The strength of the student's essay lies in her recognition of necessity: that powerful forces outside of herself, economic and historical, compelled her to be missing, painfully, at her grandmother's bedside as she lay dying.

"Like Darwish said," she writes, "'You are your memory.' We are unable to choose our national memory." It became clear in the further development of her argument that, if she could, she might erase this memory of her grandmother's death. Yet that would mean, she suggests, eradicating a wealth of "enjoyable national memories," a great many made possible by her grandmother's expert memory and storytelling technique, which is the subject of her essay.

We might not be able to choose our national memories, but we can become conscious of them, of where they came from, and how they got there, and why they remain so significant to us. We can remember to not forget them.

Moreover, we can compare them to other national memories and, while learning about them, learn much more about ourselves. This is the higher ground of the assignment, yet the concrete tasks of reading, analyzing, researching, and composing are not lost in the loftiness of the project; rather, they enable it.

So what does "class struggle" have to do with it? It might be more useful to ask, what *doesn't* class struggle have to do with it? For as I look at my new rosters each semester, many of Marx's most oft-quoted passages from the *Manifesto* come to mind. They help ease me into another sixteen weeks of intense emotional ups and downs, new difficulties and discoveries, and complex, demanding classroom instruction and social interaction, where somehow the whole crazily fragmented world is sitting directly in front of me, at this very moment. One such passage still reads as fresh as it did in 1848:

> The bourgeoisie, wherever it has got the upper hand, has put an end to all feudal, patriarchal, idyllic relations. It has pitilessly torn asunder the motley feudal ties that bound man to his 'natural superiors,' and has left no other nexus between man and man than naked self-interest, than callous 'cash payment.' It has drowned the most heavenly ecstasies of religious fervour, of chivalrous enthusiasm, of philistine sentimentalism, in the icy water of egotistical calculation. It has resolved personal worth into exchange value, and in place of the numberless indefeasible chartered freedoms, has set up that single, unconscionable freedom—Free Trade. In one word, for exploitation, veiled by religious and political illusions, it has substituted naked, shameless, direct, brutal exploitation... It has converted the physician, the lawyer, the priest, the poet, the man of science, into its paid wage laborers (53).

It's true that the typical BMCC classroom could be apprehended clearly without Marx's perspicacious analysis in the *Manifesto*. Yet when it comes to developing specific course curricula that begin with our international student dynamism, rather than merely presuming it, the search for explanatory concepts that could appreciate this chaotic diversity leads one back to the origin of it all. In my recent experiment, I found that this impulse towards the origin opened up a marvelous variety of individual expression and insight, focused study and execution of basic academic tasks, friendly cooperation, and intellectual development.

References

Darwish, Mahmoud. *Memory for Forgetfulness.* Trans. Ibrahim Muhawi. Berkeley: University of California Press, 1995.

Emecheta, Buchi. *The Joys of Motherhood.* London: George Braziller, 1980.

Marx, Karl and Friedrich Engels. *The Communist Manifesto.* New York: Signet Classic, 1998.

Pérez, Loida Martitza. *Geographies of Home.* New York: Penguin, 2000.

Roumain, Jacques. *Masters of the Dew.* Trans. Langston Hughes and Mercer Cook. London: Heineman, 1978.

Shange, Ntozake. *Sassafrass, Cypress, and Indigo.* New York: Picador, 1996.

Yehoshua, A.B. "Facing the Forests." *The Continuing Silence of a Poet,* by A.B. Yehoshua. Syracuse, NY: Syracuse University Press, 1998.

Argument and Counterargument

Karla Odenwald
Developmental Skills

Persuasion—An All -American Pursuit

Persuasive essays follow students in the American educational system, wherever they may go. Just to take a few examples of tests which include an argumentative essay component, we have the TOEFL (a test for foreign students), the GED (for those who did not obtain a traditional high school diploma), and, of course, the ACT (the CUNY test), which is our main concern as ESL and ENG 095 instructors at BMCC. Nor are students able to free themselves from persuasive essays once this last formidable hurdle is surpassed. They will continue to write persuasive essays in their English courses, in several required liberal arts courses, and if they want to go on for a Master's, there's always the GMAT or the GRE; these, too, contain a persuasive essay question. Of course, we, as English instructors, hope that somewhere along the line most of our students have stopped trying to fight the inevitable, and finally decide to embrace persuasive writing, not merely as a necessary evil, but as one of the finest expressions of critical thinking skills. We hope they will learn to enjoy whatever opportunity they have to exercise their powers of analysis, for the opportunities will abound.

Later on in life, persuasive essays may suddenly metamorphose into persuasive letters, persuasive memos, persuasive monologues, or dialogues. For the rest of their lives our students will be in contact with people whom they will want to persuade of one thing or another. Whether they're trying to win over a new client for their company, want to convince their child's teacher to give their little angel another chance to _____ (you may fill in the blank), or struggling to get the landlord to take care of that problem he just hasn't had time to for the last six months or so, in effect, for the rest of their lives, they will be called upon to exercise the fine art of persuasion. In order to do so effectively, they must master the techniques of argument and counterargument.

The Challenges Our Students Face

Our students' initial problems with arguments tend to fall into two main categories. The first one is sticking to generalizations, and ending up with circular reasoning. That sort of argument looks something like this:

> The first reason I think it's better to expand the library is because it would be good for the students. More books mean more education. Education is power and will lead to a better world, which would be good for the students. So I think expanding the library is the way to go.

Another typical problem is focusing just on details which affect the individual writing the essay, and forgetting to relate those to a larger group:

> The first reason I support building a low cost daycare center is because the ones in our community are too expensive. I don't make enough money to pay for daycare, so I have to leave my children at home alone until I get back from work. If a new low cost daycare center were built, I would not have this problem.

The concept of counterargument is even more difficult for our students at BMCC to master—especially when it comes to moving them away from writing, "the opposing point sounds like a nice idea, but my proposal is the better one." A more specific example would be something like the following: "Though a hospital sounds like a nice idea, we need an elementary school more." Often we teach formulas to give students a little grounding, but then they get stuck there forever.

Perhaps the difficulty with counterarguments stems from our students' inability to really listen to others, making it difficult for them to put themselves in other people's shoes, think their

thoughts, and follow their line of reasoning to its most likely conclusion. Often their position is one of "Of course I am right," and thus, instead of entering into an authentic dialogue with the other, they listen to him with closed ears—nodding absentmindedly while they build up their own brilliant refutations.

This is especially evident in an exercise I like to do with my ESL 095 students at the beginning of every semester—before I even say a word about writing. The question they must consider is "Would you rather have a high paying job that you hate, or a low paying job you love?" Then I explain the conditions.

The Scenario

You have to choose between one of two jobs which you will hold starting tomorrow, and which will last you until you retire at 70. After this you will live for a few more years. Once you make a decision you cannot go back and change your job. For instance, you cannot choose the high paying job for ten or twenty years, save some money, and then do something you love. With this job you will support a spouse and two children. You will never win the lottery, come into an inheritance, or open your own business on the side. Your spouse has no money of his or her own, and never will. No person or agency will support you in any way. Then I go on to describe what the two alternative lifestyles will be like; of course, I explain to the students that what I am about to describe are highly contrived situations.

1. In the high paying job you make 100K+. You live in a beautiful house or apartment and have a luxurious car. Your children go to exclusive schools. You can afford to frequent the best restaurants, clubs, and other venues. You can afford designer clothing and luxury items. You can travel around the world. However, because you're such an important person in your company, there are many others who want your job and resent you. Your coworkers are snakes and backstabbers, your boss is temperamental and never satisfied, and you are forced to put in very long hours to prove you're productive. Often you find yourself coming in to work at 7AM and staying until 10 or 11PM; you also have to give up many weekends. Sometimes you even have to cut your vacation short if something urgent comes up at the office. You hate your job and each morning, when the alarm clock goes off, a feeling of dread comes over you.

2. In the low paying job you make about 30K. You live with your family in a tiny one bedroom apartment in a pretty run down neighborhood. You only use public transportation. Your kids go to public school. You can't afford to go out. Maybe, a couple of times a year for your anniversary or some other special occasion, you can eat out at McDonald's, Burger King or Wendy's. For your vacation you can go to the Bronx Zoo, the Botanical Garden, Central Park, or public beaches. However, you love your job. Your boss and your colleagues are great. You put in 9 to 5 days, your weekends are free, and no one bothers you when you're on vacation.

Students choose one of the two options, and then I separate them into two circles, according to their choice. The two groups are usually about even, and anyway, it doesn't matter if there are a few more students in one. In their groups they choose a secretary who should record seven reasons to support their position.After about ten minutes, I ask the students to stop what they're doing and give them another task—try to come up with three reasons the other group may have thought of and "attack those reasons." I give the class about ten more minutes to do this.

Then I break up the original groups and reorganize the students so that they're sitting in small groups made up of two or three "poor people" and two or three "rich people". They get another ten minutes for an informal debate. "Try to convince the other group of your point of view," I instruct them. Voices go back and forth; some students are more vocal, more argumentative, than others. Some just tend to sit and listen. I circulate around the groups, encouraging those who are quiet to speak up.

Analyzing Content & Structure

After the improvised debate I ask, "Were you able to convince anyone to change his or her point of view?" Most people shake their heads. Very seldom do I get an affirmative response. A few more questions follow.

1. What did you say to try to convince your classmates you were right?
2. Did you let them speak?
3. Did you listen carefully to what they said, or were you too busy thinking about your response?
4. What did you say to try to prove they were wrong?

Little by little I elicit information from them to result in the following chart:

ARGUMENTS	COUNTERARGUMENTS
• **my reasons (1, 2, 3)**	• **the other group's reasons (1 or 2)**
• **why my reasons are strong**	• **why the other group's reasons are weak**
•explanations	(attack their explanations, cause and effect
•cause and effect relationships	relationships, examples, facts, etc.)
•examples	• **why my position is stronger**
•facts	(reemphasize my own point of view by
•statistics	showing how my proposal is the more
•anecdotes	necessary or beneficial one)

We then talk about their preparation for the debate. They need to distinguish between when they were working on building up an argument and when they were working on the counterargument. We talk about the importance of a well developed argument and an incisive counterargument. I tell them the ACT graders will be paying special attention to students' critical thinking skills—in particular their ability to weigh two sides of an issue carefully before supporting one of them. Then, it is important that students support their chosen proposal with strong reasons which are well developed with general reasoning supported by specific, concrete examples. Furthermore, a good counterargument doesn't just dismiss the opposing viewpoint as worthless, but takes it under a microscope, giving it serious consideration by looking at the pros, before discarding it after finding these pros to be wanting. Once in a while a student will stumble upon a different kind of counterargument which basically consists of "finding" weaknesses in his own argument, and showing how these are not really weaknesses, or don't affect the main thrust of his position, thus answering his own objections. This type of counterargument also works well for the ACT.

The formal position of the counterargument in the essay also comes up on a regular basis. Though I encourage students to make it the fourth paragraph of their essay, some prefer to position it in the second paragraph, or even to include a mini counterargument in their introduction. I tell them to go ahead and do whatever they like as long as it's logical and well organized.

Once we have carefully gone over all these points and the students have had an opportunity to ask questions and make suggestions of their own, they have forty-five minutes to write an essay answering the original question, though they usually take less time to do this since so much brainstorming and discussion has gone on. Because they have examined the topic in great detail and find it interesting, they hand in some very well developed arguments. They are able to discuss how choosing money over job satisfaction or vice versa can affect workers in general, and specifically how they think it would affect their own lives. The essays are filled with vivid details which hold the reader's attention. With enthusiasm and conviction they defend their point of view and tear down the other position. I tell them to transfer this same enthusiasm to the ACT test, together with the pointers we have learned in this class. Throughout the term some students make a very serious effort to do so, though they may not derive much inspiration from the ACT topics they are usually presented with.

Conclusions

On a final note, I tell students that my suggestions for a good ACT essay format are not set in stone. As long as students can provide logical arguments for their position, offering lots of details, and with overall good grammar, spelling, and punctuation, they should be successful. Of course, there are different levels of success and infinite room for improvement when it comes to demonstrating critical thinking skills. Throughout the term we will discuss techniques to make an argument more polished and sophisticated, we will talk about how discussions of real life experience should be broad enough to incorporate not only students' own personal experience, but awareness and sensitivity to issues that affect the communities they identify with, as well as others that are around them. We will discuss logic flaws they should avoid, and how to spot these in their own arguments and in the arguments of others. Above all, I hope my students will not become overly dependent on formulas, and that the critical thinking skills they learn in their ESL 095 class will transfer over into later college courses, in which they will not only parrot the information professors give them, but instead learn to ask insightful questions of their own, see the many sides of an issue, and take a position based on a deeper understanding of the matters under discussion, and not just a passionate response based on emotion. In short, I am hoping that by the end of the course students develop and sharpen their analytical skills since these will serve them well in the numerous tasks they will perform throughout their lives.

Making the Right Connections

Brahmadeo Dewprashad
Science

The problem with organic chemistry courses is aptly described in a recent issue of *Chemistry Education*, "Although Princeton is a highly selective university, the organic chemistry course seems to share the usual problems peculiar to the course everywhere: a certain reputation as being a killer, hyper-anxiety and over-competitiveness on the part of some of the students, and a stubborn refusal on the part of many students to believe that any attempt to deal with the course by memorization would ultimately be fatal." The problem described in the literature (1) is even more severe in community colleges where many of the students start with weak academic backgrounds and are still developing analytical and problem-solving skills. In addition, most of these students have very limited time for studying as they are often taking classes whilst holding full-time jobs and fulfilling parenting and other family responsibilities. Many students have indicated to me that despite their best efforts, the amount of material that they have to learn in—and beyond—organic chemistry seems insurmountable. They are often dissappointed, as the study skills that served them so well in other courses do not serve them similarly in organic chemistry. Undergraduate organic chemistry has been placed on a short list of courses that act as "filters" to the science pipeline (2). Ensuring that our students learn organic chemistry (and do not drop out and abandon their career plans) requires special effort.

Effective instruction requires, not transmission of factual information, but helping our students to develop the skills that will allow them to function successfully within the discipline (3,4). There is now a mountain of information in most disciplines (particularly in undergraduate organic chemistry) that is beyond the ability of most of us to remember. Competence (without Herculean effort and infinite time) requires being able to generalize, and to see as similar, things that initially appear quite different. This requires helping students to understand and practice applying the logic of the discipline. In organic chemistry, this requires an understanding of the etiquette/rules of its unique language utilizing chemical structures for molecules and curved arrows to indicate movement of electrons and fragments of molecules, and practice in using these to predict how organic molecules would behave in different environments.

Co-operative learning has been recognized as an effective method for facilitating learning whereby students are taught the logic of concepts and become practiced in applying the same (3,4). There are several reports in the literature on efforts to use cooperative learning in general chemistry and in physical chemistry (5-11). Fewer attempts have been made in organic chemistry although the Workshop Chemistry Project of the Rochester group (12) and the work by Bradley et. al. (1) are notable exceptions and the results are encouraging.

I have been teaching Organic Chemistry I (CHE 230) at BMCC for the last four years. A serious limitation has been the lack of suitable instructional material. The textbooks and instructional materials available are not ideal for facilitating co-operative learning and for use by community college students. I believe that they were written primarily for instructor-centered classes and for students majoring in chemistry in universities. The textbooks have not changed much over the years (13-18); the style has remained the same with more and more content added. Some notable (and welcome) changes have been the use of more appealing illustrations, accompanying CD's and access to websites with 3-D models of compounds, and footnotes with concrete applications of organic chemistry. This trend is in the right direction but is not enough, especially for community college students. In order to facilitate student-centered instructional methods, new materials are needed. A welcome step in this direction has been the publication of a booklet, which can be used to supplement lectures with peer-led tutorials (19). Towards that end, I have developed a student workbook, which could be used to teach organic chemistry co-operatively in community colleges. I have been using this workbook in my classes for the last two years. Most of the class time is spent helping students (working in groups) to apply fundamental concepts to solve problems from the

workbook. I am encouraged by the results; students seem to prefer and enjoy this mode of instruction and drop out rates are minimal.

The workbook has several features that facilitate active learning. Core concepts are very simply outlined and related to the relevant background material that was covered in the general chemistry courses (which are prerequisite courses for the organic chemistry courses). I feel that such a connection is essential as there are usually many students who completed the prerequisites such a long time ago that they do not remember the fundamentals. In addition, there are some students who passed the general chemistry courses and can recall factual information from them, but somehow, seem to have missed conceptual understanding of many core concepts. This, of course, in no way is a reflection of the instructors in general chemistry. Many of these students start out with weak math and reading skills and burden themselves with impractical course loads making it too difficult for them to develop the necessary proficiency in the allotted time.

The underlying theme of the workbook is that there is a *logic* to organic chemistry. A minimum factual base is required, but most of the chemistry of organic compounds can be predicted by applying the laws of nature, the same laws that govern our behavior. For example, compounds undergo *Elimination* reactions and the major product formed can be predicted by application of the concept that nature generally favors symmetry. Symmetrical compounds, like animals, are more stable, have an evolutionary advantage, and are the ones selected out by nature. They are easily recognized, as they are generally more pleasing to the eye. In *Elimination* reactions, generally the more symmetrical compound is formed. However, as in nature, symmetry is not the only feature that confers evolutionary advantage. Students are practiced in looking for other characteristics of molecules that may sometimes lead to the less symmetrical product. After intense practice, students become very adept at predicting the correct product(s). Developing the confidence to attempt predictions requires practice and the workbook gives such practice. At the beginning of this course though, many students are disconcerted by this approach; they are accustomed to relying on a crutch of factoids for re-gurgitation in exams and are often hesitant to venture into predictions. However, with practice, students become more comfortable and adopt the approach wholeheartedly.

I have developed and included in the book many problems that pertain to applications. For example, the concept of *hydrogenation* is related to the production and incorporation of trans-fatty acids into processed foods. The concept of resonance is related to the mechanism of action of anti-aging preparations and the formulation of mouthwashes. The concept of *cis-trans isomerization* is related to the role of Vitamin A in vision and the concept of enantiomers is related the mode of action of medications. The inclusion of applications is particularly welcomed by students. It generates student interest and helps makes concepts concrete.

A fundamental feature of the workbook is that it provides intense practice in drawing structures in different conformations and in different stereochemical orientations. I have included these portions as I found that students very often overestimate their abilities to be able to do these tasks. Many students study the course material and understand the concepts but have difficulty expressing these in the formal language of organic chemistry—chemical structures representing 3-D molecules and arrows to show movement of electrons. As with any language, a deep understanding of the grammatical rules and mastery of all the vocabulary without appropriate practice in writing and speaking the language is not enough to make one comprehensible in the language. The workbook provides students with the necessary practice.

Another feature of the workbook is that it takes students, in a slow, deliberative and stepwise fashion through all the steps involved in problem solving. It does this via a series of questions. The problem sets then progress to problems where students are required to integrate several concepts and apply them to solve further problems. Also, at the end of every section, there are questions that require students to state, in their own words, the main concepts. Review of this portion of the workbook affords me the opportunity to correct any misconceptions students might had had.

Evaluation

Students' perception of the workbook was evaluated. An anonymous survey of CHE 230 students who used the workbook was done at the end of each semester. (The questions asked and the tallied responses are shown in Appendix A.) The results of the survey were very encouraging. It was heartening to see that the great majority of students felt that the book helped them "see" the logic of organic chemistry and depend less on memorization. The workbook is suitable for use in organic chemistry classes with class sizes of less than 30 where an instructor can effectively interact with and review each student's work during the class. The workbook would need further modification for use in much larger classrooms (typical in senior colleges).

