"*They made the trip up, but never came back down*"

Social sciences and the knowledge economy

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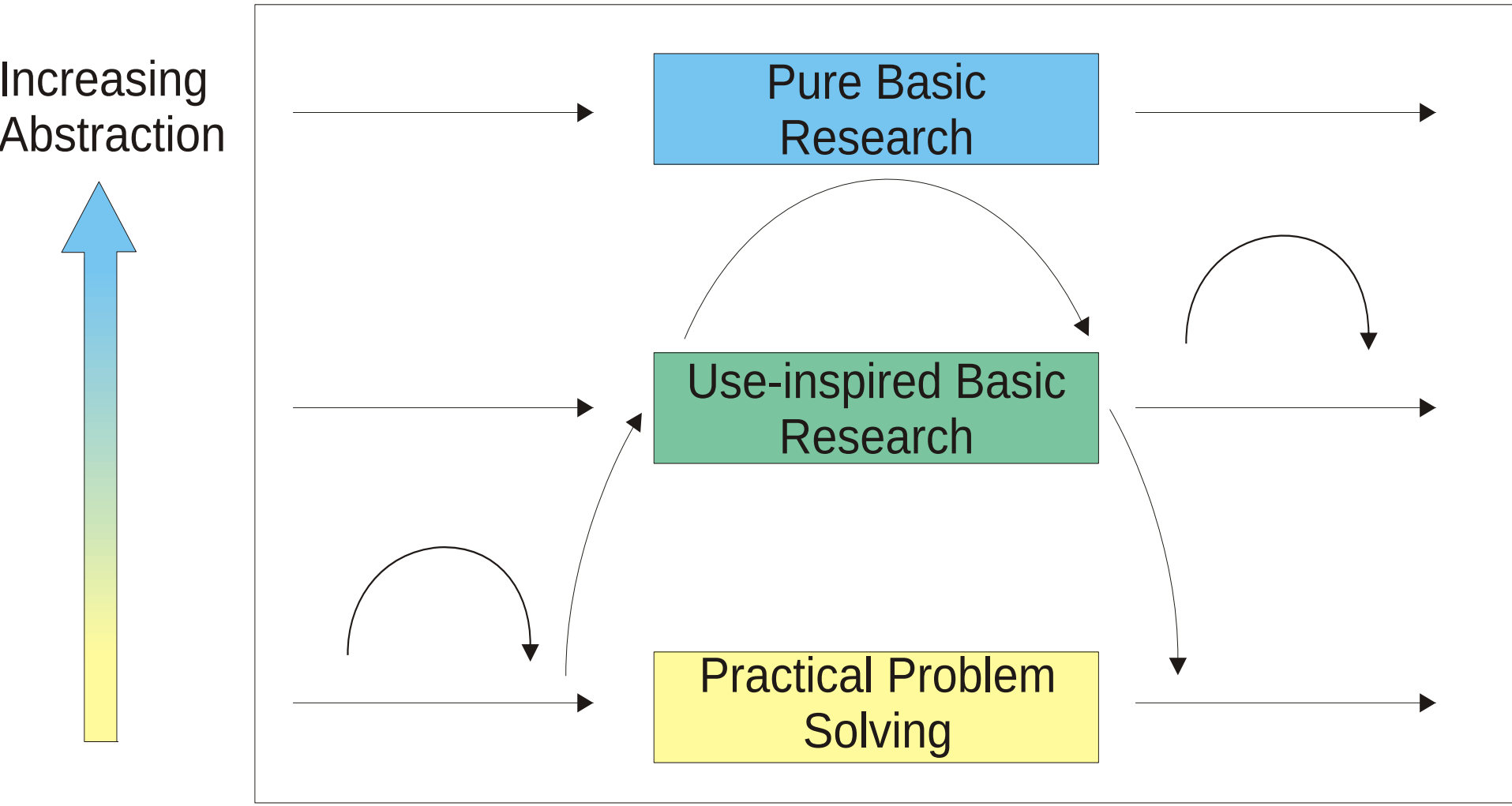
Source:

