Teaching, an Art and a Mutual Challenge

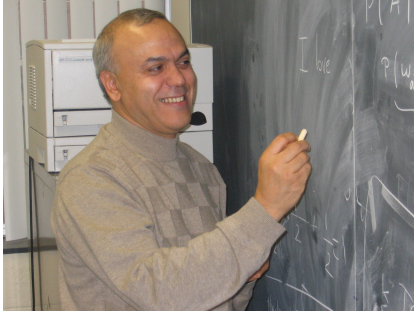Professor Djamel Bouchaffra
Computer Science and Engineering
Oakland University
bouchaff@oakland.edu   http://www.oakland.edu/~bouchaff

So many lines of text have been written about teaching as one of the oldest professions on Earth. This noble profession is embedded with many challenges that can be overcome only through an effective interaction between the learner and the teacher. The learner should be the principle driving force, with the educator as the facilitator. During this active learning process, both parties will build an environment that stimulates learning and enhances creativity. However, the learner should still maintain the will to develop his/her own vision of the knowledge conveyed. This new insight that is inherent to the learner discerns the true nature of the knowledge that often benefits the educator. It is well known that Aristotle was deeply influenced by Plato's persona and ethics, but never did he let his admiration get in the way of his personal stands on politics and ethics. Just as Plato studied under the wing of Socrates and later established his own philosophy, Aristotle followed suit. There are several points that need to be addressed in order to promote effective teaching. We will focus in this article only on the criteria addressed in the teaching excellence award, which are: (i) superior classroom teaching, (ii) innovative instructional strategies, (iii) high educational standards, (iv) productive learning environment, and (v) demonstrated ability to inspire and motivate students.

**Professor
Djamel Bouchaffra**
Computer Science and Engineering

*Oakland University's 2004
Excellence in Teaching Award
Recipient*

    The ***superior classroom teaching*** criterion is one of the most important in the educational system. The educator should first master the language he/she is using to convey the required message and then be knowledgeable in the subject that needs to be taught. When an educator has a deficiency in the language, both the student and the educator will suffer. Similarly, when a teacher is not very familiar with the concepts and materials introduced in the course, he or she cannot sell any knowledge and sooner or later the students will notice it. Once the educator is perceived as strong in the subject taught, he or she becomes reliable. When reliability is present, a confidence and a mutual respect between the educator and the student emerge. Thereby, the communication between the two parties reaches a high level of understanding. According to the student feedback I have received during my years of teaching, I can say that I was quite familiar with the topics covered in my courses. Furthermore, teaching should not be boring; students often welcome a change in the teaching methodology.

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They also prefer teachers that are energetic in conveying a message. A good educator should be able to make simple subjects attractive and complex subjects simple (not simpler!). For example, in a mathematical course, the educator should first explain the goal of the

equations used in simple words and later introduce them analytically rather than doing the opposite. The teacher should discuss with the students the history of the scientific contributors related to the course. Informing the student about who discovered a particular concept and when this discovery happened has a double effect: (i) it will help the students *to* disconnect and rest for a short period of time and then be able to remain focused for another shot; and (ii) it will encourage them to be more confident and creative. For example, the educator should not hesitate to mention names of famous contributors when covering a particular chapter. The students should feel that their educator is part of a strong group of researchers who have contributed significantly to those chapters. For example, when I covered probability theory in CSE 513 (soft computing), I talked about the interesting discussion I had with an eminent scientist, at a conference held in Fort Lauderdale (Florida) regarding my contribution to the field. I found the students very interested in the matter and very eager to discuss it further. I often briefly discuss the contents of my publications that are related to the course. I inform my students about conferences and symposiums I am going to attend shortly. This exchange of information is usually easier when dealing with graduate students. This approach engages learners by matching the concepts taught to the learner's interests, understanding, and development level. *The student is the driving force whereas the educator is the facilitator:* It is not an egg-chicken problem. Therefore, I believe that teaching can be significantly enhanced if the professor is involved in research as well. Aren't we explaining concepts that were investigated some years back or a longtime ago? Another important contribution to superior classroom

teaching is the World Wide Web (or the Internet) mode of communication. All my courses are put online as PowerPoint and HTML files. The portable document format (pdf) file containing my course is made available in a friendly, printable format. The students are encouraged to print the file prior to the class. Students should research the topic before coming into the classroom. The file contains several references on the topic that is covered. Having the student research the topic prior to class gives the educator the opportunity to cover deeper (or more interesting) aspects of the course. Similarly, all exercises we solve in the class are also put online during the weekends. Students should never waste their time copying course materials or exercise solutions, but use their time to listen, annotate, reason and exchange information with the educator. Finally the teacher should not only focus on the knowledge conveyed in the course but also on the meta-knowledge of the course: the way he/she organizes and structures the course within an assigned time slot. I personally put much time and effort into organizing course materials and searching for the best way to convey a particular concept or idea in all my classes.

