



WHAT OUGHT TO BE TAUGHT?

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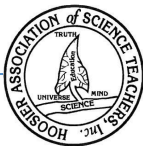
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What ought to be taught? The seventh grade life science text, the tenth grade text, the twelfth grade text, and the freshman college text all include the same content. This is true also of the physical science texts. Need I say it again -- the same, the very same STUFF. Oh yes, we big people at the University demand that students learn more detail -- and the twelfth grade teacher demands more than the tenth grade teacher -- and that teacher demands more than the seventh grade teacher. BUT IT IS THE SAME STUFF WE INSIST THEY LEARN AND RELEARN AND RELEARN AND RELEARN -- or, did I get too redundant? This reminds me of the jingle:

Big fleas have little fleas
Upon their backs to bite 'em.
And little fleas have lesser fleas,
And so on, ad infinitum.

This makes one think. If we could only get elementary school teachers to teach life science, they could carry this repetition right down to preschool. Then, we could almost guarantee that every student, and not just the current 90% plus, would become bored with science, because what is happening in life sciences is also happening in physical sciences. Students are being bored, turned off to science, simply because it has not been made interesting. Science is being taught as a foreign language. Unlike learning a foreign language which may be useful in some future travels, science is not perceived as offering an equal incentive. Of course, we say you will need it in college, but the real beauty, utility, and future that a career in science offers is not made evident. It is memorize those systems, recite the chemical formulas, name that plant, ad infinitum. When did you last ask a student, "How does that plant make a living?" or "Why do you believe that fact?" Is it as important to know why you believe something, as it is merely to believe something? WHAT OUGHT TO BE TAUGHT?



Do not get me wrong. What is being taught is often very important. Teachers usually emphasize learning facts, concepts, principles, and conceptual schemes. I can still recall the Preamble to the American Constitution, the Gettysburg Address, and the Pledge of Allegiance to the American Flag, and many scientific principles. I am most pleased with my ability to recall this information; it is satisfying to know that I have not lost it all -- yet. Then, I think of other things I can recall and things I know in other ways. I can recite Newton's laws of motion. I also know that, when my car rounds a corner, my car will obey Newton's laws -- and the presence of a policeperson is irrelevant. That is more than recalling because this knowledge governs my thinking about driving -- it is more than a tasty tidbit to throw out at a cocktail party. WHAT OUGHT TO BE TAUGHT?

Two years ago I had the opportunity to engage in extended conversation over this question. Assembled were some, but not all, of the best teachers in the State of Indiana. The meetings were heady! (I served as the informal chairperson/ secretary; I think I was awarded this position because I had access to a secretary.) We asked, "What ought to be taught?" I wrote down what was said and it was rendered readable by my secretary. Each time we met we revised, we argued, and we revised some more. The end result was a seventh draft which represented a lot of emotion and a lot of compromise. We decided that it was time to stop and pass the document on to others knowing that continued revision would be desirable and necessary in the future.

This was, for me, a most valuable experience. I had wanted these discussions for 25 years and I enjoyed being a part of them. I did not feel that we had discovered the right answers, but I thought we had put together some good thinking -- some thinking that would stimulate other thinking -- and really, that was our intent.

One bit of thinking this experience caused was to make me recall the admonishments of my first college physics teacher who made this statement almost daily, "Don't be stupid, make a diagram FIRST, then decide how to solve the problem." I had not made a diagram; in fact, I had not even tried to make a diagram. I really felt that I had learned a lot from participating in the year of discussion/debate and I felt that I should try to pull our deliberations together in a concise diagram. Figure 1 is that diagram. The references at the end of the article indicate where more information can be found on each dimension of the "What ought to be taught model."