Conclusions

The great majority of students taking organic chemistry at BMCC (and other community colleges) do not intend to go on to further studies/careers in chemistry. As such, they are not particularly motivated to master concepts in chemistry that seem obscure and to have no particular relevance to their lives. The workbook helps students make connections between organic chemistry and their lives. Recognition of such a connection increases interest in the subject and motivates students to work harder. Student feedback indicates that the workbook does help students make these connections and is effective in facilitating learning. However, effective instructional material is but one step towards facilitating learning. I believe that the most important connection that instructors have to make is the one with students. It is my opinion that it is, above all, this connection with students that I have been able to establish, that facilitated the effective use of the workbook.

There might be concerns that students are likely to view the introduction of a workbook (in addition) to the textbook as unnecessary additional work for them. This is not the case. At the beginning of every semester, I give them only the workbook material pertaining to that lecture. After they have used it during the class, I ask for their feedback on the material. I then build on their responses to explain the reasons why we will be using the workbook and its likely benefits to them. Students have always welcomed the opportunity to use the workbook. I suspect many of them recognized the need for such an approach before I ever did.

Acknowledgements

I would like to thank all my CHE 230 students, both past and present. They used the workbook enthusiastically and made many suggestions for change (which I have adapted). I would also like to thank BMCC for a Faculty Development award in support of this effort. Gratitude is also expressed to the Chair and faculty of the Science Department for their encouragement and support.

References

Bradley, A.Z.; Ulrich, S.M.; Jones, S.M. *J. Chem. Educ.* **2002**, 79, 514.

Seymour, E.; Hewitt, N. M. Talking About Leaving: Why undergraduates leave the Sciences; Westview Press: Boulder, CO 1997.

Gardner, H.; Hirsch, E.D. Two views on How to get Johnny to Read and Think; *The New York Times*, September 4, 1999, pA12.

Gardner, H. *The Disciplined Mind: What All Students Should Understand:* Simon and Schuster: New York, **1999**.

Farell, J.J.; Moog, R.S.; Spenser, J.N. *J. Chem. Educ.* **1999**, 76, 570.

Spenser, J. N. *J. Chem. Educ.* **1999**, 76, 566.

Doughterty, R.C. *J. Chem. Educ.* **1997**, 74, 222.

Robinson, W. R. J. Chem. Educ. **1997**, 74, 622.

Felder, R. M. J. Chem. Educ. **1996**, 73, 832.

Ellis, A. B. *Chemtech* **1995**, 15.

Scherear, W.R. *J. Chem. Educ.* **1998**, 65, 133.

Gosser, D. K.; Roth, V.J. *J. Chem. Educ.* **1998**, 75, 185.

Solomons, T. W. *Organic Chemistry, 3th Ed.*; John Wiley & Sons: New York, 1976.
Solomons, T. W.; Fryhle, C.B. *Organic Chemistry, 8th Ed.*; John Wiley & Sons: New York, 2004.
McMurry, J. *Organic Chemistry; 4th Ed.*; Brooks/Cole: Pacific Grove, CA, 1999.
McMurry, J. *Organic Chemistry; 6th Ed.*; Brooks/Cole: Pacific Grove, CA, 2005.
Loundon, M.L. *Organic Chemistry*; Benjamin/Cummings: Redwood City, CA 1995.
Wade, L.G. *Organic Chemistry*, 4th Ed.; Prentice Hall: New Jersey, 1999.
Kampmeier, J. A.; Varma-Nelson, P.; Wegegaert, D.K. Peer-Led Team Learning. *Organic Chemistry;* Prentice-Hall: New York, 1999.

Appendix A

Results of anonymous student survey:

1. This workbook was beneficial to me.

Most definitely	20
Definitely	5
Not sure	0
No	0

2. The workbook helped me understand the concepts covered in the syllabus.

Most definitely	20
Definitely	4
Not sure	1
No	0

3. Solving the problems in the workbook gave me the required practice in applying concepts to solve problems.

Most definitely	17
Definitely	8
Not sure	0
No	0

4. Solving the problems in the workbook helped me make connections between the different concepts

Most definitely	15
Definitely	9
Not sure	1
No	0

5. Solving the problems in the workbook helped me make connections between concepts covered and applications of organic chemistry in my life.

Most definitely	14
Definitely	10
Not sure	1
No	0

6. Solving problems in the workbook made reading and understanding of the textbook easier.

Most definitely	14
Definitely	5
Not sure	6
No	

7. Solving problems in the workbook helped me see the logic of organic chemistry and made me depend less on memorization (than I normally would) during examinations.

Most definitely	17
Definitely	4
Not sure	3
No	1

8. Additional comments about the workbook:

Establish Relevance with Student Topics and a Student Magazine

Joseph Bisz
English

Before I came to BMCC, I was an instructor at Broome Community College in upstate New York. Skeleton trees stood outside our room, barren yet tremendous against the white sky: and in front of them my English Composition students had their eyes open and (usually) their pens in hand. So did I; but I was tired of teaching the same clever anthology articles I had used from last semester, of throwing up the same clever student answers on the board for the past two weeks. I ran my hand through my hair, stared outside the poorly painted windows of the new semester, and felt something like a student myself, thinking, "They're supposed to be learning how to write, right? So what's the point of these topics? What's the point of *any* topic?"

During the previous holiday break I had digested a rather famous little book titled *Teaching as a Subversive Activity* which called for, in all courses, the complete abandonment of teaching by syllabus in favor of teaching by content that students actually desired to know. I had not yet become sold on that singular and sweeping idea, but I was moved by Postman and Weingartner's emphatic plea that teachers must establish the *relevance* of what they are teaching—why the topic should be important to a student—since despite the threat or promise of grades not all students take as gospel that learning calculus, animal dissection, the ACT essay, or issues behind global warming is going to help them become sharper, fully educated people.

Since the purpose of composition courses is to teach the tools of writing (essay models, argument formation), it was easy for me to go home that day and look over my course content (critical essays, stories) as being comparatively unimportant. The next day, borrowing from an exercise that Postman and Weingartner wrote about, I left my books at home and informed my students in class that we were going to do things a little differently. I asked them to write down on a piece of paper problems that they really cared about, perhaps issues affecting their own lives, or issues or ideas they had heard of on the news, and so on, that they wish they knew more about. Already sheepish grins were forming; they thought this was a joke: the teacher wasn't seriously going to ask them what *they* wanted to know! I put one steadfast hand on my hip, wrote up their topics on the board with my free hand, and we playfully drew lines between topics together, connecting similar ones or creating broader headings (the topic "always fighting with my parents" might be linked to "Communicating with Teenagers"). I finally put down and surrendered my chalk, and asked them to vote—like a democracy—on the three topics of highest interest. They did; I announced that for the remainder of the semester their chosen topics would make up our class.

Learners Learn What's Relevant

The importance of establishing relevance to a learner cannot be overstated. Jonathan Scott observes in his *Inquirer* article "Terms and Concept" that "when reading academic literature and studying unfamiliar subjects and questions, no material self-interest obtains. And this is where the whole thesis process tends to break down, because how could a student expect to argue convincingly for one thing or another if they have no personal stake in the outcome...?" It is the casting of a subject in the light of a perceived problem—especially a problem that students have realized they're interested in—which motivates students. Weimer, speaking about college classes in the field of management, offers empirical proof that students picking their own projects is important: "Research... has documented that organizations can be improved if those managing the group give them 'psychological ownership,'" and she concludes, "Students believed they learned more in a condition where they selected the product." Although professors, as evaluators, do set up requirements for projects (and grades), allowing giving students some leeway in how they choose or complete projects will give students a feeling of motivation and pride because their project, their work,

actually applies to them. This result seems to corroborate with general theories of learning, which state that one cannot learn anything without relating it to something she or he already knows. I believe that a student's often unconscious process of *finding out how to relate to something* is essentially *a process of relevance-making*.

Writing is a Critique of Culture

By the end of the third week I was scrambling to find essays for them to read and I began to wonder about their upcoming academic papers that would soon argue these topics. I realized that it wasn't enough for me to have the students in control of the classroom conversation. I wanted them to feel like they were in control of these papers, too. I went home, and came back to our class the next week with an idea that had long been fermenting in my head—to focus their papers and the rest of the semester around what I called the "Culture Critique Magazine."

Essentially, I told them that day they would write the *exact same* academic papers I promised in the syllabus, only now their papers would be compiled into a "magazine" at the course's end and handed back to them. They seemed excited about the idea of self-publishing, about 'owning' their product—as I knew they would be—and our class discussions continued as usual but my plan for the semester, of course, changed. I now had to allow them a lot more time to do group work, a lot of group work. I had them appoint a 'head editor' and 'recorder' per group of four students, the first responsible for running the meetings and calling on people, the second for taking notes on the group's discussion and decisions. In groups they would workshop each other's essays, proofreading for grammar and talking about ideas that were clear or unclear, or that were the most interesting or least interesting; brainstorm for new ideas for future essays; help their teammates pick the best pieces and art for final magazine inclusion; debate ways to approach or expand on the topic the student was investigating (usually by asking the student to research facts that they themselves were curious to know), etc.

In computer labs they formatted their papers in Microsoft Word. In the classroom they picked art for essays, interior images, and the cover. Laying out a 'magazine' was teaching them visual logic, the power of ads, the importance of standardized readable formats and argumentative models. Students phoned and checked up on group mates who didn't show up to class. Working in these editor-groups was establishing responsibility. Most students seemed actually excited about being in class, and would jump off into groups even before I arrived. Again, they felt like they owned their product, and motivation abounded.

And, what about the writing? The writing improved because their preparation improved. There were more essays turned in on time, for example. Also, it was one thing to hand in a revision to me and forget to fix errors I had noted, but another thing entirely to hand over a revision to their whole group of peers without having first fixed the errors *they* had found on the earlier draft. Their peers were behind them; there was more at stake. Feedback from peers also helped the students feel that they had connected with someone besides the teacher, therefore their papers, which were enunciations of ideas often shared in discussions, felt more tangible and significant to them and less prosaic to me. Craft-wise, I detected more emotional involvement in what they were writing ("It is an utter travesty that a woman's concept of herself could be manipulated by the media"), or at least a more aggressive (and sometimes too one-sided) pursuit of supporting sources (for instance, citing essayists who argue that the drinking age should be lowered).

Using a *Class Magazine* was a fantastic exercise that showed my students an already existing structure in our culture where academic writing and criticism happen (magazines, journals and newspapers), WHY it was happening (to critique culture and problems), and look, they could participate too! The papers they were being 'made' to write were not just something we as teachers make up. Such writing is part of a national discussion. (And for those of you who have trouble just word-processing, don't worry. I use the term 'magazine' loosely. Simply pick a uniform margin and font size, have them tape some pictures to their essays, and bam! It's ready to be printed and bound at BMCC's Reprographics).

Onwards to BMCC

In my composition classes at BMCC I was not willing to implement the *Class Topics* or *Class Magazine* approach until I had run through the courses a few times and gotten a feel for the students and department requirements. For instance, ENG 101 has a department-wide final exam on articles selected not by the instructor but by committee, which of course would mean that the integrity of entirely student-chosen topics would be compromised. But I learned to pay more attention to the tributaries of thought that would break off from a class discussion, and often shifted my preordained routes to take up these sometimes related but often circuitous questions. By doing this, I was following the principle behind the *Class Topics* approach. I also implemented a short "Culture Review" magazine that students worked on at the end of the semester, where they edited and published a review of some cultural event (play, art exhibit, restaurant, music), and compared their performance during this part of the semester to the earlier part when there was no magazine and they were effectively a 'control group'. I was not able to recreate most of the *Class Magazine*'s environment since I devoted only a small amount of time to the Culture Review, but I did notice that students were actively talking about it with one another, that they had worked pretty hard on it (but was this because I had trained them so well during the semester?) and that some wanted to take it further than the mandatory first revision in order that it should be 'perfect' for its published presentation to the class. Also, they read aloud from it to each other on the final day of class, and I noticed that it felt like a 'capstone' of the class for them—after all their hard work at writing essays, they were now good enough to write directly about culture, read their own words publicly, and have them printed! This had been the same feeling at Broome. I knew that BMCC students were ready for (and would enjoy) the real deal.

How do Students know what they are Interested In?

One argument against the *Class Topics* approach is that many students do not really know what they are interested in, or that students are not interested in what they should be interested in. The former statement is simply false. Saturated by input from media, family, and work, BMCC students are lead to concentrate their opinions; this leaves them nervous, sullen, or eager, but still yearning to understand how the world is treating them. The latter statement is more complicated to judge, since it strikes at the heart of any curriculum or ideology. Like a teacher-centered classroom style that steers discussion, or a lawyer that asks witnesses leading questions, it is good to remember, for those of you who are getting nervous, that class topics will still be broad enough to work in many of your 'favorite' authors or texts. For example, if students pick themes such as materialism, sex, politics, or learning disabilities, the possibilities for how you as a teacher will shape the course are endless. But the students have now placed the burden of proof upon themselves—the establishment of *relevance*—by choosing problems which they have admitted they are already interested in.

Alternatives for Faculty in Non-Writing Intensive Courses

The *Class Magazine* only makes sense for writing-intensive courses. You could, however, supplement any class with a student created pamphlet, website, performance, or other media that would adequately summarize the work the students have been doing. This takes less time than a magazine and is readily adapted to a broad range of content.

The *Class Topics* approach is not a good idea for literature classes or any class that emphasizes content. For example, if you have already picked out certain contemporary American poets to survey, it's likely that few or none will touch upon the subjects the students bring up.

You could, however, twist around my Class Topics approach by asking your students to pick topics and problems *directly* related to your course subject. For example, in an Introduction to Philosophy course you could ask students to write down problems that they think are philosophical in nature. But keep in mind that students don't necessarily know what is a philosophical topic. I would try the regular approach first, without caveats. You'll probably find that within any gener-

al list of questions and problems, much can be related to even a specialized course like Abnormal Psychology. I imagine using *Class Topics* could work not just for psychology classes and inquiry-based humanities courses but even the physical sciences.

Conclusion

If you use the *Class Topics* and/or the *Class Magazine* approach, the semester becomes about field inquiry and knowledge acquisition *as a class*. Students still maintain their individual drives to learn, to research their own ideas and take command of their education, but they recognize that others, many others, around them are doing likewise. At the end of the semester the class's conclusions are finalized and as a team they can see and compare their approaches and their knowledge to that of their peers. The class magazine thus serves the function often wished upon a "final exam": a set of questions designed to make students review and connect all the ideas from the course. But here the students have designed and written the exam themselves.

References

Postman, N. & Weingartner, C. (1969). *Teaching as a subversive activity.* New York: Dell Publishing.

Scott, J. (2004). Terms and Concepts. *Inquirer*, 11, 48-51.

Weimer, M. (2004). Ownership increases levels of self-reported learning. *The Teaching Professor,* 18 (4), p. 2.

"Oh, Mama, Can This Really Be the End?" Self, Structure, and Reader in the Conclusion of an Essay

Dolores DeLuise and Maria de Vasconcelos
English

As difficult as it is to imagine, writing the conclusion of a college essay is sometimes the trickiest part to teach to students. When polling what they have learned about the writing of conclusions in high school, we very well may hear that a conclusion should begin with "in conclusion," and then go on to a summary of what the paper was about and/or a restatement of the thesis. It is surprisingly easy for us to accept such conclusions because somewhere inside all of us lurks this directive, probably taught to us by our own high school teachers, wrung-out and out of words at the end of a trying lesson in composition. And so it is with endings, tacked on at the end as they are, end-thoughts, receiving the short end of the stick, so to speak.

Another reason that a hasty conclusion may be overlooked is because the remaining aura of **associationist**-behavioral pedagogical theory may still contain a kind of truth or common sense for many of us. The idea that tasks to be mastered should be done in some hierarchical order presents itself as logical; therefore, it seems eminently rational to teach the beginning first, then the middle, and the ending last. Research in cognitive psychology has had, in recent years, strong implications for pedagogy. It has shown that information doesn't enter the brain in a regimented order, as suggested by **behavioralists**, but in a much more flexible way. In order to illustrate it this concept, we will schematize it briefly: Imagine that as information enters the brain, it makes use of an already existing mental framework that assists us in "recoding" it, making it available for use to us in learning. Using a combination of these two pedagogical approaches—associationist-behavioral and cognitive psychological—we have fashioned a theory that has aided us in devising a method for teaching students to write conclusions that are not merely paraphrased theses. We invite them to discover and incorporate abstract concepts into their conclusions early in the process, in a non-hierarchical order, insuring that they come to understand the process of essay writing as an organic totality and not a mere succession of discrete tasks. Then, since we could not totally escape a hierarchical defining principle, we incorporated the notion of a frame.

Teaching Conclusions in Basic Writing Classes

Ah, the life of the unfortunate college "freshman." Think back to when you were a first-year student; even the most savvy among us—those who had excelled in high school, the class presidents, student government big shots, the socially successful—we were all inundated, that first semester, with an onslaught of information that seemed to become more and more meaningless by the moment. On top of all that, the uxorious composition course seemed insurmountable—we wrote and wrote personal essays that we filled with the details of our glorious high school accomplishments. And then we learned that no one really cared about what we did in high school. OK, we thought, it's just this one semester of writing essays. Not so. In our second semester, or maybe by the end of the first, we learned to our consternation that we had to write essays in most of our other classes and that they had to contain research too. It was then that the light broke and we understood what being in college actually meant.

Multiply all this by some number and you have your first-year student in a basic writing class, most unfortunate fresh-person of all. It was in addressing the particular problems of basic writers that we developed a pedagogical approach to writing conclusions and applied it successfully for students in the composition sequence (English 101 and 201) and in literature courses as well. This essay will explain the manner in which we teach the writing of conclusions to students in basic writing, after which we will make some suggestions about its application at other levels and across the curriculum.

The primary task facing students in English 088 at BMCC is writing a clear description of a person, place, object, or event. According to a strict interpretation of this assignment, they accomplish their mission with an essay that answers a question about their own lives, the infamous personal essay. The example we will work with throughout comes from a question that asks students to tell about a time they were treated unfairly. When beginning basic writing students reach the ends of such essays, they bail out as quickly as they can, often by saying something like: "In conclusion, I was treated unfairly." Our job is complicated. We must have students understand that the question should not be taken at face value: We must convey the concept implicitly demanded by the question, that is, some kind of philosophic consideration that informs or accompanies their life-stories.

Intellectual Maturity

Students arrive in basic writing courses with differing levels of intellectual maturity, and it is important to identify what level a particular student has attained. We have identified three levels of intellectual maturity that we recognize as helpful in assisting us in assessing writing. We use three criteria to assess students' levels of intellectual development as it relates to composition: self, structure, and reader. The following descriptions are meant to serve as guidelines only. We should remember that students' levels may overlap in different areas and that these levels are meant to assess intellectual maturity, which is different from intellectual capacity. This in part accounts for the fact that students whose intellectual capacity has brought them to an advanced course may still be intellectually immature and therefore have difficulty writing college-level prose. These assessments may be used, therefore, to classify not only the level of basic writing students but levels of students at every stage of the post-secondary educational process. Instructors of all disciplines may benefit from this information when evaluating written assignments. It is our hope that it will encourage revision in order to assist their students as they continue to work toward becoming successful writers of college-level prose.

The following overview will help identify at what level a basic writing student is.

1. Assessment Criteria at Level 1

Self: Students:
- see themselves as receptacles of information
- do not question the authority of what they see in print
- cannot imagine seeing their work in print
- do not understand the concept of connotation
- process information literally

Structure: Students:
- have no notion that a piece of writing may have structure, arrangement, and organization

Reader: Students:
- cannot conceive of a reader of their work other than their instructor
- cannot intuit that what they write may be capable of producing consequences or of eliciting reactions from others

2. Assessment Criteria at Level 2

Self: Students:
- begin to understand that they are free to develop and posit their own opinions for the purpose of convincing others of them

Structure: Students:
- begin to understand that it is possible to impose structure and organization on a piece of writing but may not yet know how to bring this knowledge to their own work

Reader: Students:
- begin to understand that a reader may not be able to comprehend completely what they have written
- begin to think in terms of addressing a reader they do not know and who might read their work at a future time.

