Building the scientific mind at the graduate level: Challenge at odds with conditions

Dr. Gilles Lavigne
Instituto de Investigación y Desarrollo Educativo
Universidad Autónoma de Baja California
Ensenada, Baja California, México

Abstract:

In order to be able to help graduate students to build a scientific mind, this reflection paper first wanders gathering pieces of conceptual material to give some sort of an analytical grid to understand better what is going on; then the reflection questions this grid to identify a few sets of factors or variables which are, potentially, major constraints or handicaps to the building of such scientific mind. When living in the Third World, few of these constraints may be specific. Let alone, no one will be able to outdo these unfavorable conditions, hope for ways to overcome the obstruction being the only resource. Maybe the means of communication at our disposal could help.

Everyday life on a university campus is full of rewards and frustrations. Rewards because of our students' successes, or research outcomes. Frustrations because of a lack of resources (especially when living in the Third World) or management "misunderstandings". As scholars or scientists we surf on the Knowledge Society, still to come, hoping for a future, if not made of wine and roses, at least structured by a scientific mind. So, every day we push towards this goal, helping our students to build such a mind. Fortunately, the training of doctors in the field of research is a mission that all universities assume, and this time-space moment does constitute a privileged timing to put forward a scientific mind. But what do we know about the teaching-learning process that is carried out at this level? Not Much! We teach by habit, taking for granted the Know-How was a PhD-related bonus.

For one, the thesis mentoring process is nothing but known; is it due to the reserved nature of the relationship between a student and his mentor? Not to say secrecy? For sure this type of training is very particular, almost like companionship training, with a strong and personal relationship between the director (of thesis) and the student. But nowadays, the conditions of the training have drastically changed. The research field is more or less organized like an industrial process, with a division of the labor, and research is carried out in the form of a collaborative work, comparable to the film production. The student is, in a great measure, a worker who participates in a team leaded by a credited investigator who acts as his tutor (thesis director). However the constraints of productivity, of efficiency plus the rhythm of production do not allow, as before, an efficient individualized training of the student. At the end of his training, a student will be competent in the sector he has been working in, but his knowledge of the scientific field will be full of holes. Will his mind be scientific or merely technical? In order to help we must develop a better understanding of the processes going on.

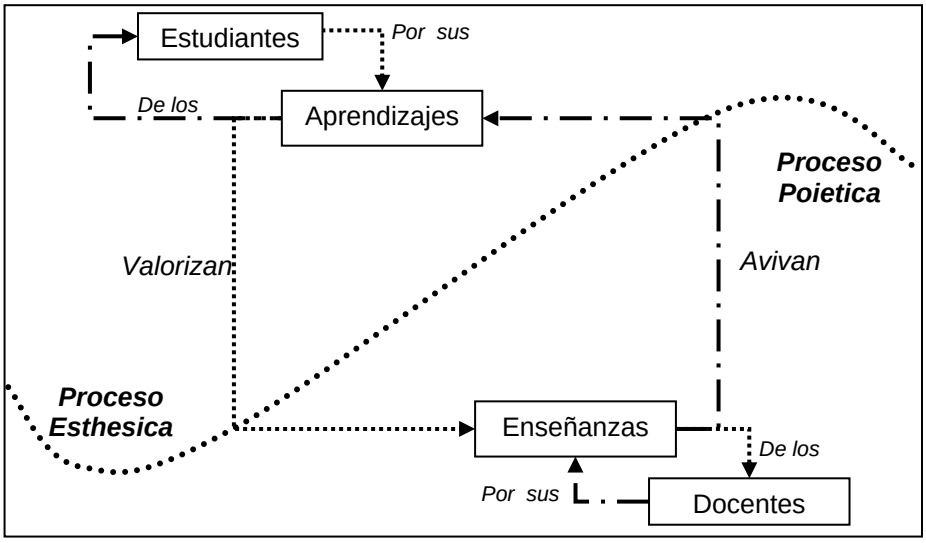
Let's sketch the relationship mentor-student starting from the positions of these two actors. As an educator, the mentor initiates (we must start at one end or the other) a process of teaching, and doing so, he mobilizes, activates or energizes the capacities of his student to learn. On the other side, the student will interpret the educative message in accordance with his own characteristics and those of his environment, and, doing so,

he will give value the mentor's teaching. It is conceivable then that the relationship between both of them be built on the articulation of two processes.

