

Teaching Resources Center
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FINDING THE SOLUTION ISN'T THE PROBLEM,
FINDING THE PROBLEM IS THE PROBLEM!

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We, as instructors, fail in a crucial way to prepare our students for the tasks ahead of them. Furthermore, we fail our best students the most and we do it with good intentions while thinking that we are doing a fine job of teaching. How and why does this happen?

Most of the significant questions encountered in life--even in academic life--are vague and poorly formulated when first encountered. They have fuzzy edges and may contain contradictory pieces of information. After sufficient work and thought, however, these ill-defined questions may yield problems that can readily be solved by methods we teach in the University. The process of going from a vague question to a tractable problem is the essence of unstructured problem-solving. The factors involved in the question must be identified, sorted out, and the problem itself clearly formulated. Once this is done, the solution often pops out by itself, or at least is easier to obtain than the problem was to formulate in the first place. Karl Popper calls such initially vague questions, "live" problems, and points out that the great value of wrestling and struggling with a "live" problem is the insight that one gains into other related fields.

We rarely require our students to wrestle with live problems. Instead, we usually give them problems that are neatly formulated and therefore "dead." In fact, when an instructor tries to confront his students with a live problem, the students themselves often resist. It is true that we may require them to determine the solution of a clearly formulated problem by using a combination of techniques in a clever way, but how often do we ask them to find that problem in the morass of facts available to them? Where do they learn to ask questions?

Perhaps the greatest barrier to teaching students how to wrestle with live problems is that few of us do it ourselves. It may be that the rewards for solving such problems are not commensurate with the work required. In fact, after the formulation is complete, the solution may be easy to find, and then it is difficult to describe the entire process without it seeming trivial.

The next greatest barrier may be that we tend to focus on content rather than on thinking in most of our courses (content is so much easier to test than is thinking). In doing so we take the easy road, but we do our students--and society in general--a disservice by neglecting to provide opportunities for our students to think through, formulate, and solve unstructured problems.

Let me conclude with an example of a live problem posed by the applied mathematician Colin Clark: *When rototilling the garden, when should you stop to clean the rototiller?*