3. Assessment Criteria at Level 3

Self: Students:
- begin to understand themselves as signifying subjects capable of and obligated to put forth their opinions on the academic topics they study
- begin to understand that learning is an exchange, giving as well as receiving
- begin to understand that words have shades of meaning, connotations, and that they are free to employ this information to better express what they mean

Structure: Students:
- begin to write with a structure in mind and are actively attempting to impose it on the essays they write
- understand the ideas of arrangement and organization and attempt to apply them to the essays they write

Reader: Students:
- begin to write with an audience in mind
- make a conscious attempt to express themselves clearly so that readers who know little or nothing about the topic will be informed well enough to follow the progress of the narrative

Examples

A. Level 1 Conclusion: "Now I'm looking for another job."

B. Level 2 Conclusion: "Life isn't fair. Sometimes people can be very unfair."

C. Level 3 Conclusion: "Everyone meets people like that, but when you think about it, they give us one less problem to avoid in the future. An unfair person can be a wonderful experience to help you develop some characteristics you do not know you had. We can learn a lesson that will make us wiser and smarter about life."

The examples at the end are taken from the essay question that asked students to tell about a time they were treated unfairly and explain what happened.

In Example A, the student's story begins at the beginning, tells the facts of the story with no commentary, and concludes with the last chronological fact. It shows clearly the initial position of beginning basic writers: There is no evidence of consciousness that a reader may be puzzled about her reasons for writing about her job. There is no evidence, indeed, that the writer herself has any conscious understanding about why she is writing about her job. She follows the directions to the letter and makes the logical decision to end her piece of writing with the last narrative element.

It is here that we point out to our basic writing students that, even though the question doesn't state that you do so, you must ground your work in a philosophical frame. Once they are able to understand this principle, they take the first step toward producing college-level prose.

The Frame

Ironically, the notion of a frame implies our essential reliance on associationist-behavioral pedagogy. It is here we make a series of hierarchical distinctions; however, this only serves to illustrate the fact that a syncretic approach to pedagogy, tailored to meet students' needs, yields superior outcomes.

We introduce the idea to Level 1 students that individual pieces of writing, even those that tell a life story, should be situated inside a thoughtful framework that need not be complicated. We

first ask them to write a sentence that addresses the overall topic in a general way. As soon as they have done this, they become introduced to the concept of reflection, of thoughtfulness. We then ask them to place themselves inside the picture with their own stories and proceed from there, reminding them that the general statement is information they and their readers have in common. They may need a sentence or so to create a bridge between the general statement and their own stories. At its simplest, the general statement, "Sometimes we are treated unfairly in life," could be followed by a bridge like, "I know because I was once treated unfairly," for example. Once students place themselves inside the picture as writers, they must guide their readers to a unique place that only they know about, constructing and furnishing the distinctive location that exists only in their thoughts. When readers arrive, students must take them on a tour.

At this same point, as we consider an essay's beginning, we extend the exercise of reflective thinking by talking about a sense of closure in general, and establishing the concept of emotional closure in particular, by becoming readers ourselves. We ask: "How did you feel when you read the end of Essay X as compared to when you read the end of Essay Y?," providing appropriate examples. This exercise acquaints basic writers with the idea that is possible for them to exert control over readers' responses according to what they choose to write, an important step toward intellectual maturity.

Example B, above, is from a basic writing student who is about to enter the second level. She understands the need to introduce the topic to the reader and that she must provide closure that is not a part of the narrative proper; that is, she is beginning to understand how to employ a frame. Although she begins to initiate emotional closure in the last sentence, she has written an unreflective conclusion that quotes her thesis. Without intervention at this point, she may very well continue to write such conclusions in one guise or another, on a larger scale, of course, with varying amounts of success throughout her college career. This is the precise place where we may let students down if we do not become aware of our own intuitive reliance on associationist-behavioral theory, accepting conclusions that merely paraphrase the thesis because such statements approach closure and because we may not consider them to be as hierarchically significant as the beginnings and middles of essays.

Philosophy and the Beginning Writer

We teach students to become "philosophers." Once the notion of a frame, the structure, is established, we go forward with the philosophical elements of the frame. We are using the word "philosophical" in its broadest sense: acts of reflection that interrogate human nature and our attempt to understand our own thoughts with respect to those acts. In order to elicit such responses, we ask that students construct their essays as follows:

Road Map of a Reflective Essay for Basic Writing Students

Beginning:	• Make a general statement about the topic. • Explain yourself and/or your own situation as it relates to the topic.
Middle:	• Present as many examples, illustrations, descriptions, and stories as are necessary so that your reader understands what you mean almost as well as you do. • Every new idea requires a new paragraph. • Use as many paragraphs as are necessary to have your readers understand what you mean.
Conclusion:	• Briefly restate the main point of your essay in one or two sentences, using (mostly) different words than those contained in the beginning. • Teach your readers what you learned from your experience or what they should learn from reading about your experience.

The results of the non-hierarchical approach will be apparent here; concentrating on teaching the beginning and conclusion simultaneously fosters understanding of the totality of the essay.

In Example C, the student first reflects on and then teaches about the topic of people who treat you unfairly. She has a clearly-formulated opinion and has constructed a philosophical frame, going from the particular—being treated unfairly (her own story as it fits into the topic)—to the general—adversity may assist us in discovering our hidden strengths (what she is able to teach about her experience). It is obvious that this student has much work to do in other areas of her writing, like vocabulary selection and sentence structure, for example, but she has written a successful, reflective conclusion that illustrates good progress toward intellectual maturity and helps further her success in writing college-level prose.

Applications

This method may be easily adapted for all college courses that require a written paper. Instructors in such disciplines as political science, history and the social sciences, and literature, may incorporate the concepts of self, structure, and reader into written assignments by means of the following "road map" expressed in terms of their own disciplines, particularly in the middle section, which is the appropriate place for specific research.

Road Map for College Essay

Be sure your paper has a beginning, middle, and end.

Beginning:
- Usually one paragraph.
- Begin with some general information about the overall topic.
- Do not linger too long at this point.
- Refine your topic as it relates to the assignment and clearly state your ideas and findings about it here (thesis).

Middle:
- At least as many paragraphs as there are points.
- Present research here.
- Relying on your research, present as many examples, illustrations, descriptions, and stories that illuminate your points as are necessary so that your reader understands what you mean almost as well as you do.
- New idea—new paragraph.
- Do not create a paragraph for a new idea before the present idea is complete.
- After presenting each point, discuss the relationship between the information presented (stories, examples, etc.) and the thesis. Be specific, even if you feel it's obvious.

Conclusion:
- One or two paragraphs.
- Briefly restate the main point of your paper in one or two sentences, using (mostly) different words than those contained at the beginning.
- Teach your readers what you learned from your findings or what they will be able to learn from reading about your findings.

Conclusion

That's all, folks.

MAT 160: Quantitative Reasoning

Klement Teixeira
Mathematics

Program Development

Beginning in the fall semester of 2003, I chaired a committee to create a new "Quantitative Reasoning" (QR) math course at Borough of Manhattan Community College (BMCC). Since we did not offer this type of course, some of my colleagues felt that our department needed such a course. Because I had prior experience teaching QR at another university, I volunteered to chair a committee to design the course. Thirteen faculty members from the mathematics department volunteered to join the committee to assist me in this process. Some committee members were senior faculty with prior experience creating courses. Others were junior faculty members who were eager to learn about QR and course design. The course was developed and unanimously approved by the BMCC faculty council at the end of the fall 2004 semester.

Several mathematical organizations including the American Mathematical Association of Two Year Colleges (AMATYC) and the Mathematical Association of America (MAA), have stated the need for all college graduates to be quantitatively literate. Consequently, we felt that such a course would be of great value to our students. Some of the committee members were unfamiliar with this type of course, while others had differing viewpoints about QR courses.

With some research, I discovered, and reported to the committee, that there are significant variations among such courses. I discovered variation in the course title; for example, Quantitative Reasoning (QR), Quantitative Literacy (QL), Mathematics Literacy (ML), Numeracy, Mathematical Thinking, or simply Mathematics. To some, these terms are synonymous, but to others there is a difference in how these terms are defined.

The National Adult Literacy Survey defines quantitative literacy as: "The knowledge and skills required to apply arithmetic operations, either alone or sequentially, using numbers embedded in printed material (e.g, balancing a checkbook, completing an order form)" (Steen, 2001, p.7). Others cast quantitative literacy as a specific collection of skills—basic mathematical skills, statistical reasoning skills, critical thinking skills, and problem solving skills (QL_SIAM). "Like literacy itself, these are survival skills, needed by any person who wants to understand and make decisions in a complex world flooded with data" (QL_SIAM, p. 1). QL is also defined as the "level of mathematical knowledge and skills required of all citizens. It includes the ability to apply aspects of mathematics (including measurement, data representation, number sense, variables, geometric shapes, spatial visualization, and chance) to understand, predict, and control routine events in people's lives" (QL, p. 1).

Quantitative literacy is regarded by some as a combination of skills, comfort and confidence when dealing with fundamental quantitative problems (QL_ SIAM). Others view QL from a cultural or historical perspective. "It provides students with an idea of the power and utility of mathematics, and makes them aware of how it has shaped the society in which we now live" (QL_SIAM, p. 1).

Some differentiate between Quantitative Literacy and Quantitative Reasoning. Quantitative Reasoning is viewed by some "as an interpretive activity that takes place within a deductively structured framework. It involves a tapestry of meaning provided by a warp of abstract patterns and a weft of context and story line. In quantitative reasoning, context provides meaning" (QR/QL, p.3).

Mathematics literacy is defined by the Programme for International Assessment as "an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded mathematical judgments and to engage in mathematics in ways that meet the needs of that individual's current and future life as a constructive, concerned and reflective citizen" (Steen, 2001, p.7).

Some distinguish between "literacy" type courses (QL, QR, Mathematics literacy,

Numeracy) and mathematics. "Whereas mathematics tends to be hierarchical and abstract, quantitative literacy is broad, outreaching, and practical because of its interfaces with other disciplines" (QL_SIAM, p.1). "Quantitative literacy is mathematics in context, it is mathematics as it arises in diverse real situations." (QL_SIAM, p. 1). "Numeracy is not the same as mathematics. It is an aggregation of skills, knowledge, beliefs, dispositions, habits of mind, communication capabilities, and problem solving skills that people need in order to engage effectively and autonomously in quantitative situations arising in life and work." (QL, p.1)

These definitions suggest substantial variation among QR courses. The emphasis of some courses is critical thinking skills. For others it is basic arithmetic skills. Still others focus on math appreciation by applying concepts taught to real world problems, and others emphasize problem solving (Steen, 2001). While I was a graduate student at NYU, I was exposed to this variation since the QR courses offered at NYU are:

(a) Mathematical Patterns in Nature—emphasizes the application of mathematics to the physical sciences;
(a) Mathematical Patterns in Society—emphasizes the application of mathematics to the social sciences;
(b) Mathematics and the Computer—emphasizes the application of Boolean algebra and logic to digital electronics;
(c) Probability, Statistics, and Decision Making—emphasizes probability from the viewpoint of gambling and games, and;
(d) Elementary Statistics—emphasizes the use of statistical methods (MAP, 2003-2004).

Each of these courses has weekly workshops (called recitation) where graduate assistants review material covered in lecture and work on lab projects. The task that our QR committee faced was to determine which approach to QR was best suitable for our student population.

Program Goals and Learning Objectives

Our students are required to demonstrate skills associated with academic literacy upon graduation. These skills include "the ability to understand and think critically about ideas and information presented in print and the ability to write clearly, logically, and correctly" (CPE, 2003-2004, p.1). All students are required to pass an exit exam, called the CPE (CUNY Proficiency Examination). This exam is divided into two parts, Task 1: Analytical Reading and Writing; and Task 2: Analyzing and Integrating Materials from Graphs and Text (CPE, 2003-2004). The committee agreed that one of the course objectives should be to assist students in developing these necessary skills. The committee also felt that writing should be an integral part of the course since it would better prepare students for the Proficiency exam.

The committee unanimously agreed that the learning objectives for this course should satisfy the general education learning outcome goals of the college. At the time this course was being developed, the general education objectives for the college were being revised. The following general education learning outcome goal was under consideration by the college: Students will use quantitative skills and the concepts and methods of mathematics to solve problems across all disciplines. The objectives under consideration were:

Students will

- Understand and apply basic methods of arithmetic, algebra, geometry and statistics for computational problems in a variety of theoretical and real world situations.
- Interpret, make appropriate judgments, and draw logical conclusions based on quantitative information.
- Critically evaluate quantitative material, identifying deceptive or erroneous reasoning.

The committee compared these general education objectives to the Mathematical Association of America guidelines for QR courses. According to the MAA, a quantitatively literate student should be able to:

1. Interpret graphs, tables, and schematics, and draw inferences from them.
2. Represent mathematical information symbolically, visually, numerically, and verbally.
3. Use arithmetical, algebraic, geometric and statistical methods to solve problems.
4. Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results. (MAA, p.2).

The committee reflected on the general education and MAA guidelines to determine which of the various forms of quantitative literacy (discussed previously) is best suitable for our student population. After carefully studying and discussing these guidelines, we agreed that this course should contain applications from various disciplines. An interdisciplinary course of this nature is recommended by the American Mathematical Association of Two-Year Colleges (AMATYC).

According to AMATYC, "Because liberal arts students will encounter mathematics in a variety of settings, the approach taken should involve applications from several disciplines" (AMATYC, p. 20). Further, "just as the "writing across the curriculum movement" addresses the need for students to write frequently in order to improve as verbal thinkers, a "mathematics across the curriculum movement" is needed so that students develop as mathematical thinkers." (AMATYC, p. 20).

Based on our program goals, learning objectives, and student population, our form of QL will emphasize certain skills (e.g critical thinking, statistical reasoning, etc) and provide opportunities for students to master these skills and be comfortable and confident when applying them to their everyday lives.

Conclusion

Quantitative Reasoning will be offered at BMCC in the near future. Quantitative Reasoning (MAT 160) is an elective course for Liberal Arts majors to fulfill their mathematics graduation requirement. However, this course is open to students across all disciplines. Any student who lacks adequate quantitative literacy skills to succeed on the CPE exam can take this course to improve these skills. I believe this course will serve the needs of our students. It will enable them to develop the quantitative reasoning skills necessary to live fulfilling and productive lives.

References

AMATYC (1995). *Crossroads in Mathematics Interpreting the Standards.* Retrieved April, 2004 from http://www.imacc.org/standards/interpreting.html

Bennett, J.O., & Briggs, W.L. (2003). *Using and Understanding Mathematics. A Quantitative Reasoning Approach*. Addison Wesley.

BMCC *2000-2002 Bulletin, The Office of Institutional Research, Academic Affairs.*

CPE (2003-2004). *A Description of the CUNY Proficiency Examination. Information for Students.* http:// www.cuny.edu/cpe.

BMCC Factbook 2001-2002. The Office of Institutional Research Academic Affairs.

MAA (1998). *Quantitative Literacy: Goals.* Retrieved September, 2003 from http://www.maa.org/past/ql/ql_part2.html

MAP (2003-2004). *The Morse Academic Plan*. The General Education Program of New York University. Prepared by the Morse Academic, New York, NY.

QL. Different Views on Quantitative Literacy. Retrieved April, 2004 from http:// www. stolaf.edu/other/extend/Numeracy/defns.html

QL_SIAM. Quantitative Literacy and SIAM. Retrieved April 2004 from
http:// www-math.cudenver.edu/~wbriggs/qr/siam_news.html
QR/QL. What is QL/QR? Retrieved September, 2003 from
http:// www-math.cudenver.edu/~wbriggs/qr/whatisit.html
Steen, L.A. (2001). Mathematics and Democracy. *The Case for Quantitative Literacy*.
Prepared by the National Council on Education and the Disciplines, Washington, D.C.

Summing Up a Unique Peer-led Team Learning Mathematics Project

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Mathematics

About Peer-Led Team Learning

Peer-Led Team Learning is an educational approach used in scientific disciplines. The Peer-Led Team Learning (PLTL) model was developed by a nationwide team of faculty and learning specialists who were concerned about the inadequacies of the lecture mode of instruction used in college chemistry courses. A National Science Foundation (NSF) grant provided for further development and dissemination of the PLTL model for other scientific disciplines. In the United States, over one hundred institutions of higher education currently use the designated PLTL Workshop Model.

There are several characteristics that distinguish PLTL from other tutoring projects. Videoconferencing is used to offer education courses to both two-year and four-year college peer leaders. PLTL faculty liaisons are also instructors, counselors and mentors to leaders. Peer leaders are trained to conduct special small-group workshops of six to eight students. Additional project efforts facilitate the transfer of two-year college leaders to four-year institutions. All students, not simply those in danger of failing, are expected to attend PLTL workshops because they are an integral part of the course.

A Special PLTL Project

In 1999, BMCC was invited to join an NSF-funded CUNY Science and Mathematics Teacher Recruitment/PLTL Project. The other participating campuses are City College, New York City College of Technology, Bronx Community College and LaGuardia Community College.

The BMCC mathematics course selected for the project was Fundamentals of Mathematics I (MAT 100), a four-credit terminal course with a high enrollment of Liberal Arts students, some of which are currently teachers or prospective teachers. From Spring 2000 to Spring 2004 I taught thirteen non-PLTL MAT 100 sections (339 students) using computers, three PLTL MAT 100 sections (67 students) using computers, and eight PLTL MAT 100 sections (202 students) using a lecture approach. Note that the lecture-based instruction was implemented because of the loss of two labs of Macintosh computers that supported the course software, and the failure of Macintosh emulators to function as suitable replacements.

Leader Recruitment

Because of difficulties recruiting prospective teachers, I enlisted two groups of peer leaders majoring in science, technology, engineering or mathematics (STEM) areas. One group had teaching goals and the other did not, so leader interaction was encouraged. More leaders thus began to consider teaching careers.

Prior to the beginning of each semester, I identified leader candidates who completed Precalculus (MAT 206) or Fundamentals of Mathematics (MAT 100) with A/B grades. The recruitment process included PLTL advertisements in a BMCC newsletter for prospective teachers, as well as letters and phone calls to prospective leaders.

Leader Training and Development

At the beginning of each semester, I conducted a five-hour orientation session introducing all prospective leaders to general PLTL methods and group management. Peer leaders planning teaching careers were also enrolled in a videoconferenced one-credit CCNY Educational Leadership (EDUC 31507) course which has a special two-day PLTL orientation each semester. The orientation includes Blackboard training to upload and download course materials and to promote discussion of classwork, readings and assignments. All peer leaders, including those enrolled in EDUC 31507,

were required to participate in regularly scheduled training sessions with me.
During Spring and Fall 2002, I held weekly two-hour PLTL leader training sessions. The leaders then held one-hour problem-solving workshops for students. The workshops were scheduled days, evenings and Saturdays. All leaders were required to give me PLTL journals describing their workshop experiences. No special format was required.

From Spring 2003 to Spring 2004, the training schedule was adjusted. Because of challenges peer leaders experienced as mathematics lab employees, I recruited volunteers. To accommodate their schedules, I held bi-weekly one-hour PLTL leader training sessions. With groups of enthusiastic volunteers, the sessions often ran beyond the scheduled hour. The trained leaders then conducted one-hour student workshops on alternate weeks. After each workshop with tutees, each leader was required to give me a completed log sheet describing the workshop experience. Each log sheet contained the following four questions:

1. Review the workshop plan for today. What were you actually able to do?
2. How did you feel about what went on today in the workshop? (Include good things as well as difficulties.)
3. What do you think you need to do in the next workshop?
4. Please share any special comments or concerns about this workshop, your efforts and your students.