Through his educative activity, the mentor builds a message made of conceptual or practical knowledge as information. Developing such a message, the mentor will have to design a structure to shape the information so that the student be able to understand it. Doing so, he will give a form to his message, integrating as a whole not only pieces of knowledge, but also values, bits of experience, all subject to the conditions prevailing at this moment. In other words, he will be creating something similar to a work of art.

We know that a student, within his learning activity, will produce his proper understanding of the educative message he received, accordingly with his previous knowledge, his personal characteristics and with the conditions prevailing at that moment. That means he undergoes a process through which he receives, perceives and interprets the message. In other words, he is building a personal interpretation of the educative message similar to the interpretation of a work of art.

The meaning of such a message resides in its form made of signs not in the materials it is made of. This educational setting may therefore be compared to some semiotics setting as the one proposed by Nattiez (1990) and it may be opportune to use such semiotics concepts to draw a schema of the involved processes. As pointed by C. Castoriadis (see Morin, 2002, p. 60), the educational process may be typed as *poietic*, and the interpretative one as *esthesic*.



Figures 1: Outline of the relationship trainer-student in a tutorship situation.

The distinction which Gordon (2002) is referring to allows differentiating an allopoietic process, meaning *educational for*… from a homeopoietic one, meaning *educational with*…. This distinction qualifies the mentor's relationship towards his students: or his intervention will be of value for all his students, or it will be defined within the relationship itself.

On the other hand, the esthesic process may integrate the double distinction "emic" and

“etic” introduced by Pike (no date) in social sciences to describe human behaviors or perceptions according to two interpretations. The introduction of this distinction in the field of the education would permit qualifying how a student perceives and interprets an educational message, mainly with his own criteria, or with academic ones, the result being a more customized learning in one case, and a more standardized one in the other.

The articulation of the educational processes, as drawn, gives an effective analytic grid which switches, partially, the issues of education from sciences to arts. The debate is not new, but if we do not oppose sciences to arts it may prove positive in the understanding of the learning process and the building of a scientific mind. We however need to deepen a little more the issues. What are the factors an educator must deal with while building such an educational message? There are a lot of them!

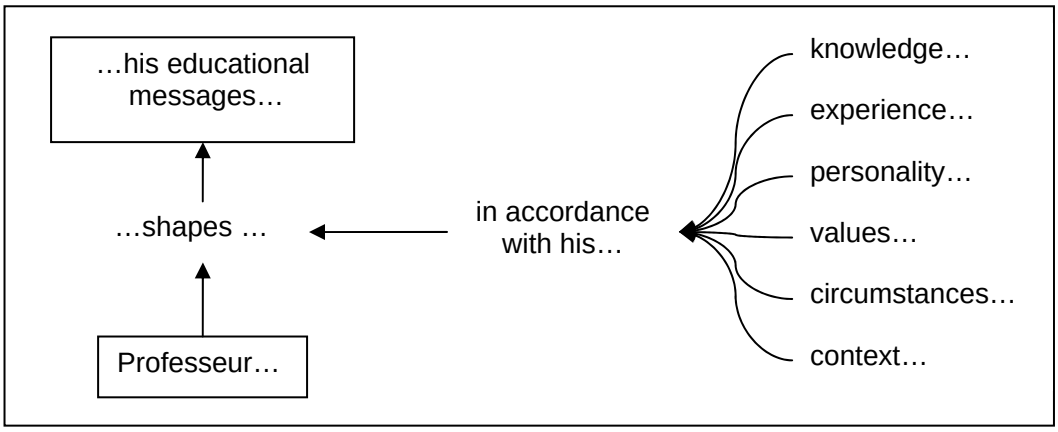


Figure 2: The sets of factors influencing the shaping of educational messages.