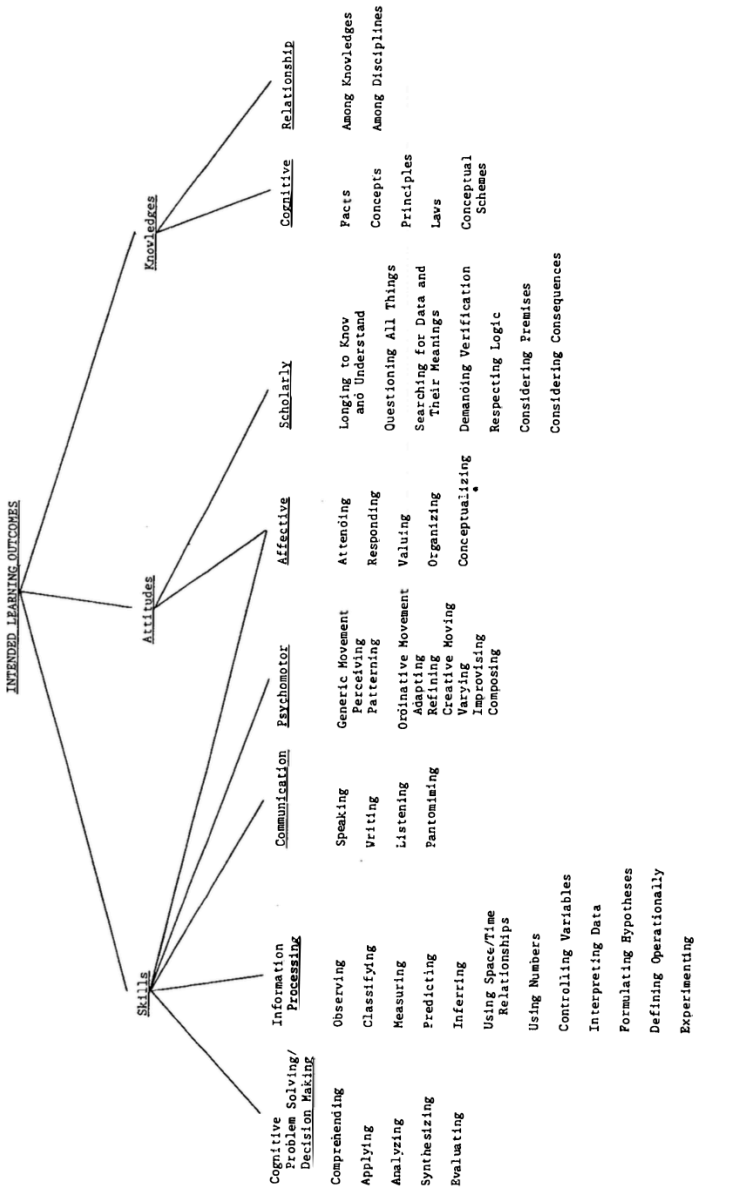


Figure 1. What ought to be taught model



The diagram illustrates eight overlapping domains. At present, only one, Cognitive Facts, receives the emphasis it deserves. We are teaching 1/8th of "What ought to be taught" and in so doing we are even doing that 1/8th an injustice, because the other seven domains contain the glue that holds the model together. Figure 2, "Gluing it all together," attempts to illustrate these interrelationships.

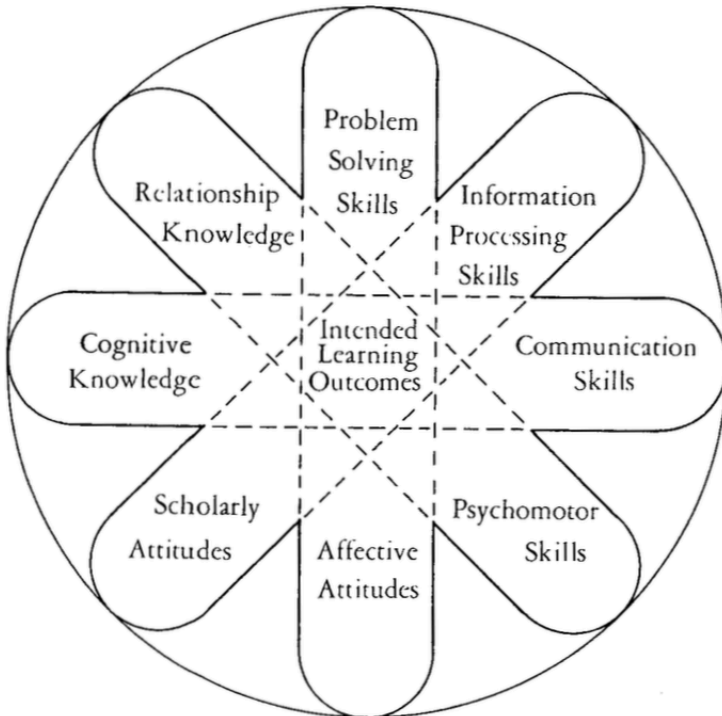
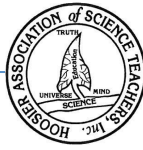


Figure 2. Gluing it all together

One of our group asked, "Why the *&#%#\$* are we doing this?" We knew why. We, too, wanted to know "What ought to be taught." We willingly adopted the idea that, "It is not important to teach interesting things, but to make those things that ought to be taught interesting." Did we know "What ought to be taught?" We had a better idea. And, if we were to meet tomorrow, one of our



group would ask, “What the *&%#\$* were you talking about, Hans?” And we would begin revising again, as will always be necessary. However, the likelihood that fewer domains would be assign to the science teacher is remote. We have much more than knowledge to teach - and we had better do it!

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