

Adding Rigor to Teaching and Learning

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Introduction

Heated and interesting discussions abound on the desire to make teaching and learning rigorous. What this actually means will vary, depending on the participants' fields of endeavor, their past experiences in the classrooms as students and instructors, and the response they get from using a multiplicity of strategies in their teaching. Every teaching-learning situation has its own rigor. The precise measurement of this rigor may be elusive, but aiming to have it, and to have more of it, is extremely desirable. That is the reason for putting the words adding rigor in the title of this paper.

Teachers, instructors, and professors would probably agree at the outset that some measure of rigor can be brought about if students (at different ages, at different levels of their academic pursuit, and in different courses)

- Can get excited about a subject,
- Can get personally involved in it,
- Can see its relevance in their own lives, and
- Can relate it, and see its connection, to other areas of study.

The perennial question, then, is how to bring this about, how to implement it, and how to sustain it. Of the three main component parts of education:

- The objectives (or the why of education),
- The content (or the what of education), and
- The methods (or the how of education),

it is very obvious that clearly stated (by teachers) and understood (by students) objectives would be extremely helpful. It is equally obvious that the well organized and neatly sequenced curricular content would add much to the task of "rigorizing" teaching and learning. But it is the methodology utilized that will be the biggest single factor contributing to rigor. The following venues in methodology, which can be implemented to different degrees of simplicity or sophistication at the elementary, secondary, college, or post-graduate levels, will be the focus of this article. While the five venues are discussed separately, it should be understood that there exists a great measure of overlap between them.

Relevance to Students' Lives

The more relevant a subject is to students' personal lives, the more rigorous it becomes. The relevance itself will vary with different students. There is no guarantee that the same methodology or approach will have the very same effect on different students. It is all relative. There is hopefulness involved, however, when an attempt is made to show students, in a real fashion, how a subject, or different aspects of it, can relate to their personal lives.

Here are some examples:

1. In a language arts class (on all levels) students should, in a very practical way, see for themselves that good communication skills (through improved language proficiency) can
 - Earn them better grades in all their courses.
 - Improve their relations with family members and friends,
 - Develop the possibility of having pen pals, and
 - Help in landing them better positions in the future.

2. In a social science class (like history and geography), while facts are important, getting the students interested in different places to visit nationally and abroad, having their interest whetted to visit museums, learn about world cultures, and see how past events have contributed to their and the world's situations, would make a course come alive for them. Those things in themselves can motivate them to ask more questions and to seek more resources to widen their horizons.
3. In all science classes there are innumerable facts and elements that relate to students' health and environment, which can ignite a variety of interests and involvement beyond the confines of a course. To illustrate this point, I recall a friend of mine who was a pharmacist. He was asked to teach high school chemistry classes for a couple of years. To begin with, he had a very pleasant personality, and he related well to people. His friends and customers flocked to his pharmacy for advice on, and prescriptions for, their maladies. In his chemistry classes, he related the chemical elements in his course to the effects they had on people's bodies and how to handle health problems that their family members were facing. In time, he often received thank you notes from his students' parents for the advice he provided. The students adored him. The relevance of their chemistry courses was truly experienced. And who knows how many of those students were motivated enough to major in chemistry or pharmacy or any other science?

Interconnectedness of Disciplines

There is definitely some importance in dealing with specific details related to a specific subject. The relevant facts should be taught and learned in practically all subjects. However, compartmentalizing subjects can be limiting in its possible scopes. To view matters in perspective, to see them in relation to other areas, to approach them holistically or globally can have many advantages, chief among which is the fact we live our lives holistically. All elements and conditions in our lives are at play all the time. The interconnectedness of disciplines is not limited to viewing things congruently. People's mental scopes are greatly widened when they see comparisons and contrasts in relation to a number of similar or different areas of thought or endeavor.

There is a real connection, for example, in all the natural and physical sciences. While the details in any one course are extremely important, the meaningfulness of that very course can be multiplied manifold when those details are compared and contrasted with, or at least related to, other subjects. For example, it is important for students in a physics class to learn about centigrade and Fahrenheit degrees and how to convert degrees from one to the other. An added relevance can be seen when temperatures like the boiling point of water (100 degrees centigrade and 212 degrees Fahrenheit) and the freezing point of water (0 degrees centigrade and 32 degrees Fahrenheit) at sea level can change measurably above and below sea level.

In a history course, wouldn't it be much more interesting, challenging, and relevant to relate different eras to the prevailing cultural, social, and economic features? Then it would be much more meaningful for the students to compare and contrast certain of those features to prevailing conditions and circumstances in their own national settings. Similarly, it would mean considerably more to students, in discussing different wars, to relate those wars to the effects they had on health conditions, economic situations, and demographic upheavals, which would constitute eye openers to what is happening currently in different parts of the world.