Among these sets of factors, there are two of them which may affect the building of a scientific mind whatever the personal characteristics of the trainer be; these are the values and the context ones.

Aside the general values one may share with his social community, a university trainer will integrate, consciously or not, scientific values as shaping variables in his educational messages. To illustrate the issues, we may retain three large sets of values which support methodology values: the Respect of Things or Beings, human, natural or else, supporting values like Fidelity and Relevance; the Logic of Reasoning (Validity and Credibility); and Honesty (Reliability and Liberty). Unfortunately, nowadays, these sets of values are far from being enforced in our societies. The facts of life the newspapers and the television are reporting daily underline an amazing lack of value (war with its ugly aftermath, political corruption, environment deterioration, and so on) or promote antagonistic values such as Power (of the strongest, the richest, …) or Free-for-all. Since the students are interpreting the educational messages under the influence of such non-valuable informative realms, even though we do not know exactly how values are assimilated, we may expect difficulties in the transmission of scientific values.

There are as many contexts as there are actors, but if we consider the scientific context on a World-Wide scale, it is easy to fix a border within this context between developed countries and emerging or developing ones. The conditions scholars of the South are

facing do not help them to construct a scientific mind. They have limited access to scientific information which is mainly produced in the North. They cannot afford the up-to-date technical devices research requires. They lack founding resources. They lack qualified trainers. So we may ask ourselves if it is worth to build a scientific mind without 2/3 of humanity.

Even though we may develop a better understanding of undergoing processes in the field of education, and thus be able to sustain more adequately the building of a scientific mind, we are facing antagonistic and unfavorable contexts to such carrying out. Daily news is broadcasted as a show, a live one, without a bit of criticism. Is this informative context imprinting values? Which ones? How? We do not know for sure. The North-South Gap, either technical or financial, is here to stay, even though every body is holding forth on it. We will have to live with it until it bursts open, one way or the other. Whatever we may do it will be a like a drop of charity in an ocean of misery. May it be worth trying it? Probably! With the support of the communication and information technologies at our disposal, new ways of cooperation and collaboration have emerged which could help. Let's think, for example, about the organization of virtual collective expertise through communities of practice. Integrating southerners and northerners, with equal status, in such virtual groups could be a way to help solving partly few of the problems. We may think networking service sites giving access to scientific resources. The main idea is to promote sharing; even though southerners do not have much to share, they still detain, at least, a specific experience which could be of some help to northerners. Above all, they have a mind and they may share their thoughts.

References

Gordon, R. (2002) A Little Ambiguity Can Go a Long Way. France: Learning Institute Development. Consultado el 20 de abril 2005 en http://www.learndev.org/ambiguity.html#anchor1248183#anchor1248183

Morin, E., Ciurana, E. R., Motta, R. D. (2002). *Educar en la era planetaria*. Barcelona: Gedisa.

Nattiez, Jean-Jacques (1990). *Music and Discourse: Toward a Semiology of Music* (Musicologie générale et sémiologue, 1987). Translated by Carolyn Abbate (1990). ISBN 0691027145. Consultado el 26 de abril de 2005 en: http://en.wikipedia.org/wiki/-poietic

Pike K. L. (sf), A Stereoscopic Window On The World. *Personal sitio Web*. Consultado el 22 de abril 2005 en: http://personalwebs.oakland.edu/~kitchens/150d/pike.html

Visser, J. (2002) Rational en *BOOK OF PROBLEMS*. (Ed. Jan Visser) Presidential Workshops and Interactive Discussion Sessions at the International Conferences of the Association for Educational Communications and Technology Dallas, Texas, November 12-16, 2002, and Anaheim, California, October 22-25, 2003. On line book accessible at: http://www.learndev.org/