



NOTES TO BEGINNING TEACHERS*

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Preparing students to teach science has been my profession since 1966, but my preparation for this role began much earlier. In 1958 as a junior in college, I spent a lot of time thinking about what I wanted to do with my life. I knew I loved science and people and wanted to think of a career involving both when I began reading a book by Charles Schlieter titled *Science in A Tavern*. The beginning chapters in the book dealt with the early days of modern science when the Royal Academy held its meetings in taverns and discussions raged into the night. One chapter was different from all the others in that it did not address science - - it addressed teaching; and, reading and rereading this chapter convinced me that Schlieter was correct in stating, "Teaching is more than an art to be practiced, it is a life to be lived." Schlieter made other statements that defined a career path that I continue to hope describes what I have embodied in my teaching. For example, Schlieter, who was a freshman algebra teacher for most of his career, stated,

"But actually, I did not teach freshmen. I taught attorneys, bankers, big businessmen, physicians, surgeons, judges, congressmen, governors, writers, editors, poets, inventors, great engineers, corporation presidents, railroad presidents, scientists, professors, deans, regents, and university presidents. For that is what all those freshmen are now and of course, they were the same persons then." ⁵

As a teacher and teacher educator, I have practiced and tried to convince all that we do not ever teach freshmen, we teach students who are in the process of emerging as leaders in our society. This is why teaching is so purposeful, why

*"Notes to Beginning Teachers" is the title of the chapter in Schlieter's book. ⁵



it is a life to be lived, why it is a process of evolving to meet the challenge of emerging youth.

Perhaps Jocelyn Elders, the former Surgeon General, stated it best when she said, "They may only be 10% of our population, but they are 100% of our future." Students have been my future and that is why the messages of Schlieter and Elders are the first I want to communicate to my preservice teachers.

The second message I try to transmit to my students is the attitude that they need to effervesce on the first and every day of teaching. Good teachers radiate an of course you are going to learn aura that reaches every student in their classes. And, these teachers are correct --_ though educators have tried everything, they have never stopped anyone from learning. Learning persists throughout everyone's life. Admittedly, we frequently have problems getting our students to learn in the time and sequence we have planned; however, we have never stopped children from learning. In leading the curriculum reform of the 1960s, Jerrold Zacharias stated this position - - if children could not understand something we were trying to teach, we assumed that it was we who were not clever enough, not the children.² If students do not seem to be learning as much or as fast as you wish on a given day, stop and ask yourself, "Am I being clever enough?" "Is there another approach that may be more effective?"

Message three has to do with planning. I often hear about teachers who "teach off the cuff" with seemingly little planning. However, a good teacher rarely stops planning - - a good teacher is always searching for new and better ideas whether on vacation, watching a favorite TV presentation, listening to a spouse, or exploring the world with children. Planning almost becomes an obsession, a constant search for new approaches to lessons - - because good teachers realize that variety is a powerful influence which determines how, when, and how much their students will learn. Good teachers know that, "To be maximally effective the lesson must stir the heart as well as the head."² One of the most important reasons for planning is to design a sequence of instruction or a path students can and will follow. Questions or the question sequence can become the lubricant that allows the lesson to flow, the students to become engaged, and the path defined.



In designing the question sequence, it is important to realize that one needs to proceed from concrete to abstract. One of the errors of many and particularly beginning teachers is to begin their lessons with an abstraction which only a few students understand. When faced with an abstraction first, many students simply conclude that they are not going to learn the material so they stop trying. I have found that the questioning sequence proposed by Eltsgeest is very useful tool in planning instruction.³ His sequence begins with attention focusing questions designed simply to get the students' attention. The sequence then proceeds to measuring and counting, comparison, action, problem posing, and how and why questions. Eltsgeest talks about productive questions which, as defined, engage the students' in actions other than simple recall and points out that how and why questions are usually recall/regurgitation questions if they are not preceded by the other questions in the hierarchy. Proceeding from concrete to abstract will permit you to engage more students and thereby make instruction interesting to more students. Slichter stated in his talk to teachers, "It is not his task to teach interesting things, as the quacks proclaim, but to make interesting the things that ought to be taught." This leads, immediately, to assessment or what the students already know because it is what they know that will determine what they will learn.

Preservice teachers, however, tend not to be turned on by the words assessment or even authentic assessment. Preservice teachers want to know, "How should I figure grades? Who should get an "A," a "B," and who do I have to fail?" My advice is to make sure you, as the teacher, establish a win-win situation. When students perceive themselves as losers, they begin acting like losers and in no time at all, they become losers. Hence, you need to establish a system in which students think that they can be winners. A win-win classroom! Is it possible? Yes!! First, I think it is important that students know what they are learning. I mean, that they should understand what it means to learn and understand something. Bloom's Taxonomy is an excellent way to classify what ought to be learned and every student should be taught this system. Why? If the students understand Bloom's Taxonomy, you, as the teacher, can tell them about everything that will be on the next test without telling them what will be on the test. Is this a contradiction? No! If the students know Bloom's Taxonomy, you can tell them that the topic being covered on the next test will be "X" or "X+Y +Z" and that the test will consist of 20 knowledge level items, ten comprehension level items, five application level items, one analysis level item, one synthesis level item, and one evaluation level item. So armed, students



could serious study which is a far cry from the students who say, “I don’t know what will be on the test so what should I study?” Let us make school a win-win environment; let us celebrate success. As Resnick stated in following up Ausubel’s statement that the most important factor influencing learning is what the learner knows, “Cognitive self- esteem or that belief that one will learn is equally important.” This concept must be on our minds all the time.

In pursuit of the win-win classroom, my next suggestion to preservice teachers is to engage students in designing rubrics that define what these preservice teachers think will be evidence that they have learned. I started out my college class with the statement that “Active participation in the class is required.” The first rubric my students construct answers three questions: What does it mean to hit the target “Active Participation”? What is a miss? What is in between? I have never been disappointed by my students’ responses - - my students are usually more demanding than I would be. This brings me to the last big message I try to convey to students.

“You can’t learn anybody anything.” This is not only bad English, but students can learn. Teachers can only facilitate learning. How does one become a facilitator? First, one must remember that students often fail to learn something for absolutely trivial reasons. Remember the poem from Franklin’s Almanac.

Because of a nail a shoe was lost.
Because of a shoe the horse was lost.
Because of the horse the rider was lost.

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Until the whole war was lost.

The war was lost for a trivial reason - - a nail. Students frequently fail to solve significant problems for trivial reasons. Your job as facilitator is to eliminate the trivial reasons and that means that one of your most important functions is to listen to students. What they know, not only what you know, influences what the student will learn. In making this statement, I do not mean to dismiss as unimportant what teachers know. What you know also determines what you can teach.



Second, one must remember that we (including students) are all involved in constructing structures that contain our beliefs. Some of these structures become ridged and seemingly immune to change. However, change is possible!

Tell me, I'll forget;
Show me, I may remember;
But involve me and I'll understand!
Chinese proverb.

I have attempted to get only a few ideas across. In summary, offer reminders. First is a paraphrased quote of a colleague who said, I really think there are two brains - - a school brain and a what-I-really-believe-brain. I challenge you, teacher, do what you can to make sure that the "school brain" leaves the school with the student and is used as he/she pursues life. Second is a quote from "P³ = Successful Teaching" - - the Ps were Purpose, Practice, and Pride; one ought to give students a "real" purpose, and enough practice to do it well so that students could share the "pride" of a job well done. My second challenge is that you give each student purpose, practice, and pride.

References

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