# Research led teaching: Definition and views

**Definition:** Three aspects comprise Research-Led Teaching: (1) teaching driven by front line research; (2) teaching by using research activity; and (3) teaching to carry out research.

1. **Teaching driven by front line research:** This issue can be discussed in terms of two objectives: (a) demonstration of the immediate relevance of the taught material to front-line research, and (b) enthusing students through exposure to such research. The relative prioritisation of these objectives should change with the study year. The first one is often an explicit objective of the curriculum. It should be increasingly emphasised with progression. By demonstrating the potential usage of tools and methodologies in current research the students gain confidence in the utility of the knowledge that they are provided with and are therefore motivated to put effort and personal resources into mastering that knowledge. The second objective is more implicit but should play a significant role in the first two years of undergraduate studies. The prevalent methodology in A-levels is to have students memorize methods, facts and formulae. This spoon-feeding approach encourages passive learning and, while necessary to provide a broad-based education, is unfortunately quite often boring to students. Interested students will invest more time and effort in their studies and therefore it is essential to get students involved by appealing to their natural curiosity. Passive learning has little chance of achieving this goal. Rather than demonstrating the effectiveness of methods for already solved problems, a very efficient way to involve students is by pointing out and discussing *open* questions in the field to which the same methods may apply. For example, studying Newton laws on cubic masses that slide down sloped surfaces would invariably fail to spark a student's imagination, while the application of the same laws to understand how a pile of sand can support a person's weight or how avalanches form may well do so. Indeed the latter are examples of problems that have been in the front line of research recently.

The most obvious source of open problems are the educator's own research interests but this should not be the only one. Adopting this approach seriously must involve the development of a broad pool of research problems that are both relevant and potentially intriguing and engaging.

This philosophy should help create an atmosphere which encourages innovative thinking as well as exposing students to new ideas. Students should be encouraged to actively explore questions similar to those discussed by the educator in class and in course work. Very importantly, students should be driven to regularly suggest new problems to explore with the methods that they learn.

2. **Teaching by using research activity:** This relates to the use of research as a teaching tool to augment and complement frontal lectures. Experiencing research activity can increase students involvement and generate questions beyond the taught material. While lectures usually aim at elucidating the generality

of concepts and ideas, research activity can lead students to confront the same ideas in specific contexts enhancing the understanding of relevant issues. For example , using games in economics classroom proved to enhance student interest and learning [1], as did simulated case analyses in psychology classroom.

3. **Teaching to carry out research:** This issue concerns the direct objective of providing students with the means to carry out independent and collaborative research. Achieving this objective involves several aspects, some of which have been surprisingly neglected by educators. We should distinguish between courses aimed at students whose main destination after graduation involves a large component of active research and students who may carry out research only occasionally. For the latter group it suffices to provide the appropriate methodologies and tools to gather data, analyse it effectively and present the research and its results. These involve acquiring a host of skills, such as: information technology, study skills, analytical background, critical evaluation, time management, presentation skills, and others.

The students who intend to engage primarily in research after graduation should be provided with more than that. First, they clearly have to master the above skills, some at a deeper level. For example, analytical skills should be broader and more thoroughly practiced. Second, the educator needs to develop in this group the invaluable skill of ability to formulating questions that facilitate effective research. Currently, there is hardly any effort in higher education not only at the undergraduate level but also at the postgraduate, to address this issue. Another important attribute of good research that is rarely addressed in any systematic manner is creativity. Research is a creative human endeavour in many fields and especially so in sciences where it manifests both when choosing the subject and in exploiting innovative ideas to carry out a given research project.

Generally, the stimulus of research can be exploited to enhance the teaching structure and it is particularly important to do this at the undergraduate level. Although the first years necessarily need to provide a broad-based education, emphasis should be put on the students own engagement and involvemnt. Interested and enthused students learn faster and understand better than passive ones. By and large research is an activity that originates from human curiosity and educators should aim to exploit the curiosity factor that is particularly strong in the early years of study. Students should be encouraged to explore many open questions from front line research and educators should not be afraid to reply "I don't know" because this very reply may drive students to invest time and effort in innovative thinking, which in turn should benefit their development and the education process.

1. R. Fels, J. Economic Education **24**, 365-70 (1993)