Leader concerns and comments were discussed at subsequent training sessions. Private concerns were promptly discussed with me. Leaders were thus uninhibited about disclosing a variety of issues of importance to them. General issues included leader effectiveness, workshop expectations, communication of mathematical concepts, interpersonal relationships, time management, scholarship prospects, participation in special programs such as the Vassar Project, and needs for additional tutoring/mentoring.

Mathematics peer leaders with teaching goals enrolled in EDUC 31507, and completed research projects incorporating coursework and workshop experiences. Each semester, a PLTL Preliminary Presentation Day was scheduled to provide these leaders with a special opportunity to practice their presentations and obtain feedback from other peer leaders and BMCC Mathematics Department faculty. The leaders were then better prepared to do their presentations via videoconferencing or at the CUNY PLTL Student Conference at CCNY. All presentations had to be completed in PowerPoint. After each peer leader presented, PLTL faculty liaisons and other peer leaders from all five participating CUNY campuses had a chance to question the research. Faculty submitted written evaluations of each presenter, who subsequently received an EDUC 31507 grade based on previously graded assignments and the presentation results.

Because of the collaborative role of PLTL faculty in training peer leaders, other CUNY faculty shared the training of those BMCC leaders with teaching goals. In addition, each semester BMCC faculty and staff welcomed all leaders to a variety of presentations, such as those given in the Teaching-Learning Center and on Technology Day. Dr. Fred Peskoff's "Mathematics Anxiety Workshop" inspired one peer leader's research efforts, and he provided special insight when he critiqued her project. When Professor/CLT Mark Jagai gave his training session in Blackboard and Whiteboard, he taught leaders ways besides e-mail and chat rooms to conduct extra online tutoring that was sometimes requested by tutees.
Leaders were also invited to local and national PLTL conferences where they had opportunities to interact with other faculty and students from other colleges.

Results of the Mathematics Teacher Recruitment/PLTL Project
To judge the effectiveness of PLTL methodology in MAT 100, the performance of both peer leaders and workshop students must be analyzed. (All tables are provided in the Appendix.) Table 1 shows

the participation and persistence of peer leaders in the project. Further details reflect their talents and abilities, and for some, their steadfastness in achieving teaching goals. Of 28 mathematics peer leaders recruited:

- Eighteen participated in the Teacher Preparation Program.
- Five mathematics leaders served as volunteers over two or more semesters.
- Five leaders received BMCC Mathematics Department (CSEM) scholarships.
- Four mathematics peer leaders transferred to CCNY.
- Two leaders participated in a national PLTL conference in Montana; seven leaders presented at local student PLTL conferences at CCNY; and another five leaders gave videoconferenced presentations.
- All leaders attended one or more BMCC faculty presentation.
- Nine leaders worked as mathematics lab employees either during or after their PLTL leadership training.

During Fall 2003, the peer leaders formed the BMCC Club for Future Teachers of High School Mathematics and Science. The club facilitated collaboration and support in researching career information, identifying mentors and other special projects or opportunities to help them develop skills related to teaching in STEM areas.

Student performance and retention in PLTL courses is analyzed in terms of ABC grades and withdrawals. Table 2 shows that for all MAT 100 sections I taught from Spring 2000–Spring 2004:

- Students in all non-PLTL sections were slightly less likely to earn ABC grades (62.2%) than those in all PLTL sections (63.5%).
- Students in the non-PLTL sections were slightly less likely to withdraw from the course than students in the PLTL sections (10.3% vs. 11.5%).

Because Table 2 adequately compares and summarizes student performance and retention, the detailed analysis by course section is not shown. However, the details reveal that less than 40% of students in the Saturday PLTL MAT 100 sections were likely to earn ABC grades. These students were required to finish approximately four hours of the scheduled class before meeting for the hourly PLTL workshop. Although many of these Saturday students found the course requirements overwhelming and benefited least from PLTL participation, the withdrawal rates remained less than 14%. To eliminate skewing caused by the data from Saturday sections, further analyses include only non-Saturday sections.

Table 3 shows that for all MAT 100 sections that did not meet on Saturdays:

- Students in the non-PLTL sections were less likely to earn ABC grades than those in the PLTL sections (64.5% vs. 69.1%).
- Students in the non-PLTL sections were less likely to withdraw from the course than the students in the PLTL sections (7.0% vs. 11.2%).

A final analysis was necessary only to investigate the effects of different modes of instruction on student performance. Table 4 shows that for non-Saturday sections of students who actually completed the course:

- Students in the non-PLTL computer sections were less likely to earn ABC grades than those in the PLTL computer section (69.4% vs. 76.2%).
- Students in the PLTL computer section were nearly as likely to earn ABC grades as students in

the PLTL lecture sections (76.2% vs. 78.1%).
- Students in the non-PLTL sections were less likely to earn ABC grades than those in the PLTL sections (69.4% vs. 77.9%).

Since students in the computer-based sections and lecture-based sections were nearly as likely to earn higher grades, the mode of instruction does not appear to be a determining factor. Higher grades were earned by students completing the course in PLTL sections, regardless of the mode of instruction.

Summary

Although recruitment of mathematics peer leaders is challenging, a total of 28 leaders were recruited for the project. A majority of the leaders participated in the Teacher Preparation Program. Several leaders served as volunteers over two or more semesters, received BMCC Mathematics Department scholarships, participated in national and local conferences, worked as BMCC Math Lab tutors, and transferred to CCNY to participate in teacher preparation programs. The leaders also established the BMCC Club for Future Teachers of High School Mathematics and Science.

All of the MAT 100 grade analyses indicate that students in PLTL sections were more likely to achieve higher grades, but also more likely to withdraw than students in non-PLTL sections. Though students initially agreed to participate in the project, they sometimes found that the extra workshop commitment conflicted with other personal, academic or employment responsibilities. Some students simply opted not to do the workshop and transferred to another MAT 100 section that did not require one. Though students in Saturday PLTL MAT 100 sections were least likely to earn ABC grades and benefit from PLTL participation, their withdrawal rates remained less than 14%. Of MAT 100 students who completed the course, those in non-Saturday PLTL computer-based sections and lecture-based sections were nearly as likely to earn higher grades so the mode of instruction did not appear to be a determining factor.

In comparison to the data reported from other participating institutions in the PLTL project, the BMCC data is typical. Peer leaders, whether volunteers or not, tend to benefit even more than the students they tutor. Leaders are apt to become much more confident as they develop their inherent talents and abilities, and grow accustomed to the leadership role. As they tutor, they also hone their interpersonal and communications skills. Mathematics leaders attain better conceptual and procedural understanding of the subject, and greater appreciation for its order and consistency. The PLTL project clearly provides excellent pre-professional experiences for those leaders who plan careers in teaching. For all science and mathematics courses, PLTL students generally earn more ABC grades but have higher course withdrawal rates than non-PLTL students because of the workshop requirement. Many participating students also benefit from being both tutored and mentored by the workshop leaders who are genuinely concerned about their academic and personal progress.

While the focus of this research is on PLTL implementation in a mathematics course for BMCC Liberal Arts students, the most important aspects of the PLTL project are actually mathematics teacher recruitment and training. Larger numbers of skilled mathematics teachers are needed as both New York and the nation strive to improve the performance of k-12 students on local, national and international assessments of educational progress. This CUNY Project provides a way to accomplish early recruitment and training of prospective teachers in a highly organized and effective manner. Leaders who pursue teaching goals are provided with faculty mentors at both the two-year and four-year college level, and are later assigned mentors who are master New York City public school teachers. BMCC PLTL workshops provide leaders with early pre-professional experiences that develop teaching skills and a deeper knowledge of mathematics. Leaders participate in conferences and workshops, and other special programs. They complete both educational and mathematics research projects, and sometimes earn scholarships before they even enter the four

year college. It is crucial that the peer leaders experience significant benefits in the project because the investment in them is the key to future improvements in mathematics education.

Plans to Continue

I will continue this PLTL project with a new phase of research that will study the effects of peer-led team learning in pilot Precalculus (MAT 206) sections taught using computers. I expect my students to benefit from the workshops. As I recruit, train and mentor more Precalculus students to serve as leader volunteers, I know that they too will benefit from their PLTL experiences and eventually become the qualified k–12 mathematics teachers both New York and this nation desperately need.

References

Gosser, D.K., et al. (2001). *Peer-led team learning, a guidebook.*. Upper Saddle River, .NJ: Prentice-Hall.
The Peer-led Team Learning Project Web site: http://www.pltl.org

Appendix

Table 1. Participation and Persistence of BMCC Mathematics Peer Leaders

Semester	Number of Leaders at Start	Enrolled in EDUC 31507	Completed EDUC 31507	Number of Leaders at End
Fall 2001	1	1	1	1
Spring 2002	8	5	2	5
Fall 2002	6	2	2	4
Spring 2003	8	3	3	7
Fall 2003	6	3	3	6
Spring 2004	8	2	1	8

Table 2. Grade Analysis for All MAT 100 Sections

Grades	Non-PLTL n=339	PLTL n=269
ABC	62.2%	63.5%
W/WU	10.3%	11.5%

Table 3. Non-Saturday MAT 100 Sections

Grades	Non-PLTL n=200	PLTL n=224
ABC	64.5%	69.1%
W/WU	7.0%	11.2%

Table 4. Non-Saturday Sections of Students Who Completed MAT 100

Grades	Non-PLTL Computer n=186	PLTL Computer n=21	PLTL Lecture n=178	PLTL All n=199
ABC	69.4%	76.2%	78.1%	77.9%

"Caring For" and "Caring About": Teaching Caring in an Age of Fear

Helen A. Dalpiaz
Nursing

In the Nursing Department, there are approximately 500 students who have finished their pre-clinical requirements and are now in the clinical portion of the program. These students put themselves through a rigorous curriculum over a two-year period of time. The science of nursing, based in anatomy and physiology, microbiology, chemistry, physics and pharmacology, as well as the liberal arts, is tempered by what we generalize under the umbrella of "caring." The National Council of State Boards of Nursing, which oversees licensure for professional nurses, defines caring as "an interaction of the nurse and client in an atmosphere of mutual respect and trust. In this collaborative environment, the nurse provides hope, support and compassion to help achieve desired outcomes."[1]

Over the course of their academic and clinical preparation, students are acculturated in the value of caring for patients' physical, psychosocial and spiritual needs without making moral judgments related to the cause of illness or consequences of lifestyle. This is not always easy. Some of our students have not known much caring in their own lives and come to us closed off, unwilling to give of themselves emotionally. In addition, nursing has traditionally been used by many capable but disadvantaged people, especially women, as a pathway out of their present life situation or economic inequality and, ultimately, as a means of entry into the professional middle class. Therefore, many of our students want only to invest their study time in memorizing the facts they will need to finish the program and pass the licensure exam. Just like an Ivy League school, caring is too expensive and leaves them too vulnerable to the elements that may have hurt them in the past. Helping the students learn how to use their knowledge and, just as importantly, their presence at the bedside is challenging. It is also, for me, one of the most rewarding facets of teaching nursing.

That caring is not an optional skill in health care is a fact that everyone would accept. The faculty continually reinforces and looks for evidence of demonstration of this most human of values. For without caring about our patients as human beings and caring about life as precious and worthy of dignity and respect in every encounter, we would fail to provide a necessary and crucial service. Computer programs can dispense medication on time, measure vital signs, and monitor symptoms of complications with uncanny accuracy. But a computer program cannot be written, and, I suspect, never will be written, that can hold a frightened child's hand or encourage a mother laboring to bring a new life into the world. A programmed machine cannot sit with an elderly gentleman struggling to breathe or help someone leave his or her life with grace and peace. But what exactly is caring?

Like love or faith, it seems that we can all recognize caring when we see it or experience it, but in defining it we need to pause and reflect on its true meaning. I have chosen to separate caring into two dimensions, both of which I feel are important for our students to incorporate into their nursing practice. The first is "caring for," the easier of the two. Nurses, as caregivers, convey the benefits of medical technology by administering treatments and medications accurately, by gathering clinical signs and symptoms and documenting progress, or the lack of it. Nurses exercise skills that restore health, prevent disease, and provide comfort. I think we would all agree that administering chemotherapy, vaccinating children, assessing vital signs and monitoring a mother and her fetus in labor are concrete, valuable skills that serve the greater good. But if caring were simply "caring for," limited to a set of skills learned to perfection, it might not be so elusive to pin down and define.

[1]Hertz, J. et al (2000) Linking the NCLEX-RN® National Licensure Examination to practice: 1999 practice analysis of newly licensed registered nurses in the U.S. Chicago: National Council of State Boards of Nursing

Caring is a universal phenomenon that influences the ways in which people think, feel and behave in relation to one another. It describes a wide range of involvement, from parental love to friendship, from caring for one's work to caring for one's pet, to caring for and about one's clients (patients). This brings us to the second dimension of caring, caring about, an ability that is as difficult to teach, as it is to judge because affective qualities and experiences, unlike actions, cannot be objectively evaluated. Caring about involves actions and behaviors that express concern for the personal well-being of a patient, such as sensitivity, comforting, attentive listening, honesty, advocacy and support. Caring about is profoundly relational. The nurse and the client enter into a relationship that is much more than one person simply "doing tasks" for another. There is mutual give and take that develops as the nurse and client begin to know and care for one another. An interconnectedness forms between the one cared for and about and the one caring. Both the nurse and the client are influenced through the transaction, for better or worse. Caring about one's patients is interpreted by many as being a moral imperative, which provides the stance from which one intervenes as a nurse. The ability to provide presence, to be with another person in a way that acknowledges one's shared humanity, is at the core of nursing as a caring practice. Eye contact, body language, voice tone, listening and having a positive and encouraging attitude create an openness and understanding. To care for another individual, one must understand the context of the person's life and illness. Caring is at its core, raw, deep and personal, because empathy, compassion and mobilizing hope for our clients, transcends the limits of everyday openness and allows access to the higher human spirit. For our students to be truly prepared to practice professional nursing at the end of the program, they must, at the very least, be as competent in "caring about," as they are in "caring for."

I began teaching at BMCC just two weeks before 9/11. The excruciating pain that the terrorist attack brought to our campus and to our city has given way to a sad acceptance that our lives have changed forever and that fear of violent mass death and destruction is no longer a foreign problem. And, because our survival as a people and as a community depends on being prepared for the worst that humans can inflict on their own kind, we have been forced to give names and shapes to these terrifying dangers and to bring them into the classroom. We have begun to incorporate the elements of disaster nursing into our curriculum. Our students must have the skills to triage mass casualties as dispassionately as any battlefield commander. They must be able to rapidly assess physical injury and psychological response in the victims of mass trauma and to intervene with basic therapeutic care. They may have to decide how we can best distribute finite medical and nursing care to hundreds or perhaps thousands of injured and dying people. The student nurses may have to decide which of the victims is likely to survive and whom to make comfortable while he or she awaits death. As health care workers, nurses must be able to recognize the general signs and symptoms of exposure to chemical, radiological, nuclear and explosive agents. In my usually happy subject of Maternal and Newborn Nursing, I must prepare my students for emergency childbirth. I wish this were just in case they were on their way to school one evening and a fellow passenger on the *E* train went into labor at Canal Street! While that's certainly possible, I know that traumatic events like the WTC disaster often trigger labor in women at term. Life struggles to survive even in the midst of death, and our students must know how to protect it.

I attended a professional conference not long ago, where the guest speakers were two Israeli nurses who worked in the Intensive Care Unit of a major trauma center in Tel Aviv. Almost every day brings them the casualties of the horrific violence convulsing the Middle East. Occasionally, the person who perpetrated a bombing survives and arrives by ambulance alongside his or her victims. Can one look at innocent civilians, often children, who are maimed or dying from a car or suicide bombing and not feel rage toward the person who committed this senseless act? Can that same nurse then turn and give equally skillful and compassionate care to the young man or woman lying on the stretcher next to that bloodied child or young mother knowing that he or she willfully created this destruction? The Israeli nurses said that they had learned how to sepa-

rate their personal and professional feelings not simply in order to do what is morally right toward another human being, but to protect themselves from the anguish around them. Perhaps it is the human face of these hate-filled fanatics that terrifies us the most. Given another set of circumstances, they could be us or we might be them. The staff had learned how to care for these patients' physical injuries without discrimination, but found that they did not care about them. Not surprisingly, they also felt that their choice, while understandable, cost them something spiritually on a human level. The morality of setting aside one's beliefs and denying presence and compassion to a patient who, given the opportunity, would try to kill us is not a choice of conscience that I have ever personally had to make. (I would not be so arrogant as to judge these nurses or anyone else in this regard.) Once would be hard enough; however, to make that decision on a daily basis would be excruciating.

This brings me back to our students who now have to learn the symptoms of diseases like smallpox and bubonic plague, scourges that few physicians and nurses working today have ever seen and that, not long ago, we had congratulated ourselves for eliminating from our world. They need to be able to recognize those who might be the first victims of a deliberately released biological toxin in our environment. Sadly, our students will graduate into a world where the old enemies of hunger, poverty, disease and ignorance have made room for a new demon, unpredictable violence carried out on a potentially massive scale in order to intimidate societies and control the course of human events. Somehow, we must teach compassion for all in an age of terrorist hotlines and radiation-sniffing dogs, in a time when we ride home in the evening with the National Guard on our trains. Difficult as it is, we must teach our students to care about the humanity of people whose beliefs put them in direct conflict with our own and who seem to hate us so vehemently. What if one of these people is their patient? Will they be able to care for but not care about the person behind the ideology?

Caring and compassion are best taught by example. As faculty, we must be willing to demonstrate openness and empathy first to our students, and then to the patients we assign to them. We help students to assist family members to become active participants in a client's care. We demonstrate the use of touch and skillful and gentle performance of nursing care procedures. We help them to analyze their own body language and tone of voice, and to listen to what the client has to say with full attention and interest. We help our students and their patients to find an interpretation or understanding of illness, symptoms or emotions that is acceptable to both and which may involve a transpersonal aspect such as God or a higher power. Finally, we help them to utilize their knowledge and nursing skills, by demonstration and verbalization, in direct or indirect nurturant activities, processes and decisions that assist people in ways that are empathetic, compassionate and supportive, and that are dependent on the needs, problems and values of the individual being assisted. In short, we must not only train our students in the skill of caring for, we must show them the gifts of caring about.

Caring, in each of its dimensions, has been a part of the nursing discipline since its beginning and has been studied from a variety of philosophical and ethical perspectives at least since the time of Florence Knightingale. For many nurses, being able to assist individuals during a time of need is the reason for entering the profession. Human beings have great resilience in the face of seemingly overwhelming circumstances. The profession of nursing, unlike medicine, can care and assist people without medical diagnoses or new technologies and treatments. Caring is a motivating force for people to become nurses and it becomes the source of satisfaction when nurses know they have made a difference in their clients' lives. The task for our students, as for all of us, is to prepare themselves for the new realities of our world without losing their humanity in the process, without losing their compassion for one another and for those they pledge to serve. It is not an easy agenda.

The Eminent Mother's Cycle & Symbolic Interaction: A Paradigm for Counseling the Single Mother College Student

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Counseling Center

Breadth

The role for single mothers has dynamically expanded in American society and it is appropriate to promote a common thread of positive connotations when discussing this group. This population is increasingly prominent throughout the CUNY system, and fairly saturates the BMCC student body. Single mothers seek intervention from the counseling department for various academic and/or personal challenges. Studies on human behavior note the resilience of these women, due to their ability to multi-task roles of working, bearing children, and attending college. Historically, society has not been kind to single mothers and have viewed their unplanned pregnancies with subtle, and sometimes not-so-subtle, disdain. Socially, the behaviors of these women have altered the family- life cycle stage of coupling and marriage and they have created a new phase in family life. These college students are demonstrate that they are fit to survive. After researching a number of the single mothers who are part of the CUNY system, it seemed vital to create a phase that would continue to validate their existence in the realm of the family life cycle. The new phase that I coined for this group is termed the eminent mother's cycle (EMC). EMC should be considered an international phase within the family life cycle in relation to women who meet the criteria of the term. It is defined as single mothers who are obtaining, or who may have attained college education, or higher, are employed, and who are not involved in cohabiting relationships. EMC is more of a transitional phase (though no doubt a permanent one in some instances) that is used to identify these women. They are eminent in their roles and dedicated to building a solid foundation for themselves and their families because being a mother is more important to these women than being married, at least at this time in their life.