Bloom's Taxonomy of Educational Objectives

In the Department of Education at Marymount University we try to model the application of Bloom's taxonomy of educational objectives in our training of prospective teachers. We also require pre-service teachers to include a number of objectives in their unit and lesson plans that reflect a variety of levels of thinking. To some extent this is practiced in their student teaching. To make students move progressively from the basic level of gathering information to higher levels of thinking (including, for example, understanding and interpreting the information, applying it in a number of ways, integrating it with other bits of their experiences, assessing the use of it in varying situations, and creating new ways to implement it) can be exceedingly stimulating, challenging, and gratifying to students' minds and intellectual curiosity. And this can be applied (from the simplest to the most sophisticated ways) on all academic levels. I have seen examples of similar approaches and strategies practiced by our student teachers in elementary and secondary language arts and social science classes. In my graduate classes, a good number of students have used such methods themselves with a great sense of accomplishment.

Howar Gardner's Multiple Intelligences

All people, whether with great powers and abilities or with varying degrees of disability, have a good number of talents and capabilities at a wide spectrum of levels. Great orators and famous writers, obviously, have good linguistic intelligence. But anyone who understands language, appreciates vocabulary nuances, or writes well has some measure of linguistic intelligence. Engineers and interior decorators, presumably, have spatial intelligence, but anyone with a good sense of direction, for example, has some measure of that. Similarly, famous singers, musicians, and orchestra players and conductors are said to have great musical intelligence. However, let us not make the mistake of labeling a person who appreciates (and likes to listen to) music as void of such intelligence. And the same is true of all the other intelligences: naturalistic, artistic, mathematical, interpersonal, and intrapersonal. Teachers and professors who know their students well (meaning those who know their students' strengths and weaknesses, talents, abilities, dreams, and aspirations) are in a much better position to have their students use their intelligences to further their achievement of the courses' objectives. The interest that this approach generates in students can make all the difference in their academic pursuits and achievements and create in them a sense of contributing substantively to class participation and develop a feeling of being creative and productive in their own right.

The Sky's the Limit

A great stimulator of intellectual endeavors is broader horizons, where what is referred to as lateral thinking can occur. It can also be known as thinking out of the box and, sometimes, as the sky's the limit. For the first example, I'd like to mention the experiences I had as a college student with two English literature professors. One of them asked the whole class to read one novel to be discussed in class and to have written tests on it. It was a good course. We discussed the setting, the theme, the plot, and the novelist's literary style. We analyzed the characters and we took different roles impersonating the various characters and developing dialogues to match their attitudes and behaviors. We knew that novel thoroughly. The other professor asked each of us to pick a novel of our choice from the same literary era. In our class discussions, each of us, rather briefly, reported on our impressions of the settings, the plots, the characters, and the literary styles involved. We got to know our own novels very well, but then we indulged in comparative and contrastive discussions that broadened our views and understandings and got us acquainted with the other novels that our colleagues had read and analyzed. Needless to say, it was a much richer experience.

For another example, in one of my graduate courses dealing with the teaching of language pragmatics, the emphasis is on having my students, the prospective teachers, train their future students to be communicatively competent – that is, to determine what they want to communicate effectively before they dip into their reservoir of language elements to select what is most appropriate for a particular situation. In one of our discussions dealing with sentence structures (affirmative, negative, and interrogative) I pointed out that traditional grammar exercises ask students to change sentences from the affirmative to the negative and interrogative forms. I told them that it is much more important practically to determine exactly what information we are seeking before we form our questions. Then I put a sentence on the board such as:

Our history teacher asked us to write an essay on the main causes of World War I. Then I asked them to write as many questions as they could in five minutes, depending on what information they were seeking. I gave them four examples:

1. Who is your history teacher?
2. Does your teacher ever relate the two world wars?
3. How long a time did your teacher give you for writing your essay?
4. Is this a semester or a year course?

Interestingly, after five minutes, they read over a hundred questions. The exercise was an eye opener for them. To conclude this article I will mention that this approach need not be limited to strictly academic settings. It can also be applied in other activities such as social games.

After dinner at a friend's home, the host wanted to entertain his guests by giving us a thought-provoking quiz. He gave us series of numbers preceded and followed by blank spaces that we were supposed to fill.

____ 2, 4, 8, 16 ____

____ 6, 10, 14, 18 ____

____ 3, 9, 27, 81 ____

____ 6, 3, 3, 7 ____

All of us got the first three:

1, 2, 4, 8, 16, 32 (doubling progressively)

2, 6, 10, 14, 18, 22 (adding 4 progressively)

1, 3, 9, 27, 81, 243 (tripling progressively)

We all failed to get the fourth set, which should have been

2, 6, 3, 3, 7, 5

The host then said, "All of you were only thinking of mathematical computations.

The numbers in the fourth set represented the dates of the first Mondays in the first four months of 2014. The first blank date was to be the first Monday of

December, 2013, and the second blank date was to be the first Monday of May, 2015."

This was a case in point. The sky's the limit.