On Improving Teaching and Learning Outcomes in Science

Ara S. Velasco, Ed.D.
Luakan National High School

The goal of Science curriculum is clearly expressed in the 2010 Secondary Education Curriculum- achievement of scientific literacy. It is defined as the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity (United States National Center for Education Statistics, 2011). It also includes specific types of abilities. (National Science Education Standards, 1996).

These standards also describe a scientifically literate individual- a person who can ask, find, or determine answers to questions derived from curiosity about everyday experiences. It is also referred to as a person who has the ability to describe, explain, and predict natural phenomena. Scientific literacy requires being able to read with understanding articles about science and to engage in social conversation about the validity of the conclusions. Scientific literacy implies that a person can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed. A literate citizen should be able to evaluate the quality of scientific information on the basis of its source and the methods used to generate it.

Scientific literacy also implies the capacity to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriately. But how can scientific literacy be developed in an individual? Who or what can help a learner achieve this kind of learning? There are various models, learning theories, and approaches that explain how a learner can acquire the desired skills, knowledge, and attitudes... but everything boils down to the people who are responsible for molding the heart and mind of their students.

They are the ones who foresee what can be accomplished and what cannot be accomplished. These individuals also need to educate and invest in themselves to acquire lifelong learning skills so they can help whom they teach to acquire the same skills. These same individuals are those who inspire, motivate and teach that there is pleasure in teaching and learning. They are the teachers.

Why the teacher? First, it is the teacher whom the learner gets exposed to. The quality of instruction provided by the teacher determines greatly the extent of learning the learner achieves. For this reason, the Department of Education invests so much in human resource development by training both the trainers and teachers. Much of these trainings are aimed at equipping the teacher with the skills that he/she needs to facilitate and transfer learning to the students. DepED implemented several ways to help teachers achieve their goal of improving learning outcomes. To cite, UbD or Understanding by Design, application of HOTS or Higher Order thinking Skills and CBI or Content-Based Instruction, teaching with Information and Computer Technology (ICT) and Computer-Aided Instruction (CAI) have been some of the classic examples of these strategies.

One of the earliest changes adopted was the Understanding by Design under Secondary Education Curriculum. This strategy was one way of addressing the issue of improving teachers' competence and efficiency in lesson and activity planning for the achievement of desired learning outcomes. This framework was designed by Grant Wiggins and Jay McTighe which they called UNDERSTANDING BY DESIGN.

Understanding by Design (UbD) is a framework for improving student achievement. Emphasizing the teacher's critical role as a designer of student learning, UbD works within the standards-driven curriculum to help teachers clarify learning goals, devise revealing assessments of student understanding, and craft effective and engaging learning activities. Teachers need to teach for understanding and do it by design. The design reflects on three-stage design process called "backward design" that delays the planning of classroom activities until goals have been clarified and assessments designed. It emphasizes that lessons should be logically inferred from the results sought and activities which are most comfortable. (Wiggins, & McTighe, 2005).

This approach also aims to help teachers reengineer their teaching skills, method, and techniques which would enable their students develop and deepen their understanding on the subject matter, self-learning and social learning.
Another important fact is that students reveal their understanding most effectively when they are provided with complex, authentic opportunities to explain, interpret, apply, shift perspective, explore, and self-assess. In this regard, teachers are encouraged to use ICT and CAI. With utilization of the modern technology, teachers can provide learners with vivid and concrete pictures of the concepts that students should understand. CAI or computer-aided instruction helps the teacher present the lesson in style and with ease. These modern technology and equipment help the teacher manage and save time in terms of preparing or making the needed instructional materials. ICT provides all kinds of learning activities, references, visual aids that are needed to enhance learning. Aside from these, if the teacher demonstrates technological fluency, students’ interest is sustained and they are most likely to be more motivated to learn. Another important thing is the teacher’s ability to ask the right questions during the presentation of lesson which greatly affects how the learner thinks. Teachers need to employ the art of questioning and hone the higher order thinking skills of the students (HOTS). By asking thought-provoking questions, students could climb higher in the Bloom’s Taxonomy of learning.

One more important approach that can improve teaching and learning is applying the content-based instruction (CBI). Content-Based Instruction (CBI) is a significant approach which is designed to provide second-language learners instruction in content and language. (Brinton, Snow, & Wesche, 1989).

What are the benefits of using CBI? First, learners are exposed to a considerable amount of language through stimulating content. Learners explore interesting content & are engaged in appropriate language-dependent activities. Learning language becomes automatic. Second, CBI supports contextualized learning; learners are taught useful language that is embedded within relevant discourse contexts rather than as isolated language fragments. Hence students make greater connections with the language & what they already know. Third, complex information is delivered through real life context for the students to grasp well & leads to intrinsic motivation. Lastly, In CBI information is reiterated by strategically delivering information at right time & situation compelling the students to learn out of passion. (wikipedia.org/wiki/Content-based_instruction).

In using CBI, students learn through doing and are actively engaged in the learning process. They do not depend on the teacher to direct all learning or to be the source of all information. Central to CBI is the belief that learning occurs not only through exposure to the teacher's input, but also through peer input and interactions. In the light of these ideas presented, the author believes that a teacher should, as much as possible learn these things. Nobody can give what she or he does not have. As a person who transfers knowledge, she can only transfer what she has or what she knows. This means that teachers should not only be good role models of good values but be an exemplar of technological fluency (with the use of CAI and ICT), communicative competence (CBI), motivates students to think (HOTS) by applying the art of questioning, and make sure that students acquire the desired knowledge, skills, and attitude (UbD) that will make them functional citizen who are instrumental in the attainment of the national development goals stated in the Philippine Constitution.

References:
http://en.wikipedia.org/wiki/3S_Understanding
wikipedia.org/wiki/Content-based_instruction