Most important, when one is confronted with many roles and has few or no support systems available for survival, other elements such as confusion, depression, and child neglect become prevalent. A healthy level of self-esteem is vital for the academic success of these mothers. From a classical perspective, symbolic interaction theory implies that individuals should be educated on various role expectations. So, when these mothers are educated on what is expected for parenthood and academia, they encounter less behavior strain and/or conflict for the specified role. Also, by educating these mothers on strategies for managing family life, academics, and work, a healthy level of self-esteem and academic success can be achieved. As educators, we know that low self-esteem is a detrimental factor for any type of success. The National Association for Self-Esteem (NASE) defines a healthy level of self-esteem as "one's overall sense of self-competence and self-worth. Self-competence is a generalized sense of one's own efficacy or ability to deal effectively with life's challenges and to attain challenging goals" (Malhi, 2003, p. 4). Therefore, the higher education arena is foremost for ensuring that these women receive the essential components for their academic success which will later evolve into societal change of how they are perceived.

Depth

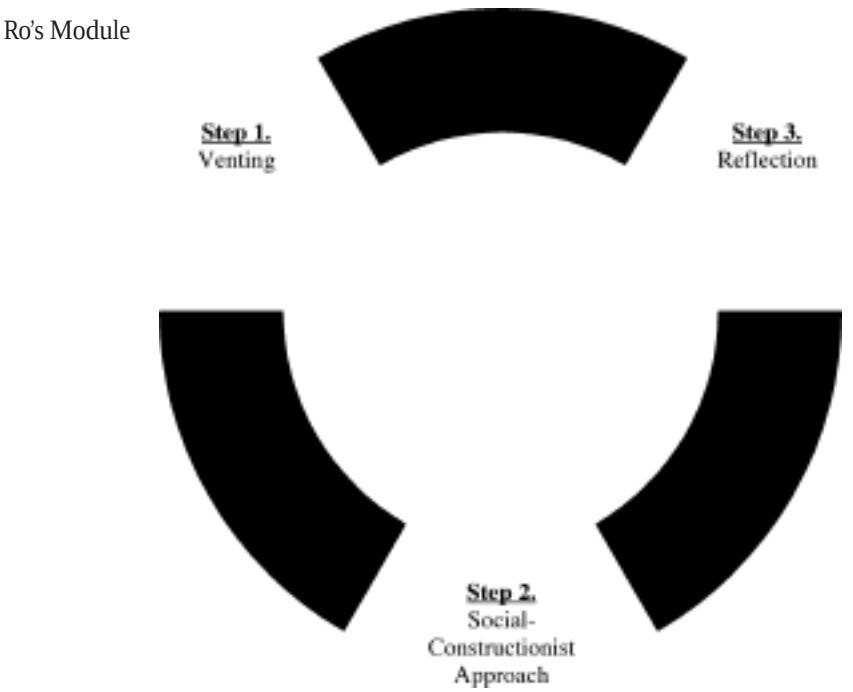
There have been many intervention programs that assist the working single mother in the realm of education and childcare services. BMCC can be viewed as one of many organizational pioneers assisting this group. As a higher educational institution, BMCC has created a flexible environment for learning, identified in the evening/weekend college program as well as the professional childcare services that are provided for many of the students' children. These professional childcare facilities are recognized in at least 14 CUNY colleges. Although, they are not designated for single mothers

only, they are conducive for the family, which is a contemporary viable practice for colleges and universities. Although these programs are in existence, there is limited availability for students. The students that I interviewed (whose children were not in the professional childcare facility that CUNY offers) expressed a need for emergency childcare services when their extended family or childcare service provider was unavailable, resulting in reduced attendance conflicts at school.

Application

My background in therapy has led me to the philosophy that counseling in higher education is a safety net procedure which entails student behavior modification. The Department of Counseling is a valuable asset for students to become educated on positive mental health practices, which will help them to better balance their academic loads along with their personal issues. Counseling is a non-judgmental process that accepts the students for who they are and allows them to express their realities, as well as become cognizant of their own behaviors, and the impact of those behaviors on their environment. It is my belief that faculty counselors assist with fostering concentration skills by using eclectic counseling strategies to reduce temperamental experiences in moderation while keeping the student grounded academically. Teaching faculty and professional staff in the CUNY system could assist these women by referring them to the counseling department, if/when students report that they are having family and/or personal problems, which is a practice facilitated by CUNY staff. There is no need for faculty and/or other professional staff to probe students to assess if they are single mothers because we assist students from diverse backgrounds. Also, probing may result in a student having feelings of inadequacy because of the historical aspects connoted to single motherhood and/or unplanned pregnancies. Figure 1 is a paradigm that I created for counselors working with students who are part of the eminent mother's cycle. It is presented as a three-step process and entitled Ro's Module. This module is based on brief therapy and incorporates a family systems (circular) approach. Brief therapy usually consists of several counseling sessions and the family systems approach works with all family members, so if the child is present the counselor should interact with the child to reduce parent/child relationship stress.

Figure 1. Counseling the Single Mother College Student



Step 1. Venting

This process allows the student to explore her concerns. The student may be overwhelmed with parenting responsibilities. Some identifiable stressors are financial hardship, depression, overwhelming responsibilities, time management, childcare concerns, and housing resources. If her child is present, it is recommended that the counselor ask the child how he/she feels about what the mother is expressing. This is done because the child is absorbing all of the information and processing it, so it is important for his/her feelings and thoughts to be heard as well. At this point, it is necessary to listen to what the student is saying and not intervene with a quick remedy to resolve the problem.

Step 2. Social-constructionist approach

During this process the student should begin to identify ways of solving the problem from concepts already known. If the student is unable to do so, then the counselor should offer different possible ways of solving the problem. The student must have options and should not be presented with a single problem solving approach. The student should write out goals and keep them as a reference. Wiley publishers have a host of brief therapy homework assignments that could be used. It is important for counselors to go over the homework sheet before issuing it to the student, and more so, to review the sheet after the student completes it. A one-week scheduled appointment should be given to the student for follow-up.

Step 3. Reflections

During this process, the student discusses what has happened since the last meeting and the steps that where taken from the delineated goals made with the counselor. The counselor probes how her child was affected by the changes (or asks the child if he/she is present). The counselor should praise the student for any milestones achieved and discuss any revisions to goals. The counselor should also determine further follow-up.

References

Erickson, M. (1998). Re-visioning the family life cycle theory and paradigm in marriage and family therapy. *The American Journal of Family Therapy,* 26, 341–355.

Klein, D. & White, J. (1996). *Family Theories.* CA: Sage Publications.

Malhi, S.R. (2003). Self Esteem and Peak Performance at Work. *The National Association of Self Esteem, 12, (3) 4–8.*

Why Romeo and Juliet are Wrong

Rolando Jorif
English

When I teach *Romeo and Juliet*, I notice that the students tend to side with the lovers. I have witnessed this reaction even among my fellow graduate students. I also remember that, in the Sixties, Zeffirelli's film based on the play was a hit with the young. They saw in it evidence of the validity of their rejection of authority. I admit that, until a few years ago, the logic of the lover's suicides always escaped me. Then, when Professor William Elton refused to add the play to a course on Shakespeare's tragedies, I understood what had always bothered me. He said that the play was merely a melodrama that taught, "Do what Mummy and Daddy tell you."

Shakespeare's tragic heroes do not quite follow Aristotle's rules in the *Poetics*, especially the one about how tragedy should imitate people who are better than the ordinary man (686). Often, Shakesspeare's heroes take on more than they can really manage because they try to adapt themselves to an idea of life. Some take rueful action. Some neglect responsibility. Because of their arrogant disregard for the situation in which they find themselves, their attempts at heroism fail. For Shakespeare, a life lived with a sure eye for the practical and secure way brings contentment. A rashly conducted existence fails.

In an interview with Charlie Rose (WNET 13, 1 December 2004, 11:00P.M.), Stephen Greenblatt emphasized the degree to which Shakespeare never risked much in his own life. The playwright was a literary and financial success by being shrewdly pragmatic in a dangerous time. The early deaths of several of Shakespeare's talented contemporaries taught him that misfortune resulted from egotistical self-deception. The ordinary life was worth living.

For instance, the plays seem to teach that our troubles stem from our own failings (JC 1.2.140-141). They stress humility. Hamlet plainly instructs his ambitious uncle, "Your fat king and your lean beggar is but variable service—two dishes, but to one table" (Ham.4.3.23–25).

Indeed, Shakespeare and his public knew the price of things must be paid at cost. They would have understood that simple family life controlled everyone. Even Henry VIII's failed marriages risked everything because his vagaries set the scene for his heirs' difficulties in securing the throne. For the playwright, responsibility gets the last word.

I argue that the two lovers in *Romeo and Juliet* are examples of uninstructed folly. Like the unreformed Prince Hal, they are dreaming and need to awake to real life (2H4 5.5.49–51). At the play's end, the audience needs to see this transformation happen. Instead, the lovers persist in error by choosing to sleep on.

Their insisting on doing what they know to be true to themselves appeals to young audiences because it devalues authority. However, for Shakespeare, in a dangerous, controlling world, authority matters. So, although we may want youthful ardor to succeed, experience tells that in the circumstances and conventions the playwright delineates, the lovers are doomed.

According to Aristotle, the audience's desire to see error corrected is inconsistent with tragedy. The dominance of plot in a play relegates it to comedy because of the frenetic search for a happy resolution "where the bitterest enemies ... walk off good friends at the end" (Aristotle 682). Indeed, in Romeo and Juliet, the audience's knowledge that the lovers create a ridiculously impossible situation for themselves marks the play as being primarily comic (689).

Shakespeare's source for the play (a poem by Arthur Brooke) comes from an Italian text. Brooke's success created a vogue for Boccaccio's Decameron and the works of other romancers (Hankins 17) which often contain the elements of Italian popular theater that appear in the commedia dell'arte (Pugliese 69). That tradition allows for "improvisation, the partial use of masks, the use of lazzi, or comic tricks, and a plot outline that normally revolve[s] around the theme of love" (Pugliese 70). Marriage could be a romance's crowning moment. So, the commedia dell'arte offers marriage to its distressed lovers (49). Typically, Renaissance drama would use marriage to affirm a renewed society (48).

In *Romeo and Juliet*, Shakespeare indicates his play's reliance on the commedia dell'arte by its beginning with the lazzi of the feuding servants and by its masked ball. The traditional use of masks to designate types and stock figures produces characters that "create their own being in the course of events." The masks liberate the actors to invent an emotionally unpredictable course when faced with the plot's demands for action (Pugliese 71). Similarly, masks refer to carnival, which is a period of activity when society postpones the consequences of action. Thereby, the performances acquire a festive nature, becoming games "whose rules and conventions [are] known in advance, and in which the audience [is] expected to participate with knowing and amused attention" (Stewart 199) (Rom.1.4.39, 1.5.119).

Both Romeo and Juliet, as lovers, take on the privileges of the mask, especially initially. Nevertheless, even during festival, there are rules. For this reason, the Nurse interrupts the lovers' first meeting (1.5.111) and there are always other calls to order. Even Mercutio's usually bowdlerized joke about Romeo's determined pursuit of romance is a warning of sorts (2.1.33–38).

The opposing of the fulfillment of sexual desire to romance's chaste conventions forms the argument of the balcony scene. Just as Romeo counters Mercutio's obscenity with a lover's cliché (2.2.1), Juliet attempts to fit her sexual awakening to Petrarchian sonnet conventions. However, she only succeeds at a naïve housewifery when she catalogues her suitor's parts in the hope of making use of him (2.2.38–49). When the Nurse interrupts the love-making, the adolescents can no longer sustain their attempt at courtliness. Romeo's frank confession of desire (2.2.125) prompts Juliet's demand that he marry her to prove himself. Of course, she wants sex, but safely. Because the audience is aware of the true purpose of the young lovers' desperate improvisations, the scene is comic.

Here then the disorderly, unstructured reality of adolescence subverts the romantic sonnet conventions that the lovers appropriate. Moreover, we now see that the play must continue on without the authority of the commedia dell'arte. The disruption appears mainly by means of the lovers' early, secret marriage. It obviates the sonnet tradition of the longed-for, unobtainable lover and comedy's claim to a final, happy resolution of the antic by marriage. Nevertheless, in the play, Juliet is determined to do everything wrong "by the book" (1.5.110).

The girl's rebellion emerges in her response to Romeo's appeals for physical contact. She warns that she would destroy him (2.2.184). Similarly, although Juliet accepts that Romeo risks his life by entering the garden, she invites him to return to her again. Romeo's bravado and Juliet's own exaggerated sense of the power of her love permit comedy to reign.

Ultimately, both the Nurse and the Friar offer antithetical voices to the charming duet of youthful self-assertion. Both elders remind their wards that the time for play is over (3.5.214–227, 3.3.108–158). Yet, the lovers play on.

This refusal to accept consequences acerbates the initial error of Romeo's intrusion into the Capulet's lives. Finally, in this play, Shakespeare's version of tragedy builds on the comic possibilities of what happens to a Romeo faced with the eternal feminine.

The play's end also takes on the dictates of the comic because it calls for a marriage that makes all things right. Previously because the lovers' marriage remained a secret, it never received the blessing of society. However, by the lovers' unfortunate deaths, Romeo and Juliet unite their families. They solve the difficulty that they found excitingly intriguing. All play is done: è finita la festa!

I recommend that, when teaching Romeo and Juliet, instructors keep in mind that Shakespeare wrote great plays for a specific audience that would have known the conventions he relied on. It would have had knowledge of the references he made, and it would have appreciated his challenges to its sensibilities. The instructor should rediscover these parameters for the students. They will then learn what the plays are really about by seeing them reborn anew as if Shakespeare wrote them the night before class.

A fault in teaching Shakespeare is that attempts are made to make him fresh so that stu-

dents can understand him. However, the playwright's work persists in effectiveness because his conventions and judgments are also stills ours. We just have to learn to listen to him and not pay attention to the legends that spoil the productions of the plays. Romeo and Juliet are wrong and Shakespeare clearly says so.

References

Aristotle. *Introduction to Aristotle.* Ed. Richard McKeon. New York: Modern Library Press, 1992.

Hankins, John E. Introduction. *Romeo and Juliet* by William Shakespeare. New York: Penguin Books, 1988. 14–23.

Pietropaolo, Domenico, ed. *The Science of Buffoonery: Theory and History of the Commedia dell'Arte.* Toronto: University of Toronto, 1989.

All references to Shakespeare's plays are from *The Riverside Shakespeare.*2nd ed. Boston: Houghton Mifflin Co., 1997.

Another Semester

Yeghia Aslanian
Developmental Skills

Another semester is under way at BMCC and, as teachers, we are asking ourselves, "What should I do differently this semester to make my teaching more effective?" It's a question we ask ourselves because we are genuinely interested in effecting favorable change in our way of teaching. The philosopher Charles Sanders Peirce (quoted in Stephens, D., et al., 1999–2000), believes that the actions of individuals are based on and driven by their beliefs. There are four ways, he elaborates, by which we arrive at certain beliefs in our lives:

1. Believing what one wants to believe (tenacity).
2. Believing what someone else has said is true (authority).
3. Believing what one always has and which seems reasonable (a priori).
4. Believing what one has tested out through investigation (scientific method, or method of experience).

Most of us might have beliefs in all the four categories above. Quite understandably, we tenaciously believe in a certain way of doing things in class and we never let go of it; we sometimes follow a certain path because we feel comfortable following in an authority's footsteps and any shift of paradigm throws us off balance; we often plan what we want to do and even predict outcomes in the classroom regardless of the actual situation; and occasionally we convince ourselves to look into new ideas and new approaches. Most probably, we would all agree that coming to a belief or conviction as a result of exploration and openness is the most lasting and cogent approach. I believe that good teachers are good learners and once we stop learning, our teaching suffers somehow.

As I have grappled with these ideas myself and as I have tried to reflect honestly on my own teaching (over twenty years at BMCC and fifteen years elsewhere), I have come to certain conclusions based on my readings and my classroom experience. Speaking of experience, I always fondly remember a colleague's comment years ago on teaching experience. If somebody claimed that he was a "good" teacher because he had taught for 30 years, this colleague would respond that it is one year's experience thirty times over! I do not, however, believe that we would want to think of ourselves as having gotten stuck in a rut and in a maze of conventions from which we cannot extricate ourselves. I tend to be more positive than that. I want to believe that with each year's experience we gain new insights into our own professional lives and teaching. My assumption is that we have chosen to be teachers because we want to make a difference in our students' lives and in the life of our community.

In what follows, I will summarize (not in any particular order of priority) some of my own thinking about successful teaching and certain characteristics of effective teachers. I will also touch on some of the research conclusions with regard to effective teaching published in the latest professional journals and elaborate on some of the current thinking in the field. I am firmly convinced that it is only through reading, reflecting, experiencing and sharing that we can open up new "windows" onto the goings-on in the public forum that is the classroom.

The first characteristic of an effective teacher, in my judgment, is having a sense of *curiosity*, curiosity in research, in what works and what doesn't work. The meaning of curiosity according to *Webster's Third New International Dictionary* is: the desire to know, the desire to investigate, the interest leading to inquiry. A curious teacher always probes and asks questions, looks for novelty and challenges preconceived notions. If, for example, a student rarely participates in class activities and hardly ever interacts with peers, a curious teacher would demonstrate a sense of inquisitiveness; the next thing you would want to do is to have a chat with the student outside class and find a way of inviting him or her into the classroom world. Just imagine how little Alice would have gained if she hadn't asked all those questions while she was residing in the wonderland.

Another indispensable quality of a teacher is *enthusiasm*, not the phony *enthusiasm* that Hamlet's actors initially demonstrated in the play within the play by ("sawing the air"), but a genuine enthusiasm with which we "suit the action to the word, the word to the action." Not long ago, I was at a teachers' meeting and the coordinator of the program was standing in front of the group like a fixed statue and was reading, in a barely audible voice, a list of behaviors and attitudes that teachers need to display in the classroom to make teaching effective. One of the items on the list was enthusiasm. But the irony was that this person showed not the least bit of excitement or liveliness in the entire duration of his presentation; he was afraid of moving away from the desk or smiling or lightening up. The dictionary definition of the word enthusiasm is: inspiration, state of impassioned emotion, strong excitement of feeling on behalf of a cause or a subject. Every journal on teaching and teacher effectiveness lists this characteristic as a necessary condition for teaching and learning—I guess, simply because enthusiasm is contagious; when the teacher is enthusiastic, the students receive the lesson enthusiastically and get fired up beyond the classroom. Albert Einstein said this about teachers: "It is the supreme art of the teacher to waken joy in creating expression and knowledge" (*The International Education Quotations Encyclopedia*, 1995).

Humor comes to mind as another sine qua non of effective teaching. Occasional laughter in the classroom somehow reenergizes the class and helps the students get rid of stress and shyness. If students don't get a good laugh once in while, chances are they will find their own ways of distracting themselves, which might be too disruptive for learning. Here I want to believe that we are all capable of being humorous at times and as teachers, as well as "actors," we find a relaxed atmosphere more conducive to teaching and learning than an overly serious environment. I also believe that humor, as an icebreaker, bridges the gap between the teacher and the students and puts them on a more favorable plane.

