The Purpose of Education

Education and its purpose can typically be defined as a system of training and evaluation to prepare individuals to fulfill current and anticipated needs of their society. Moreover, the system should prepare creative individuals capable of aptly fulfilling **unanticipated** and **unpredictable** challenges. Various theories on modern education have been proposed and evolved since the late nineteenth century. The works of three theorists have been especially influential, namely those of John Dewey (a leading figure in the progressive education movement), Ralph W. Tyler and Maria Montessori. Given that the Montessori educational philosophy is mainly focused on early childhood education, the focus here will mostly be on Dewey and Tyler.

Dewey, Tyler and philosophers who subsequently built on their thinking, all agreed that **learning cannot be achieved through the passive transmission of information**. Furthermore, they agreed that **learning must be active**. The question, however, is: **what is the best active learning method**? Based on my understanding of the works of Dewey and Tyler, the main difference between their thinking is the postulation of learning objectives. Tyler recommends that a teacher define clear learning objectives, whereas Dewey would not. Dewey's philosophy emphasized the realization of individual potential which differs from one pupil to another. As Dewey's philosophy is certainly harder to implement in large classroom environments, Tyler's methods have become more dominant, at least in the American educational system.

Based on my personal experience as a student, in addition to observations made through tutoring in high school and as a TA in graduate school, my teaching philosophy is closer to Dewey's. Moreover, three statements have particularly come to shape my philosophy on teaching and learning:

> "Tell me and I forget. Teach me and I may remember. *Involve* me and I *learn*." (Philosopher Xunzi)

> "It doesn't matter what we *cover*, it matters what you *discover*." (MIT physics professor Victor Weisskopf's response to freshman students inquiring about what he would cover in class)

> "Education is really aimed at helping students get to the point where they can *learn on their own*." (MIT linguistics professor Noam Chomsky)

In attempting to implement these ideas into a practical strategy, it is necessary to **distinguish between literacy and knowledge**. We can typically assign such skills as knowing the alphabet, arithmetic symbols, meaning of abbreviations in a particular subject, etc., as basic literacy. This type of information can be extended to more advanced subjects, and we can talk of literacy in the layout of a computer keyboard, or literacy in the identification of a pipette in a laboratory. Knowledge is more abstract and depends on forming relations amongst subjects, usually using the *literacy* gained in that domain. In other words, knowledge is a fluid mental model of something whose construction depends on the learner's previous background, motivation, etc.

A good teaching strategy would be to impart the basic literacy of a subject effectively to students, followed by helping the learners discover the big picture in the subject, through which they will necessarily be exposed to various pieces of pertinent information. Consequently, knowledge is actively discovered and would differ from one learner to another. It may therefore not be surprising that tutorial-based teaching methods, in which the content and style of teaching are naturally altered based on constant feedback from students, perform better compared to didactic teaching techniques (Benjamin S. Bloom, *Educational Researcher* 1984). Such methods, however, may at times be impractical to set up given the requirements/limitations of the institution or classroom setting.

Backward Design: Objectives as Signposts

To demonstrate that the above strategy can be implemented practically, I will state elements of a sample syllabus geared towards, for example, an undergraduate philosophy of science course. Here we will use a backward design, so that we first start by defining a number of intended learning objectives (ILOs), which will be followed by building course components that aim to achieve those objectives (as a side note, it may be worth mentioning that this concept is similar to *mechanism design theory* in the field of economics). Because each student may discover something unique and unpredictable in the course, the ILOs aim to achieve a certain *context* rather than a *mental outcome* in the course. They are also meant to impart **modes of reasoning** to the learner. In other words, on the spectrum of 'skills', 'knowledge' and 'attitudes' (SKA), these ILOs are closer to the 'attitudes' end of the spectrum. Five such ILOs can include:

1- Augment rational arguments and thoughts on the role of philosophy in contextualizing the work of a person inquiring about the surrounding world, i.e., a scientist.

2- Augment rational arguments and thoughts on the role of science as a means and not an end in itself.
3- Augment rational arguments and thoughts on the role of (internal) language in forming scientific theories and in setting inherent limits on communicating those theories to others.
4- Augment rational arguments and thoughts on the notion that meaning (of words, concepts, etc.) in the mind is beyond mere references to physical objects in the outside world.
5- Augment rational arguments and thoughts on the role of the "capacity to wonder" for making leaps in understanding.

Assessing the Path to Understanding

The example ILOs stated above may not necessarily be quantifiably measurable; however, they can be qualitatively measured via the depth of argumentation in a course essay with an accompanying presentation. More specifically, students will be asked to write a short essay and present it at the very beginning of the course on a subject chosen from a list. They will then be asked to expand this essay (and presentation) significantly at the completion of the course, and the change in argumentation and reasoning can be assessed.

In general, the true purpose of assessment is to provide *constructive* feedback to the learner (and the teacher) on their progress towards the learning objectives. As such, effective assignments and exam questions should refer directly to the goals set out in the ILOs. A useful way of categorizing the types of possible questions is the six levels of cognitive testing set out in Bloom's taxonomy: (i) remembering, (ii) understanding, (iii) applying, (iv) analyzing, (v) evaluating and (vi) creating. Given that each level of the hierarchy builds on those preceding it, matching the appropriate level of questions with the stage at which the assignment/exam is administered in the course (chapter tests, midterm, final, etc.) is imperative. In addition to essays and presentation assignments, how can one approach multiple-choice modes of examination in bigger classrooms? My preferred multiple-choice design is to in fact provide the answer choices to the person marking the test rather than the examinee. Specifically, students would write a one- or two-word answer in an empty box in front of each question. The marker's answer key would contain a range of possible correct and partially correct answers. Moreover, the answer key can be adjusted in case a majority of students answer a question with a completely different perspective as that envisioned by the examiner. These types of questions would take longer to evaluate and cannot be administered as frequently as traditional multiple-choice exams. Nevertheless, having fewer tests, but of a higher quality (and fairness), may be more valuable.

Teaching Style Matters

Although the theoretical aspects of one's teaching methodology are important, teaching style also matters. I usually like to start any classroom session using an example or case study, on which all subsequent concepts will be built. This is similar to the human capacity of learning a language, in which we all acquire our native tongue based on many disparate (yet quite limited) examples from the environment during our early formative years. The progression of each part of the lecture will be gapped by activities or natural audience participation. The distribution and frequency of interactive activities between the lecture components of the session will be based on a model proposed by Karl A. Smith (*New Directions for Teaching and Learning* 2000). Moreover, while interacting with students, positioning becomes important and the teacher could move around the classroom to give a dynamic feeling to an ongoing conversation. For visuals, a balanced use of slides and the board will prevent a monotonous mood from settling in during the session. Educational technologies such as visual aids or computer programs will only be used if they enhance and advance a particular learning objective and not for the sake of using technology itself. Lastly, as alluded to earlier, all feedback on assignments and tasks will be constructive and, if necessary, of a "**wise criticism**" or "praise sandwich" nature. The latter approach refers to the inclusion of a critical comment in between two positive comments.

It might be apt to conclude with what seems to be a truism, but is sometimes neglected. Regardless of the number of strategies and innovative curricula one implements in a classroom, **the only indispensable element in the students' learning environment is the teacher** (lecturer / professor / instructor / facilitator). That is to say that one cannot expect to create a set of conditions in which the teacher becomes modular and transferrable, similar to the other aspects of the curriculum. Even in the most ideal and preplanned of situations, who the teacher is, matters. A teacher's character is more or less static, but open to introspection. A statement on one's teaching philosophy, therefore, can be thought of as a reflection of the teacher's own character.