There are many ways to effectively convey a message in the classroom. One of the most important points is *"diverse channels"*. The educator should use several types of channels, devices to convey the message, instead of using only one. The use of a variety of *innovative instructional strategies* and resources to respond to students promotes learning. From my own experience, I find the blackboard very convenient for solving exercises, but it is not very effective and preferable when

covering course materials. The PowerPoint/pdf package is very adequate in this case. The educator should have a very clear PowerPoint presentation (without overloading the slides) to show to the students. Exploiting all the features and resources of PowerPoint is an important asset. But the educator should also be able to use the Internet during the course in order to enrich it with other related information such as software, demonstrations, clips, etc., that are online. Another element that promotes learning is the use of multiple choice questions. They help test recall of information or facts although some precautions need to be taken when using multiple-choice questions. For example, poorly written questions can be misleading or misinterpreted. The educator should try to have a colleague answer his or her test before submitting it to the students. The educator should consider a formal assessment of his or her quiz with an "item analysis" of the test. Item analysis can identify the questions that proved to be the most difficult or the questions that most of the students with high grades missed. This analysis helps the educator identify the areas that need to be improved. This analysis represents a direct measure of the objectives of the course. Personally, I use the Oakland University WebCT for my quizzes. One helpful feature that needs to be implemented in WebCT consists of capturing the student pace in answering the questions successively rather than just displaying the total time spent in the quiz.

Educators should never consider students inferior. We learn a lot from our students everyday of our lives. The more respect we give to our students, the *higher our educational standards* are. There

are two main tasks that often enhance the educational standards: (i) the group research projects; and (ii) the group written/oral presentations. Students often perform well on these two assignments. The reason for their success is twofold: (i) they feel more responsible about knowledge, since at this time, knowledge emanates from them, and (ii) they feel more protected since they are not alone. These assignments are a teamwork effort. The oral presentation is performed individually, but the topic is discussed collectively. We can only expect the students to do a very good oral presentation if they know the path to reach this goal. Here again the Internet plays an important role for guidelines to a successful oral presentation. I provide important rules for a successful oral presentation online. In addition, the educator should encourage the students to transform a research project into a conference paper. There are many conferences that are reserved exclusively for students. The chance of getting the paper published is higher than in ordinary conferences. Another alternative is to have the educator help the student write a joint paper where the student is first author. This is exactly what I did with some of my master students in CSE 616 (Pattern Recognition). One of my students successfully presented the paper at a conference. She made several contacts with people from industry and academia.

The best way to enhance learning is within a group. Students should have a session of problem solving exercises for at least 25 minutes during a 90-minute class. Students should be encouraged to think individually and to exchange their solutions with the members of a group. The notion of a group is very important; it always leads to a *productive learning environment*.

Therefore, one of the first actions for the educator is to ask each student to create his or her working team (a team composed of at most three students). Three students in a group represent a balance for a student. More than three students can lead to distraction whereas less than three students can lead to isolation and apprehension. A team is responsible for all of its members with respect to their intellectual evolution in the class. The members of the team should be very supportive of one another by accepting different point of views. The team should promote social development and group responsibility. There is a need for establishing a climate that promotes fairness and respect. Team members should be concerned if one of them is having difficulty following the course. Therefore, the responsibility of the team is to notify the educator so that he or she can take the right action at the right time. The educator should encourage the members of a team to meet outside the course for exercise sessions or for any other course related activities. This accountability and care is the ultimate goal of a team. This is what I am doing with my students.

The educator should seek to create an environment that *inspires and motivates students*. First of all, the educator should arrange the room to enhance positive classroom interactions. This environment should reflect and promote student learning. The classroom environment should be very easy to access and safe for students. One of the key elements for promoting learning is the access to materials and resources. Therefore, students should frequently visit the library. Visiting the library as a team is better than as an individual. I believe that students should discuss problem solutions with colleagues in

a small group. This interaction has merit and impacts student's performance. Students learn from each other, and they are less intimidated in a smaller group than they are in a larger group. They express their vision and very often compete with one another. The educator should invite speakers from industry (such as Oakland University Alumni) to talk about applications related to the concepts covered in the class. This outside vision will definitely inspire and stimulate students. Finally, the educator should be very careful in selecting a topic for a master project (or independent study). The topic should be well defined and novel. The educator and the student should not reinvent the wheel. The students and the educator should discuss the topic relevancy from the industrial standpoint. Meeting with industrial partners during the topic selection process is very productive. It definitely stimulates and motivates the students. As a matter of fact, this type of project is very often converted into a funded proposal.

One of the teaching practices and style that I have found very productive is called the "repeated segments" strategy. It encourages the educator to periodically remind the learner what has been covered so far and what remains to explain. In doing so, the educator provides directions on a regular basis that help students remain focused and able to understand the entire

concept. In this case, the student will never lose track of what it is intended to be proven. I often try to use different ways of explaining the same concept. Students are very often upset in the following scenarios (i) the second explanation provided by the educator is a copy of the first one; and (ii) the educator repeats the question raised by the student and does not provide a precise answer directly.

In conclusion, teaching is a mutual challenge for many generations to come. It is one of the most interesting and difficult tasks. Both the educator and the learner are responsible for the creation of an effective teaching environment. The art of teaching can be learned through experience but it is also produced by the mind as an innate quality.

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