The next two qualities of good teaching are the teacher's sense of *awareness* of what and how every student is doing in class, and *flexibility* in planning and executing learning tasks. Successful teachers, according to educational literature, know how to create effective learning environments and use teaching techniques that maximize students' time on task and minimize frustration. Careful planning of the lessons and sequencing the skills required for the course are the basis of favorable outcomes. Berliner (1986) looks at novice and expert teachers and concludes: "...novices held literal views of objects and events, whereas experts made inferences about objects and events." He then goes on to say that "experts used higher order systems of categorization to analyze problems; they were extraordinarily fast and accurate at recognizing events that took place in the classroom; they were sensitive to the task demands, and they were opportunistic planners who changed plans quickly when lessons did not move at a productive pace." I particularly like the last point, namely, that expert teachers are not afraid of changing horses in midstream, so to speak; they gauge the efficacy of every activity they do in class and if they do not get the desired result, if they see the students are tuning out because the material is too easy or too difficult, they quickly revise their plan. I call that dynamic teaching. Sometimes when I do peer-observations, I notice that some teachers stick to their plans vigorously and rigorously regardless of student response (remember tenacity or a priori, above?). My hunch is that they are either unaware of student reaction or they are afraid of changing course. Much educational research seems to indicate that effective teachers sometimes teach beyond method and curriculum, but they always plan ahead. In my opinion, successful teaching is a result of being up-to-date in the field, freedom of thinking, flexibility in teaching approaches and acute awareness of performance.

One of my other favorite hallmarks of an effective teacher is *versatility* (the ability to adapt to or embrace a variety of subjects, fields or skills) and the willingness to venture into new territories and new things. As a teacher of English as a second language, I get a kick out of reading in areas outside my field. I try to read about issues in areas that I am least familiar with (science or a new language, for example). This activity puts me on a different plane of intellectual involvement. I learn humility and patience. I learn that learning requires good models and tons of practice. I learn

that when the mind gets challenged, it looks for new and more effective solutions—and I can then bring all these "lessons" into the classroom and share them with my students. Included in this package of effective characteristics is undeniably the ability to strike a healthy *balance* between teacher talk and student talk and engagement in learning activities. According to much theory and research, novice and expert teachers punctuate their class time differently. This is particularly visible with regard to teacher talk as opposed to student talk. Teaching by definition is a word-dominated profession. We use words to convey ideas and to impart knowledge as well as to learn. The problem arises when the amount of talking done by the teacher far exceeds that of the students—most of the time. We do not want anybody to tell us that student involvement in the process of learning is crucial for knowledge acquisition. Obviously, the more the teachers talk, the less opportunity the students get to discuss, debate, and learn. In my observations I have come across teachers who tend to dominate the classroom arena, which inevitably reduces, even suppresses, student talk. Teachers are defined with various labels, but the word that I think defines an effective teacher is the word "facilitator." Lecturing occasionally can do some good, but lecturing ad nauseam can do more harm than good; once the students doze off, they won't hear anything. If we are seeking dynamic teaching, then students have to be major role players in the classroom, not merely spectators. Besides, effective instruction takes place when teachers individualize their interactions with students. Also, there is the notion that knowing how much to talk and when to be silent for students to reflect and rehearse can go a long way in lowering the anxiety levels in the class.

At the close of this essay, it is certainly worth mentioning Howard Gardner's conception of "*multiple intelligences*." Howard Gardner is a cognitive psychologist and neurologist at the Harvard Graduate School of Education. In his seminal work *Frames of Mind* (1983), he established a theory that suggests that humans have a unique blend of intelligences. So far he has come up with eight: linguistic intelligence, logical-mathematical intelligence, musical intelligence, spatial intelligence, bodily-kinesthetic intelligence, intrapersonal intelligence, interpersonal intelligence and naturalist intelligence. Teachers need to foster at least two of these intelligences: the *intrapersonal intelligence* and *interpersonal intelligence*. The former means "the abilities to distinguish and discriminate among one's own feelings, to compose mental models, and to draw upon self-knowledge to guide one's behavior." And the latter means "the ability to recognize and distinguish among feelings and intentions of self and others and to discern and be sensitive to the needs, moods, and feelings of others." The implication for teaching is that a variety of learning tasks through various modalities and media is arguably more conducive to learning than a single approach through a single medium.

Although I am aware that we could go on and on describing good teaching, I have to come to a conclusion by going back to Lewis Carroll's *Alice's Adventures in Wonderland*. At some point in the story, Alice comes across a Caterpillar sitting on a round mushroom smoking a hookah. The Caterpillar mentions to her that one side of the mushroom will make her small and the other side will make her tall. In total puzzlement, Alice stretches her arms around the large mushroom and breaks a piece off from each side and takes them along with her. After some painful experimentation, she learns which piece does what. As she goes on with her explorations in the wonderland, she runs into big doors and small doors and has to adjust herself accordingly. With the magic power of adaptation in her hands, she is able to enter beautiful gardens and visit wonderful things. In like manner, I would argue, as teachers, we need to be equipped with the power of curiosity, knowledge, versatility and flexibility derived from the "intellectual mushroom," as it were. It is only then that we can feel passionate about our teaching. Let's not forget that teaching is a fluid art, not a rigid one. It flows with the current but is rooted in sound theory and practice; and a teacher must be always ready to seek novelty and fresh breeze in his or her teaching.

References

Berliner, D. (1986). In pursuit of expert pedagogue.. *Educational Researcher*, 15, 5–13.

Carroll, L. *Alice's Adventures in Wonderland.* (INCOMPLETE INFO)

Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Encyclopedia of Educational Research (6th ed., Vol. 4).

Shakespeare, W. *Hamlet.*

Solomon, B, Powell, K., and Gardner, H. Multiple intelligences. *Encyclopedia of Creativity*, Vol. 2, p. 276.

Stephens, D., Boldt, G., Clark, C., Gaffney, J., Shelton, J., Story, J., & Weinzierl, J.
(2000). Learning (about learning) from four teachers. *Research in the Teaching of English, 34(*4), 532–565.

Ex-Education: Privatization, Commercialization, and Pedagogy

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Conventional wisdom holds that the increased integration of technology and education is a positive development: the use of technology can and should revolutionize the so-called "chalk and talk", a pedagogical method depicting students as passive receivers (or ignorers) of information handed down to them by a "sage on the stage". Despite the simplistic nature of this view, it has been the basis of a wealth of criticism against "traditional education." As a result, institutions are paying increased attention to on-line education and its future potential. Most colleges and universities now offer on-line courses as alternatives to the in-class variety, and corporate-run, for-profit universities offering most or all of their courses electronically have blossomed. Given the increasing ubiquity of such courses and institutions, it is necessary to ask how these developments will impact the medium to long term future of traditional colleges and universities. How will the role of educator change? How will education itself be affected?

Neither technology nor the Internet is itself detrimental to education. On the contrary, similar to the advent of moveable type, the development of the Internet has broadened access to information—cheaply, instantaneously, and on a massive scale. Moreover, those unable to participate in collegiate life for one reason or another should not be denied access to knowledge. The issue at hand, rather, is the technologization of pedagogy and the possible death of education as we know it.

Virtual Education

The University of Phoenix, a for-profit institution of higher learning, is representative of its category in its description of the benefits of on-line education. According to both its website and print brochure, its "concentrated curriculum lets you earn your degree years before you could at other universities—without interrupting your job or personal life." In addition, students "[g]ain current real-world experience." All classes are available entirely on-line, with asynchronous interaction with instructors and classmates. Capella University, another for-profit institution that offers all of its courses on-line, emphasizes its new approach to education. According to their website, "[o]ur graduates experience career success, through more effective teaching practices." Indeed, at the top of their home page is the slogan: "Education Reborn."SM The benefits of on-line versus traditional education are echoed in virtually all for-profit educational institutions offering on-line courses: the opportunity to earn a degree in months, not years; the convenience of on-line learning; the promise of career advancement once completed; and the opportunity to gain "real-world" experience from instructors, themselves "industry leaders."[1] The impression these institutions give is that traditional classroom education is becoming a thing of the past, a backward, old-school approach.

Information, Knowledge, and Education

Michel Foucault, among others, has reminded us that knowledge is power. How much less meaningful and interesting is the statement "information is power"? Information is distinct from knowledge, just as both are distinct from education. Information in and of itself is merely the existence of data on any particular subject. A car manual imparts information as much as a textbook on American government. Knowledge, on the other hand, may be described as the internalization of and ability to use such information. A mechanic possesses knowledge of cars, a reader of a textbook possesses knowledge of Americans' voting patterns. This process, the transference of information to knowledge, also has a name. It's called "training." "Education." on the other hand, refers to a

[1]For example, see http://www.u-of-phoenix.com/faq.php, http://www.careercollegeonline.com/home.jsp, http://www.capelladegrees.com/, http://www.aiudegreesonline.com, http://www.careerbuilder.com.

very different process.

Socrates believed that questioning that which we take for granted and thinking critically were the indispensable beginnings of true education. The perennial question of political philosophy—how ought we to live?—finds its origins in this tradition, as does the modern scientific method. One cannot simply be trained either to answer that question or to make a scientific breakthrough. One must be able to think and reason for oneself. Learning to do this is a process that characterizes and defines education. As one who professes knowledge of political science, I consider my top three responsibilities to my students to be more universal and more important than imparting information about American government and political processes. These responsibilities are first, to get students to think (and write) critically; second, to question that which they take for granted; and third, to think for themselves. These are crucially important life skills, regardless of students' career goals. Of course, making students as excited about American government or political philosophy as I am is also a priority, but it is secondary, even as I believe that such enthusiasm is most effectively transmitted by example—live and in person.

This kind of education is not nearly as convenient or speedy as that advertised by the University of Phoenix. But students in my old-school classroom are made to present and defend publicly their ideas to each other, an activity that when done in person forces both the presenter and the detractor to listen with respect and think quickly on their feet to present their views. In an on-line course scenario, student questions and responses have the luxury of being more studied; students are not required to learn to think quickly and on their feet. Moreover, I have found that most students believe that they in fact learn from other students during group discussions that—in the realm of American politics, especially this year—can become fruitfully contentious.

The End of History and the Last Faculty

One aspect of the proliferation of on-line courses not discussed above that is just beginning to receive press coverage is already seen by many educators as the ultimate consequence of this trend: the extinction of the traditional colleges, together with tenured faculty. *The Chronicle of Higher Education* recently featured an article containing perhaps the strongest and most vivid language describing this process. According to Frank Rhodes, president emeritus of Cornell University, "colleges in the digital age are like dinosaurs looking up at the incoming comet."[2] While this quote lends a sense of inevitability to a process of extinction I hope is not yet underway, it succinctly illustrates what is already happening at places like the University of Phoenix.

Salon, a widely read on-line magazine, recently featured an article ominously titled "From Ivory Tower to Academic Sweatshop." One of the main points of the piece is that for-profit, on-line institutions of higher learning consider their paid faculty members as little more than "content experts." What's more, since these institutions reuse each designed course multiple times, they have no reason to tenure faculty, and instead are able to spend their money on network upkeep, administration, and adjunct instructors. Just as technology has historically been used to displace and replace skilled labor in many manufacturing industries, the commercialization of education shifts the balance of power decidedly toward management. Instead of hiring and retaining relatively expensive tenure-track and tenured faculty, educational institutions will increasingly seek to create economies of scale in which such faculty will be substituted "with part-time people who would have no regular employment, sub-contractors and so forth."[3] If entire libraries can be digitized, put on-line, and maintained by system administrators, what's to stop professors from sharing the same fate as librarians? Or, as a librarian at the University of Texas at Austin recently

2 Scott, Carlson and Carnevale, Dan. (2004, October 29). Technology Threatens Colleges with Extinction, Ex-President Warns. *Chronicle of Higher Education*, Vol. 5(10).

3 Alex, Wright. (n.d.). From Ivory Tower to Academic Sweatshops. *Salon.com Technology Web site:* http://www.salon.com/tech/feature/2005/01/26/distance_learning/print.html.

quipped in *The Chronicle*, "we could also hire Indian faculty members to teach our students via distance education, and save even more money."[4]

Whether Peter Drucker's statement that by 2020, "the universities of America, as we have traditionally known them, will be barren wastelands" is correct, or whether physically attending college on a campus becomes once again a mark of the elite, there is more at stake than the survival of the scholar. The art of teaching—and it is an art—will die. Far from revolutionizing education to create a more interactive and vital atmosphere of learning, the technologization of pedagogy and the commercialization of schooling may sound the death knell of education itself.

[4]Dennis, D. (2004, December 10). College Libraries: the Long Goodbye. The Chronicle of Higher Education, p. B5.

Teaching Probability and Statistics in China and the United States: Reflections of a Participant in a Study Abroad Program

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Mathematics

In the summer of 2004 I was privileged to visit China as a participant in the Fulbright Hays Group Project Abroad Program. I was fascinated by the opportunity to see this ancient country with a rich history and culture and excited to learn about Chinese mathematics and mathematics education.

Like all participants in the program, I had to come up with a project that I was expected to implement during the visit. The project I selected was related to the study of probability and statistics and, in particular, common student misconceptions about probability.

My interest in this topic dates back to time immemorial when I was a student at the Pedagogical University in Russia. A roommate of mine who was a prodigious young mathematician took interest in a game called "sport lotto" which was similar to the New York state lottery. The purpose of the game was to guess correctly 6 numbers out of 49.

I noticed that my friend never selected numbers in order like 1, 2, 3, 4, 5, and 6. In response to my asking why he avoided these numbers, he said that winning numbers always look random, and that numbers in order stand no chance of winning.

Further discussion revealed that he believed that collections of numbers that looked random had a greater chance of showing than collections of ordered numbers.

It was not difficult to demonstrate to my friend mathematically that all selections of six numbers were equally likely; nevertheless he still refused to choose numbers in order, even after he was forced to accept that mathematically all combinations are, indeed, equally likely. I realized then that misconceptions about probability are largely psychological in nature, and not simply mathematical. Only years later did I learn that at about the same time my friend and I had our conversation in Leningrad, David Kahneman and Amos Tversky (1973) published their seminal paper on misconceptions regarding probability, and that the misconception held by my friend was described in that paper.

One of the most challenging aspects of teaching statistics is helping students understand concepts of randomness and probability. Research confirmed that students bring many misconceptions about probability to their study of statistics that are difficult to eradicate and that may adversely affect understanding of statistics (del Mas, 2002).

Probability is the study of random events. It plays a critical role in a large number of professions and in most everyday situations (Hirsch et al., 2001). The ability to reason effectively about probability is necessary for many practical concerns such as interpreting weather reports, understanding DNA evidence at trials, the risk of birth defects and insurance rates, among others.

The importance of being able to reason effectively about probability and statistics was recognized by the National Council of Teachers of Mathematics (2000) in the standards for mathematics instruction. They recommend that students be able to reason statistically, as this ability is essential to becoming an informed citizen, employee and consumer. Similar recommendations were made in the Mathematics Objectives 1990 assessment, which pointed out that the ability to interpret numerical information should be regarded as basic skill. Unfortunately, current secondary school curricula are only beginning to incorporate statistical skills and, as a consequence, most students enter college with very little experience with probability and statistics (Hirsch, et al., 2001).

There is an extensive literature on the teaching and learning of probability and statistics in Western countries (see, for example, delMas, R., 2002; Shaughnessy, 1992). Little is known in

the West, however, about how these subjects are taught and learned in different cultural environments, such as China (Li, et al., 2002).

China is developing at a rapid pace. It is making headway in many areas, including mathematics education. As I found out during our visit to China, one of the reasons for their success in education is that they strive to keep abreast of the developments in the West and to incorporate new ideas generated by Western educators into their curricula. I believe that we too could benefit from cross-cultural fertilization adopting some of the productive ideas generated in China. It is with this thought in mind that I planned my activities for the Fulbright trip. I was eager to talk to Chinese college professors to learn about their perspectives on the teaching and learning of probability and statistics, how they address students' misconceptions, to discuss various methodological issues, and observe lessons on this subject. In addition, I wanted to explore opportunities for collaborative research. These objectives were accomplished during the visit of our group to three Chinese cities: Beijing, Hohhot, and Shanghai.

The Beijing Experience

During our stay in Beijing I had an opportunity to investigate the opinion of Chinese professors about various aspects of teaching probability and statistics in China. This was very useful for me because by then I had already conducted a survey on these issues with American professors and thus was in a position to compare the responses. Three professors who participated in our meeting with the Chinese college professors were experts in the field and agreed to respond to a questionnaire and be interviewed. Certainly, a sample of 3 is not enough to quantitatively compare the opinions of Chinese and American professors, but some preliminary observations could be made. Chinese professors seem to agree with their American counterparts that the study of probability and statistics is important to all college students. They also agree with Americans that, like American students, a large number of Chinese college students have misconceptions about probability. This position is consistent with the findings reported by Li (2001) that a large number of Chinese high school students have erroneous conceptions of probability. Since probability had not been part of the Chinese school curriculum up to the most recent years, it is not at all surprising that misconceptions held by high school students do not disappear by the time they get to college. There are also research findings confirming that certain misconceptions about probability in fact become more prevalent with age (Fischbein, et al., 1997).

Also Chinese professors seem to concur with their American colleagues that misconceptions about probability are resistant to change. Among the reasons contributing to the retention of erroneous concepts, Chinese professors emphasize poor coverage of the topic in textbooks, the fact that instructors, in general, do not target student' misconceptions in class, and lack in self-regulatory skills on the part of students.

The most typical misconceptions held by Chinese college students, according to the interviewed professors, are availability, compound approach and 'representativeness'. The second and third of these misconceptions are also quoted by American professors as widely spread in this country. The American professors, however, did not single out availability, as a highly prevalent misconception.Further research is needed to find out why this might be the case. (Interestingly, availability is also not mentioned in the Li study among the most common misconception of Chinese middle and high school students).

Chinese professors seem to be much less optimistic than their American counterparts regarding the opportunities for reducing misconceptions in a typical introductory statistics course. They point to time constraints, and not absence of effective strategies, as the reason for their pessimism.

I asked the Chinese professors what approaches for reducing students' misconceptions about prob-

ability they considered effective. According to them, explaining concepts and typical misconceptions in lecture form is the most effective method. Their opinion is at variance with that expressed by American professors who, on average, rated this method as 'not very effective'. When I asked Chinese professors why they put such a high premium on lecture form, they responded that nothing could be better than a good explanation by a competent teacher. I did not have time during our meeting to pursue this issue further, but it would be interesting to know what theory of knowledge they adhere to.

The Chinese professors indicated 'personal experience' as their main source of information about students' erroneous concepts, while the most common source quoted by American professors who answered my survey was 'whole class discussions'. The reason for this disparity could be that in China statistics is normally taught to very large groups of students and, therefore, there is very little opportunity for whole class discussions or alternative organizational formats. Notably, while homework was quoted as the second most important source of information in China, it is one of the least important for American professors. This discrepancy can be easily explained by the fact that it is common practice for Chinese professors to collect homework regularly, while, to my knowledge, most of the American statistics teachers collect homework only from time to time.

Further research is needed to better understand the position of Chinese professors on various aspects of teaching and learning probability and statistics.

The Hohhot Experience

In Hohhot I had the privilege of meeting two distinguished professors of statistics from the Inner Mongolia Normal University, Professor Zhang Sheng and Professor Siriguleng. The meeting was arranged by professor Zhang upon my initiative. The purpose of the meeting was to discuss and compare teaching methods, as well as to explore opportunities for collaborative research.

Our meeting took place in the departmental conference room. First, I asked the professors to provide general information about the teaching of probability and statistics in their University. Professor Zhang informed me that there are two different levels of statistics courses, one for mathematics majors, and another for science majors. Students who major in science have 50 academic hours allocated to the study of probability alone. Students who major in mathematics have 120 hours allocated for both probability and statistics. The number of hours devoted to probability in this case is left to the discretion of the instructor.

Professor Siriguleng pointed out that the average class size is about 80 students, but sometimes there are more than 100 students in one section of statistics. He also told me that the principal form of instruction is the lecture form. At the end of each lecture students are given homework. It is common practice for the professors in this university to collect homework, correct it and return it to the students with instructors' comments during the following class meeting. If the number of students in a class is very large, they collect homework from half of the students on one day of the week and from the other half on another day.

Since the focus of my project was to investigate approaches and strategies for reducing students' misconceptions of probability, I asked the professors whether they believed reducing misconceptions in this area was important and, upon receiving an affirmative answer, I asked them how they addressed the problem. The professors responded that while correcting students' homework they tried to observe patterns in errors. If a large number of students made an error in a problem, they would discuss the problem during the following class meeting and provide the correct solution and answer. I asked the professors if they employed small group discussions in their classrooms as a vehicle for triggering cognitive conflict and bringing out students' misconceptions. They said they were familiar with this approach, held it in high regard, but did not employ it because, in their opinion, it would be impractical in a large classroom.

My next question was about their method of addressing some specific misconceptions of

probability. Upon providing detailed explanations, the professors asked me about my experience regarding these problems. I shared with them what I learned from the literature, as well as my own research and personal experience.

After that I informed the professors about the purpose of my project and described the design of the study I was planning. Both the professors received my presentation favorably. I asked professor Zhang and Professor Siriguleng if they might be interested in participating in a teaching experiment aimed at comparing different approaches for resolving three typical misconceptions: represenativeness, outcome orientation and equiprobability bias. Professor Siriguleng enthusiastically agreed to participate in the experiment. Professor Zhang said that he too would like to participate, but that he was not scheduled to teach introductory statistics in 2004.

We moved on to discuss some details of Professor Seriguleng's participation. The first step would be to obtain a translation into the Chinese language of the test I created for the identification of the three misconceptions. This task could be fulfilled by professor Zhang who has a good command of the English language. During the discussion it turned out that some of the questions would have to be redesigned because Chinese students may not be familiar with the contexts in which they are set. For example, in China weather forecasts are not reported in terms of probabilities or odds, so it would be inappropriate to test for outcome orientation misconception in the context of weather forecasting. A context relevant to the experience of Chinese students would have to be identified.

Since the time of the meeting, I exchanged several e-mail messages with Professor Zhang. He reiterated his interest in conducting a collaborative research study, but indicated that the study would have to be postponed till 2005 because the Normal University of Inner Mongolia was being inspected by the Chinese Ministry for Education in 2004. Professor Zhang explained to me that the inspection was very strict and thorough preparation for it required all of his time and attention.

I look forward to conducting a joint study with the Chinese professors of statistics. The study, as I envisage it, could have a dual purpose: first, to determine whether the misconceptions about probability held by Chinese students are similar or different from those held by American students. If a difference is found, an attempt will be made to explain it. Second, to compare the effectiveness of approaches and strategies employed by Chinese professors to eradicate misconceptions to those used by American professors. Bringing the study of misconceptions to a different cultural environment and tapping into the expertise of Chinese professors might contribute to our knowledge about productive ways of dealing with students' nonstandard and erroneous concepts about probability and statistics. We might be able to identify novel ways of treating students' erroneous concepts about probability, and that, in turn, might contribute to the improvement of teaching probability and statistics in general.

The Shanghai experience

In Shanghai, we had an opportunity to observe a lesson on probability designed by expert Chinese teachers. The title of the lessons we observed was 'Possibility'.

The purpose of the lesson was first, for the students to learn that sometimes the outcome of an experiment cannot be predicted with certainty, and second, that the likelihood of uncertain events can be compared. The dominant activities in the lesson were games, and that was quite appropriate for the students' age level (6–7 years old).

At the beginning of the lesson the teacher showed students two white balls and two orange balls. She informed students that she was going to put these balls in a box and take them out with replacement, one ball at a time. Students were making predictions as to the color of the ball that the teacher might draw. Then the teacher actually drew a ball, and the students could compare their predictions with the actual outcome. The teacher asked the students what color ball was more likely to be drawn. Some students named a particular color and others said that the white ball is as likely as the orange ball. Then the teacher added two orange balls into the mix and asked children about the possibilities. Some children said that balls of both colors are equally likely; other

children said that orange balls were more likely to show than were the white balls. After making a guess about possible outcomes, the children were given an opportunity to work in groups of 4. Each group received a box and 6 balls, 4 white balls and 2 orange balls. Those who drew an orange ball were considered to have won. The teacher reminded the students that after drawing a ball they should replace it. The results of the drawings were to be recorded by a designated student. After that the students were partitioned into small groups and continued to explore chance with their partners.

It was an excellent lesson, meticulously planned and perfectly executed. One aspect of that lesson was not quite clear to some of my colleagues and myself. It was not clear what the Chinese term for 'possibility' meant exactly. The English word possibility is not synonymous to probability. "Possibility" refers to outcomes as, for example, name the possibilities or possible outcomes when a coin is flipped. The answer to a question 'What are the possibilities when a coin is flipped?' is: a head can show or a tail can show. This is not the same as asking about the probability of the respective outcomes. However, in the lesson plan the Chinese word 'possibility' was clearly used to mean both possibility and probability. So, apparently, our confusion was caused by terminological differences in the English and Chinese languages.

Conclusion

In summary, the meetings with Chinese professors in Beijing and Hohhot and the lesson I observed in Shanghai have been of great educational and scholarly value for me. I learned a great deal about how probability and statistics is taught in China, what difficulties Chinese students experience in mastering the subject, and how Chinese professors help their students overcome the difficulties.

The subject of probability and statistics is taking on a fresh life in China. Their reformed curriculum was modeled, to a large extent, after our NCTM standards, and these standards emphasized probability and statistics as a very important area for mastery whose significance parallels that of algebra, geometry and other traditionally emphasized areas of mathematics. Chinese teachers, however, are not blindly adopting our ideas.

They bring to the teaching and learning of the subject their own vast expertise, experience and traditions. As a result, we have as much to learn from them as they are learning from us.

In short, I believe that exchanges between American and Chinese teachers and college professors are immensely beneficial for mathematics educators in both countries.

References

DelMass, R. (2002), A Review of the Literature on Learning and Understanding Probability. *Paper presented at the Annual Meeting of the American Educational Research Association*, New Orleans, LA, April 1–5, 2002.

Fiscbein, E. & Schnarch, D. (1997). The Evolution With Age of Probabilistic, Intuitively Based Misconceptions. *Journal for Research in Mathematics Education*, 28, 96–105.

Hirsch, L.S. & O'Donnell, A.M. (2001). Representativeness in Statistical Reasoning: Identifying and Assessing Misconceptions, *Journal of Statistics Education*, V9N2.

Kahneman, P., Tversky, A. (1973). On the Psychology of Prediction, *in Psychology Review*, 80, pp. 237–251.

Li, J. (2000). Chinese students' understanding of probability. Unpublished doctoral dissertation. National Institute of Education, Nanyang Technological University, Singapore.

National Council of Teachers of Mathematics. *Principles and Standards for School Mathematics.* Reston, VA: The Council, 2000.

Shaughnessy, J.M. (1992). Research in Probability and Statistics: Reflections and Directions. In A.Grouws (ed), *Handbook of Research on Mathematics Teaching and Learning*, pp. 465–494.

Strategies for Internationalizing the Borough of Manhattan Community College

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Business Management

This paper presents a literature review of internationalization strategies for business administration programs. Based on this review, I propose some practical strategies for the internationalization of the Borough of Manhattan Community College (BMCC). The literature on the internationalization of higher education curriculum has largely focused on the field of business administration in four-year colleges, and graduate and doctoral level programs. This paper attempts to correct this imbalance by addressing the internationalization of the curriculum at the community college level.

The theoretical concepts that I investigated are as follows: first, how to develop an organizational strategy and organizational structure that shows the engagement of the Borough of Manhattan Community College in internationalization; second, how to develop at BMCC a process to internationalize faculty, administration and students; finally, strategies to develop a plan to internationalize the BMCC curriculum (Kwok et al., 1994). The considerations that I present in this paper serve as the basis for further discussion about the internationalization of BMCC.

The issue of internationalization in higher education is a hot topic due to the increase of exigencies of several accreditation agencies, such as the American Assembly of Collegiate Schools of Business (AACSB), which are mandating the internationalization of curriculum. Dr. Antonio Pérez, president of our institution, has expressed the laudable goal of internationalizing BMCC.

Foundations for the Internationalization Process

Internationalization is the process by which organizations recognize the importance of the international environment on their future, and begin to forge links to develop cooperation with foreign institutions. In contrast, international education is related to the process of developing educational activities, programs or projects that are conducted in a domestic educational institution with other educational institutions in two or more countries.

An internationalized higher education institution is active in the international arena offering interchange programs with foreign educational institutions for students, faculty, staff and administrators. This would include debating international issues in symposiums and seminars; inviting international diplomatic leaders such as ambassadors, consuls and commerce representatives from countries around the world, and opening the doors of BMCC to representatives of multilateral organizations such as the United Nations, the World Bank and the International Monetary Fund among others.

Internationalizing BMCC will benefit the students, faculty, staff, administrators and all members of the college community. In today's world issues are being discussed in the context of a global village. Telecommunication advances are helping us to become increasingly integrated with the rest of this village called earth, but face to face communication and contact is essential to promote understanding, tolerance and respect for all people.

To achieve internationalization it is necessary to have a mission statement, objectives and vision for the institution that reflect the commitment to internationalization. The three most important issues to be identified in the mission statement are awareness, understanding and competency. Awareness is knowledge of the opportunities that internationalization offers. Understanding is the way that we can develop the appreciation of internationalization opportunities. Competency is the ability to implement internationalization (Arpan, et al., 1993). These three components need to be reflected in the institution's goals.

To develop an internationalization strategy it is necessary to have a flexible and modern

organizational structure that welcomes change with a managerial style characterized by long-term strategic thinking. In the beginning of the internationalization process, it is recommended to have a committee charged with studying and recommending strategies to organize an administrative entity to direct the internationalization process. After the formation of the committee, it is necessary to implement the recommendations and begin the execution of internationalization (Arpan, et al., 1993).

A Strategy to Internationalize Faculty, Administration and Students

In order to internationalize the faculty and the administration, it is necessary to identify in each academic and administrative department the people who are interested in internationalizing the institution and who have some experience in international teaching and research. Also, it is important to offer international experience via exchange programs, traveling and training opportunities. Finally, it is vital to have the support of the top level administration in identifying multinational organizations in the area that share an interest in joint research ventures to identify the skills that the institution wants to develop in their students at the international level (Cavusgil, 1993). To internationalize students it is necessary to offer an international curriculum; which is addressed in the next section.

A Strategy to Internationalize the Curriculum

The main goal in internationalizing the curriculum is to increase the level of students' acceptance of different viewpoints and cultures. The three different methods to internationalize the curriculum are as follows: a) integrate an international dimension in existing courses; b) introduce general international courses; c) develop an international course for each major the College is offering. It is equally important to ensure that faculty have the determination and support to implement the internationalization strategies.

In my personal experience at BMCC, I utilize the first method to internationalize the curriculum of the Introduction to Business (BUS104) course, which I teach in the Business Management Department. This is a required course for Business Administration (BAN) and Business Management majors. To internationalize the curriculum of this course, I dedicate one chapter to international business, teaching topics related to import, export and international economic communities such as European Union (EA), North American Free Trade Agreement (NAFTA), Organization of Petroleum Exporting Countries (OPEC), Caribbean Basic Initiative (CBI), Common Market of the Southern Cone (MERCOSUR and Organization for Economic Cooperation and Development (OECD). Also, I introduce the different methods of entering international business such as licensing, joint ventures and totally owned facilities. Finally, I teach students about the different multilateral financial organizations including Multilateral Development Bank (MDB) and the International Monetary Fund (IMF) among others (Pride, Hughes, and Kapoor, 2005).

Another example of integration of an international dimension into existing courses can be seen in the general management elective for Business Management (BEC) majors that I also teach. In this course, Business Organization and Management (BUS 200), I dedicate one chapter to international management and cross cultural competence, by teaching topics related to international management, such as licensing, exporting, local warehousing and selling, local assembly and packaging, strategic alliances or partnerships and direct foreign investment. In this course, I also emphasize the geocentric attitude that managers need to assume in the international arena to work with people from around of the world. Finally, I address issues related to individualistic (emphasizing individual achievements) and collectivist cultures (emphasizing collective goals), as well as strategies to provide cross-cultural training to teach people to interact and work in foreign environments (Kreitner, 2004).

The second method for internationalizing curriculum is to introduce general interna-

tional courses such as world geography, world politics and comparative economic systems. For example, the Business Management Department could offer a course on International Business for all programs administered by our department.The third method for internationalizing curriculum is to develop an international course for each major the College offers (Kwok et al., 1994). As an example, the Business Management Department could introduce a course on international management, as a requirement for all the students majoring in business management. Other departments could integrate discipline-specific courses based upon the theme of internationalization.

As an institution, we want to define which of these three methods will be most effective for internationalizing the BMCC. I have provided examples from my experience and now we need to begin analyzing our curriculum and resources to determine which method will be most valuable in transforming our institution into an internationalized educational organization. It may be that each of them has a place in our strategy.

Finally to achieve institutional internationalization an appropriate curriculum is essential, but even more vital is a faculty with the determination and support to implement the internationalization strategies.

Conclusions

The first issue that we need to address is the development of a managerial strategy that provides a structure for the internationalization efforts at the BMCC. The development of a managerial strategy requires the creation of long-term objectives to achieve the organizational mission of internationalization of the institution. I recommend that we review the mission statement, the objectives and the vision of our institution in terms of internationalization.

After the analysis of our institutional mission statement, I propose that the statement be revised to include the BMCC's commitment to providing our students, faculty, staff and administrators with international opportunities to develop an appreciation for other cultures by interacting with people of diverse nationalities and learning to accept different point of view. In addition, I suggest developing objectives for internationalization. These might focus on such key issues as providing all students with an international education to increase their level of acceptance of different languages, traditions, customs and the skills needed to work effectively with people from various cultures.

In addition, we need to identify and assess the quality of our products, services and customer delivery systems in terms of internationalization. In the institutional vision, we need to explain the college's strategy for internationalization, such as future products and services that we will offer and the technology that we will use.

To successfully initiate an internationalization process, it is essential to understand that this lofty goal requires the engagement of every person at BMCC, from the president, faculty, administrators and staff to the students. Therefore the second point which must be addressed is the necessity that every organizational level at BMCC understands the importance of internationalization. We want to integrate the internationalization concept throughout the institution's culture. This might include the introduction of an international program committee and a director of international programs, whose main responsibilities in the beginning will be to implement the internationalization strategy and coordinate various resources.

Third, the faculty and administration need to establish a culture which supports the internationalization of BMCC. In the delicate process of internationalizing an institution, animosity can arise. It is necessary to have the solidarity of all of the constituents in cooperating and encouraging everyone to maintain high expectations and motivation.

Fourth, it is necessary to re-engineer the course offerings and syllabi to increase the focus on international issues across the curriculum.

Last, there is a practical consideration. Vital assistance can be gained for the internationalization efforts through collaboration with other City University of New York colleges that have

experience, tradition and recognition in internationalizing their programs. In addition, the institution might invite outside educators who have experience in curriculum internationalization to offer practical workshops on topics such as adding an international dimension to syllabi and techniques for teaching with an international perspective. In short, to achieve internationalization we must redefine the curriculum, re-engineer the syllabi and implement changes within the institution's culture that will support an ongoing internationalization process.

References

Arpan, J. S., Folks, W. R., and Kwok, C. C. Y. (1993). *International Business Education in the 1990s: A Global Survey.* East Lansing, MI: The Academy of International Business.

Cavusgil, T. S. (1993). Internationalization of Business Education: Defining the Challenge. In S. T. Cavusgil (Ed.), *Internationalizing Business Education: Meeting the Challenge.* East Lansing: Michigan State University Press.

Kreitner, Robert (2004). *Management (9th ed.)*. Boston: Houghton Mifflin.

Kwok, C.C.Y., Arpan, J., and Folks, W. R. Jr. (1994). A Global Survey of International Business Education in the 1990s. *Journal of International Business Studies*, Third Quarter.

Pride, W. M., Hughes, R. J., and Kapoor, J. R. (2005). *Business (8th ed.)*. Boston: Houghton Mifflin.

Plums and Wires

Hilario Barrero
Modern Languages

I would like to share a few thoughts about globalization and how it relates to my teaching and to my experience as a professor in the Study-Abroad program offered by BMCC.

BMCC has already offered four study-abroad courses in Spain at the University of Oviedo. The director of the program, Professor Suárez-Coalla, taught the course twice. Professor Pullés taught it once and I taught it in the summer of '04 and I plan to teach it in the summer of '05 as well.

This course called Hispanic Heritage has proved to be not just another language and literature course, but also a great opportunity for students to approach another culture, interact with people from a different country, and to familiarize themselves with a variety of ways of thinking about and experiencing the world.

In the summer of 2004, sixteen students enhanced their knowledge of a foreign culture through class meetings, seminars, and visits to places of historic and cultural importance. Students were immersed in the culture of the country and attended Spanish literature and writing classes and lectures on the traditions and history of Spain. They read contemporary Spanish literature and were exposed to the different aspects of Spanish culture and history. They commented on and analyzed texts of contemporary Spanish authors, wrote reports and essays on poetry and narrative, and kept a diary. Some even traveled to Madrid, Toledo and Burgos at their own expense.

The course covered an array of themes and authors, including local authors and the poets of the Generation of '27. The University of Oviedo complemented my classes with the assistance of one of their professors who taught two hours every day. For almost everybody the most exciting activity was to get to know the different aspects of Oviedo society. The students mingled with locals on the streets, in the shops, banks, cafeterias and so on. The contact with the friendly people of Oviedo was another source of knowledge. I invited five of the most outstanding contemporary Asturian writers to the class and the students were able to meet them and listen to them read and discussed their works.

Besides completing the requirements for the course, the students were exposed to daily customs, some very different from the US. They also exchanged ideas with people from all walks of life, and this interaction made them aware of the diversity of cultures in today's world. They were sometimes excited, sometimes frustrated, and sometimes surprised about these differences, but they were always eager to know more, to compare and to reflect on them. One custom that the students found amusing was the "siesta." In order to understand this you have to know that Oviedo is a small city when compared to Madrid, Barcelona or Seville, and that we were there during the height of the summer. From 2pm to 5pm, city life comes to a standstill. Most of the stores and offices close and you don't see too many people around. This prompted one of the students to say that "Oviedo looks like a ghost town" at this time of the day.

Living in a relatively small city like Oviedo, rich in Romanesque art, and surrounded by a vast rural region, the students were able to enjoy both the comforts of urban life and the beauty of the countryside and to establish comparisons between the two. They attended concerts, visited museums, went on excursions to several cities, had the opportunity to commune with nature, visited a farm, ate fruit fresh from the tree and marveled at the imposing beauty of the Picos de Europa. The students also came to better understand the concept of "global village" when they could easily contact their relatives back home thanks to the Internet and cellular phones and thus realized how close we are to one another in spite of physical distance.

I would like to close with simple examples of students' experiences and remarks. The first one occurred when Professor Suárez's father visited the class bringing a box of delicious green plums picked fresh from the trees one hour earlier. We all remember how the aroma filled the room and how this made us feel in total contact with nature. The second remarkable experiences

occurred when a few students went to a farm and for the first time in their lives touched and pet live cows. A student called her mother in Manhattan and narrated to her the exciting experience of milking a cow.

Another student wrote the following after returning home: “Thanks to the University’s generosity, we had a unique opportunity to see and learn a lot about this historic city and the region of Asturias. Moreover, we got a chance to observe the beauty and diversity of Spanish culture, with its various customs and traditions that differ from region to region.”

Teaching Science in a Multicultural Classroom

Igor V. Zaitsev
Science

The multicultural classroom

"The quality of a student's learning in science classrooms will depend upon a teacher's recognition and sensitivity to the cultural differences between a student's everyday world and the worlds of science and school science" (Aikenhead, 1997). However valid that observation by Glen S. Aikenhead in a paper entitled "Globalization of Science Education," the teacher's task so defined is complicated in cities such as New York. Reflecting its urban diversity, my community college science classes are both multicultural and multi-aged. The students are not only American-born, but also foreign-born, naturalized immigrants and visiting foreigners. These latter, as I am well aware, arrive in American schools with "extremely positive attitudes towards teachers and other school authorities"(Potter, 2001).

Many if not most of my foreign-born students have to make what has been termed a "cultural border crossing" (Jegede & Aikenhead 1991). Foreign-born myself, I, too, had to cross a cultural border when I came from Siberia to America, perhaps not as much of an ordeal for me as that of some of my students, but enough of it to make me, particularly, sensitive to their plight. Like them, I had to switch from my mother tongue to English in the classroom, not an easy accomplishment for most of us. Except for the change in pronunciation in the global vocabulary of science, I moved with ease from my native Russian scientific culture to that of the American scientific culture when I first came to this country to do research at Yale University. Many of my foreign students, on the other hand, need more help than I did moving back and forth from their everyday world to the alien one of the science classroom. As a New Yorker who has taught in borough schools, I also recognize that many American-born students also have to make a cultural border crossing from their everyday, urban home culture so different from the culture of a college science class.

I have found that some native-born students in my classes are unable to speak and write English as effectively as some foreign-born students. Despite having to contend with what may have been a more complex cultural border crossing, the latter are often surprisingly in better command of the language, both orally and in written laboratory reports. Although studies indicate that second-language learners "fall far behind other students in class participation" (Trimarchi, 2002), this has certainly not been the case in my classes. Of course, the majority of these students are mature adults responding comfortably to interactive lecture techniques. Those from India, Eastern-Europe and Africa not only actively participate in discussions but are also often impressively knowledgeable of Western Science.

According to the U.S. Department of Education, "African American parents—more so than white parents—are likely to encourage their children to take science classes and are more comfortable helping with related homework" (U.S. ED. gov, 2004). At the same time, "Hispanics are just as concerned about their children's science education ... and understand its importance and value in a globally competitive work force"(U.S. ED. gov, 2004). While teaching in a homogeneous-minority parochial school and a multicultural public school, I had numerous conferences with concerned parents, usually the mother, even after having received a positive student's progress report. When there was no reaction from a family, I usually learned that it was either dysfunctional or that the student was being cared for in either a foster home or by an indifferent relative. Nevertheless, that student, as often as not, performed effectively, even impressively, in class. Self-motivation in such a high school or college student seems to me a factor not as readily recognized and appreciated as the impact of parental involvement in minority groups under study (Jeynes, 2003).

Unfortunately, according to the U.S. Department of Education, "despite minority parental involvement and support with regards to science education, minority students tend to do worse on science assessments than their white counterparts." A thousand parents of children 13 to 17 years old, were interviewed for this nationwide poll. Its negative conclusion may not pertain as much, if at all, to those who have gone on to college. To judge from the academic accomplishment of many of my students, it seems unlikely that in high school they were among those who did worse on scientific assessments than their white counterparts.

Learners, teachers, and teaching-learning styles

In "Science Education," Costa categorized students according to the ease with which they succeeded in school science, an ease related to the similarity between their life-world culture and the culture of science (Costa, 1995). Students are characterized by a scheme which emphasizes the importance of the culture of student's family and friends. There is no reference to a student's self-motivation. Costa's category of such a range was elaborated upon by Aikenhead during an International Conference called "Globalization of Science Education" (Aikenhead, 1997). Four types of students were identified (and later a fifth):

1. Students whose cultural identity and conceptions harmonized with the micro-culture of cience. Scientific thinking enhances a student's everyday thinking. Costa identified them as "Potential Scientists" (Costa, 1995)
2. Students who adapt their views to the culture of science because that appears useful to them in their everyday lives. These students replace some of their preconceptions by constructing science conceptions.
3. Students whose cultural identity harmonized with the school culture but not with the culture of science. They understand the culture of science but scientific thinking does not guide the students' everyday thinking.
4. Students whose cultural identity and preconceptions are at odds with the micro-culture of science. These students resist assimilation of scientific thinking and play a school game that allows them to get passing grades without understanding the content of the science matter (Larson, 1995).
5. Recently, Aikenhead added an additional category of "I want to know" Students (Aikenhead, 2001). These students find the area of science highly interesting but they are less successful in academic science courses. Their thinking is more associated with interest in science than with achievement in academic science.

Since students do not all perceive and process information in the same way (Reed, 2002), how does one deal with heterogeneous student bodies? Professor Gunstone points out that "a failure to recognize complexity diminishes the quality of science education" (Gunstone, 1977). There are excellent recommendations on coping with a diverse group of students in *Guide to Classroom Instruction for Adjunct Faculty* (Reed, 2002). It contains chapters on understanding the audience, handling difficult people, characteristics of adult learners, learning styles, among many other considerations.

The National Research Council has pointed out what every science teacher knows, that "Students in school science classes should develop the abilities associated with accurate and effective communication" (NRC, 1996). During interactive lectures that consist of analytical dialogs and precise instruction, as well as conferences after class, I go out of my way to encourage students to speak up, in part, to gauge their English language proficiency not always apparent on written quizzes and examinations. In order to give students an opportunity to include something of scientific language in their own life-world language, I give them extra credit if they come up with an interesting question or observation relating to the unit we are studying. This often encourages other students to join in whatever class discourse might come from a student's initial contribution.

The science laboratory provides the perfect set-up for developing cooperative learning skills among multicultural, multi-aged students. Normally, at the beginning of the semester, students sit facing one another along laboratory counters. After a month or so, during which time I have come to know something of their academic strengths and weaknesses, I mix them racially, ethnically, by gender and by range of ability. Recent study shows that there are complex connections between cooperative behavior and student academic ability (Wallace & Chou, 2001). The most accomplished individuals in the class not only expedite the progress of the laboratory work but support and motivate students who have not being doing well.

These accomplished students, I note, even take on the role of "tutor" to help weak students keep up with the group's progress. Cooperative learning also supports weak students who can be intimidated in a classroom. They often begin to contribute actively in class when working in small groups (Trimarchi, 2002). Using new scientific concepts and terminology, they learn to talk and discuss problems with others in order to accomplish their group's goal (Foster, 1993). At the beginning of the period, after explaining what they are to accomplish, I announce, "Now, I don't want you to be quiet. Talk to one another! Interact!" As Rosser and Montgomery observe, "the laboratory climate makes a tremendous difference. Every one needs a work environment that is comfortable, supportive, and non-threatening"(Rosser & Montgomery, 2000).

During the last laboratory hour of my Anatomy and Physiology Class, I check on each group's accomplishment by reviewing their papers. If I find weak points on the collective reports, I point them out, sending that group back for a second-round while another group is ready to present their work. If team reports have been done correctly, I initiate a short group discussion giving students the opportunity to orally communicate in the cultural language of the science classroom.

Controversy and the nature of science

In recent years, more and more states have drafted standards designed to promote quality teaching (Moore, 2002). According to a study evaluating such standards for teaching evolution by science-curriculum specialist Lawrence Lerner (2000), nineteen states received 'D' to 'F- '. Many biology teachers simply avoid teaching evolution or teach and endorse creationism (Nelkin, 1983; Harp, 1999; Moore, 2001). It has been a century and a half since Darwin's masterwork was affirmed through literally hundreds—if not, indeed, thousands—of studies. Nevertheless, in a consideration of a proposed Louisiana pro-creationism statute, Supreme Court Justice Anton Scalia supported creationism as being as strong as evolution (Morehead, 2005).

When I taught in a parochial school, I asked the Catholic administrator if it would be permissible for me, a Darwinist, to teach evolution. "Of course," he replied, "we are all for it." I was aware of no negative reaction from parochial students. On the contrary, the subject elicited considerable interest. Students posed many more questions on the subject than is usually the case while we cover other scientific considerations.

The authors of a paper, published in *Science Education*, interviewed college-educated creationists and evolutionists concerning the impact of being taught Darwin's theory. Both showed strikingly similar reactions. "All groups viewed the consequences of accepting evolutionary principles in a way that might be considered undesirable: increased selfishness and racism, decreased spirituality and decreased sense of purpose and self-determination" (Brem, Ranney, Schindel, 2003). If this has been the reaction among my students, it has not been apparent. On the contrary, I have sensed a positive reaction of uniform scientific curiosity and enthusiasm with but one single exception. At BMCC, an adult female student came up to me after class, obviously distressed and perhaps cross, and said simply: "Remember, Christ is your savior!"

Science education professionals have a plethora of very different views defining science (Stanley & Brickhouse, 2001), among them: "science is the microculture of Western or Euro-American culture" (Pickering, 1992); "science is all systems of knowledge about nature" (Lewis & Aikenhead, 2000); "science is rational perceiving of reality" (Ogawa, 1995); and "science is just

another word for nature" (Smithsonian Institution, 1996).

There are two interesting articles published in *Science Education* on this matter, one written by Americans (Cobern & Loving, 2000), the other by Canadians (Gorsiglia & Snively, 2000). Both have considered the place of Western Modern Science (WMS), indigenous science, traditional ecological knowledge (TEK), "wisdom" and their place in modern science classrooms. Gorsiglia and Snively posit that a multicultural view of science will serve the needs of students coming from diverse cultural backgrounds, and "will help change the culturally corrosive effect Western science has had on non-Western cultures". Cobern and Loving, on the other hand, assume that knowledge gained outside of WMS should not be included in the school curriculum. William Stanley and Nancy Brickhouse, who categorized educators as universalists, multiculturalists, or constructivists, contend that "these arguments have important classroom implications because universalists and multiculturalists would likely approach instruction in significantly different ways" (Stanley & Brickhouse, 2000).

Since foreign-born students come from so many very different cultural backgrounds,to include for their consideration the "indigenous science"of at least a dozen different cultures with which I am hardly familiar would be an impossible undertaking. Interestingly, most science educators in Africa were educated in Europe, the United States, and Canada and seem to know more of Western Modern Science than of their own respective indigenous sciences (Irzik, 2000). No matter how science is identified, minimally, I want students to understand the nature of inquiry in science, to be able to use scientific concepts in everyday life, and to be able to interpret scientific information from the everyday press.

Among the many difficulties of introducing science to multicultural students is using instructional analogies. Even though educators recommend instructional analogies (Wrong, 1993; Newby, 1995; Newton & Newton, 1995 at. al) to which the students can relate, it is difficult to select one in a multi cultured class. Since most analogies relate to something within a student's home-culture, it is virtually impossible to find a single one to which even a slim majority of students in a multicultural class can relate.

There is considerable controversy among science education professionals having done research on this matter. Radford (1989) investigated the use of instructional analogies for concepts of cellular respiration. While he found no significant post-test differences, 81% of his students said analogies helped them understand the concepts. Cilbert (1989) not only found no statistically significant increase in achievement using analogy-based test material for a unit on heredity, but also negative attitudes of the students toward the analogy lessons. It also was found that analogies may contribute to the development of misconceptions through oversimplification of complex new knowledge (Spiro, 1988; Webb 1985). At the same time, the majority of the investigators demonstrated gains in student understanding of theoretical concepts with the use of analogies. References to their work were listed in an investigation conducted and published by William Baker and Anton Lawson (2001) in Science Education. The authors evaluated the role of complex instructional analogies on both student performance and student attitude. Significant differences in student achievement were found in favor of the experimental group.

Mentors, roles, and role models

It almost goes without saying that increased career awareness and exposure to mentors and role models can help students see science careers as a viable option (Clewell et al., 1992). Whenever I get a chance, either after a lecture or laboratory work , I find the time to talk to science students from my General Biology class about their career plans. Foreign-born students have often made up their minds. American-born students rarely have. When I ask the latter, "what do you think your major in science will be?," I get replies such as "I don't know yet," "I haven't thought about it," or "Isn't it a little early for us to know?"

This difference between these groups is not surprising. Upon entering college, a European

who has decided to become a scientist or work in the field of applied science must designate the specific branch of science he or she will specialize in, whereas an American student has time to make a decision during his or her undergraduate studies.

In the role of a mentor for students who volunteer to do extra curricular work, I give students in my General Biology an extra credit for completing an assignment during which, after choosing from among the topics we cover, they formulate a problem that interests them. After they draw up a list of at least ten well-known experts working on it, I refer them to libraries where they can locate abstracts of such experts' work. Finally as expected, the students write a review based on those abstracts.

Conclusions

Research in teaching and learning has demonstrated that for many students the best way to learn is to do (Farenga & Joyce, 1997). Many more than had participated in the past have now joined BMCC's Collegiate Science and Technology Entry Program (CSTEP). The program engages underrepresented minority groups and foreign students as well as economically disadvantaged students in majors leading to professions in science, mathematics, engineering, and technology (SMET). One part of the program involves a student-mentor collaboration on a research project. CSTEP is also open for students who do not have the time to dedicate to research project but want to be informed about career choices and employment opportunities. At biweekly CSTEP meetings last semester, invited speakers introduced students to career opportunities as physician assistants and pharmaceutical and legal career in sciences.

In this age of globalization, teaching science in a multicultural classroom entails a recognition of and sensitivity to the cultural border crossings of community college students from their everyday world culture to that of the culture of science. In a classroom of a community college in New York City that consideration would include a multiage mix and a sizeable number of foreign-born students along with the multicultural native-born majority. Given the diversity of such a class, the inclusion of instructional analogies and "indigenous sciences" might need a teacher's special consideration. On the other hand, cooperative learning and interactive lectures work as well as they would in a homogenous classroom in fostering the nature of inquiry in science. As an extension of the multicultural classroom CSTEP encourages students consideration of majors leading to professions in SMET.

References and Further Resources

Aikenhead, G. S. (1997). Recognizing and responding to complexity: cultural border crossing into science. International Conferences on Science Education: "Globalization of Science Education," May 26–30, Seoul, Korea.

Aikenhead, G. S. (2001). Students' ease in crossing cultural borders into school science. *Science Education* 85: 180–188.

Baker, W. P., & Lawson, A. E. (2001). Complex instructional analogies and theoretical concept acquisition in college genetics. *Science Education* 85: 665–683.

Brem, S.K, Ranney M.., Schindel J. (2003). The perceived consequences of evolution: College students perceive negative personal and social impact in evolutionary theory. *Science Education* 87: 181–206.

Clewell B.C., Anderson B. T., Thrope M.E. (1992). *Helping female and minority students* Succeed in Mathematics and Science. Jossey-Bass: 352 p.

Cobern, W. W., & Loving C. C. (2001). Defining "Science" in a multicultural world: Implications for science education. *Science Education* 85: 50–67

Corsiglia, J., & Snively, G. (2001). Rejoinder: Infusing indigenous science into western modern science for a sustainable future. *Science Education*: 85: 82–86.

Costa , V. B. (1995). When science is "another world": Relationship between worlds of family, friends, school, and science. *Science Education*, 79, 313–333.

Farenga S.J., & Joyce B.A.(1997). Beyond the classroom gender differences in science experiences. *Education* 117: 563–568.
Foster, A. G. (1993). *Cooperativel learning in the mathematicsc classroom.* Glencoe/McGraw-Hill: 44 pp.
Gilbert, S. (1989). An evaluation of the use of analogy, simile, and metaphor in science texts. *Journal of Research in Science Teaching,* 26 (4): 315–327.
Gunstone, R. (1997). Using learning research to reform science education: recognizing and responding to complexity. International Conferences on Science Education: "Globalization of Science Education," Seoul, Korea.
Harp, L . (1999). School guide drops word "evolution". *Louisville Courier-Journal.* 5 October: pp. A1, A5.
Irzik, G. (2001). Universalism, multiculturalism, and science education. *Science Education* 85: 69–70.
Jegede, O. J., Aikenhead G. S. (1999). Transcending cultural borders: Implication for science teaching. *Research in Science and Technology Education* 14: 45–66.
Jeynes, W. H. (2003). The effect of parental involvement on minority children's academic machievement. *Education and Urban Society.* 35: 202–218.
Larson, J. O. (1995). Fatima's riles and other elements of an unintended chemistry curriculum. Paper presented at the American education research Association annual meeting, San Francisco.
Lerner, L.S. (2000). Good science, bad science: Teaching evolution in the States. Washington, D.C.: The Thomas B. Fordham Foundation. Online at www.edexcellence.net
Lewis B.F., Aikenhead G. S. (2000) Introduction: Shifting perspectives from universalism to cross-culturalism. *Science Education* 85: 3–5.
Moore, R. (2001). Educational malpractice: Why do so many biology teachers endorse creationism? *Skeptical Inquirer* 25(6): 38–43.
Moore, R. (2001). *Evolution in the courtroom: A reference guide.* Denver, Colo.: ABC-CLIO Publishers
Moore, R. (2002). Do standards matter? *Science Teacher.* Vol. 69 No. 1.
Morehead, J. (2005). Anton Scalia versus Darwin. *Secular Humanist Bulletin*. Winter 2004/05. 20: p.8.
National Research Council. (1996). National Science Education Standards. Washington, DC: National Academy Press.
Nelkin, D. (1983). Legislating creation in Arkansas. *Society*. 20 (2), 13–16.
Pickering, A. (Ed.) (1992). Science as practice and culture. Chicago: University of Chicago Press.
Newby, T. (1995). Instructional analogies and the learning of concepts. *Educational Technology Research and Development,* 43 (1): 5–18.
Newton, D., & Newton, L. (1995). Using analogy to help young children understand. *Educational Studies*, 21 (3): 379–93.
Ogawa, M. (1995). Science education in a multi-science perspective. *Science Education*, 79: 583–593.
Pickering, A. (Ed.). (1992). *Science as practice and culture.* Chicago: University of Chicago Press.
Potter J. L. (Ed.).(2001). Building bridges between cultures. Women's Educational Equity Act (WEEA) Resource Center. September 2001. p.2.
Radford, D. (1989). Promoting learning through the use of analogies in high school biology textbooks. (ERIC Document Reproduction Service No. ED 306 085).
Reed, J. H. (2002). A guide to classroom instruction for adjunct faculty. *American Chemical Society* : 45 p.
Rosser, S. V. (2000). Gender equity issues in science careers. WEEA Digest. January 2000, p. 3. Smithsonian Institution. (1996) Case study: Donna. Cambridge, MA: Author.

Spiro, R. (1988). Multiple analogies for complex concepts: Antidotes for analogy-induced misconception in advance knowledge acquisition (ERIC Technical Report No. 439).
Stanley, W. B., & Brickhouse, N. W. (2001). Teaching sciences: The multicultural question revisited. *Science Education* 85: 35–49
Trimarchi R. (2002). Drawing Out the Quiet Voices. *The Science Teacher*, 69: 31–34.
U.S. Department of Education (2004). African-American parents consider science important part of children's education. www.ed.gov/news/pressreleases/2004/03/03162004a.html
Wallace J., Chou C.-Y. (2001). Similarity and Difference: Student Cooperation in Taiwanese and Australian Science Classrooms. Science Education 85: 694–711.
Webb, M. (1985). Analogies and their limitations. School Science and Mathematics, 85 (8): 645–650.
Wong, D. (1993). Understanding the generative capacity of analogies as a tool for explanation. Journal of Research in Science Teaching, 30 (10): 1259–1272.

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