Paul Romer, 2005

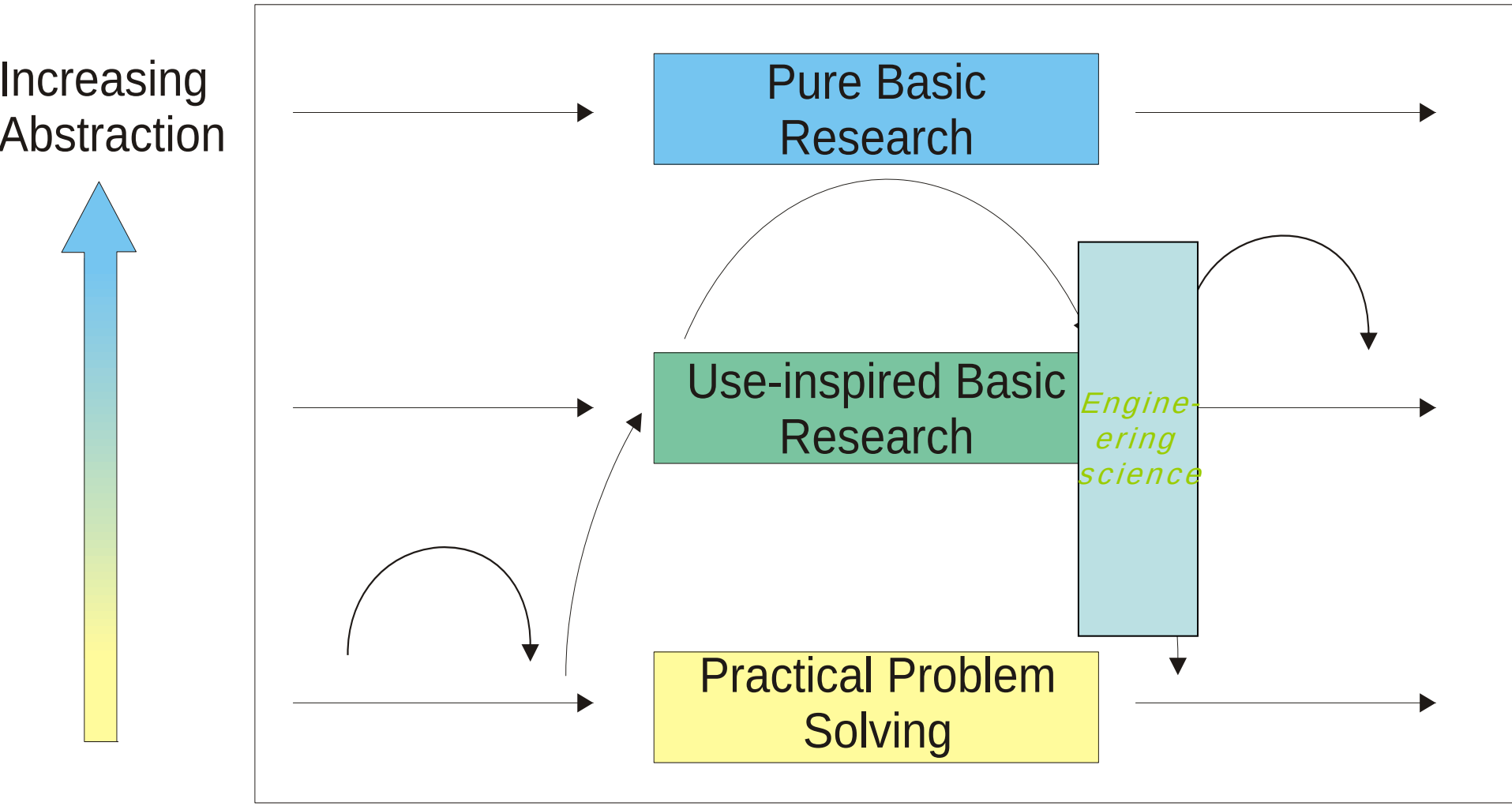
The Arc of Science



Engineering sciences..

- ..supports the gradual transformation of knowledge from ideas to operational concepts, and its passage from one codified form (at some levels of abstraction) to another codified form (adapted to application)
- A pivotal element in the « chain of events » occuring between two spheres – abstract research and concrete application

The Arc of Science



- The knowledge ecology (of a country..): set of institutions, organizations, specializations which are involved in the production, distribution and use of knowledge
- Innovation systems as (desireable) emergent properties of the interactions among the elements of the ecology which go together to solve innovation problems
- Engineering sciences: central ingredient of the knowledge ecology which is conducive to the formation of timely and effective connectivity among agents for the purposes of solving effective innovation problems

From Nelson « uneven evolution of know how » to the Baumol's disease

- « *Today it remains astonishing to observe the contrast between fields where improvement in practice are closely reflecting rapid advances in human knowledge – such as ITs, transportation, medical care (surgery and drug therapy) – and other areas where the state of knowledge appears to be far more constraining. The fact is that knowledge is not being developed to the same degree in every sector* » (Nelson, 2003)
- « *We do have in our economy a progressive sector and a non progressive sector. Although no sharp line divides the two, certain industries fall without any question into the one or the other* » (Baumol, 1973)

- Predisposing structural conditions of the progressive sectors
  - Ability to identify, understand, codify and reproduce best practices
  - Ability to experiment and learn from experiments how to advance practices
- Research in the engineering disciplines aims to develop understanding of what is going on in the operations of the relevant field of practice – so as to illuminate how to advance it
- Development of engineering sciences as a cure of the Baumol's disease

- Do we have something like engineering sciences in our fields?
- If not, is it a problem?
- Evidence-based policy research

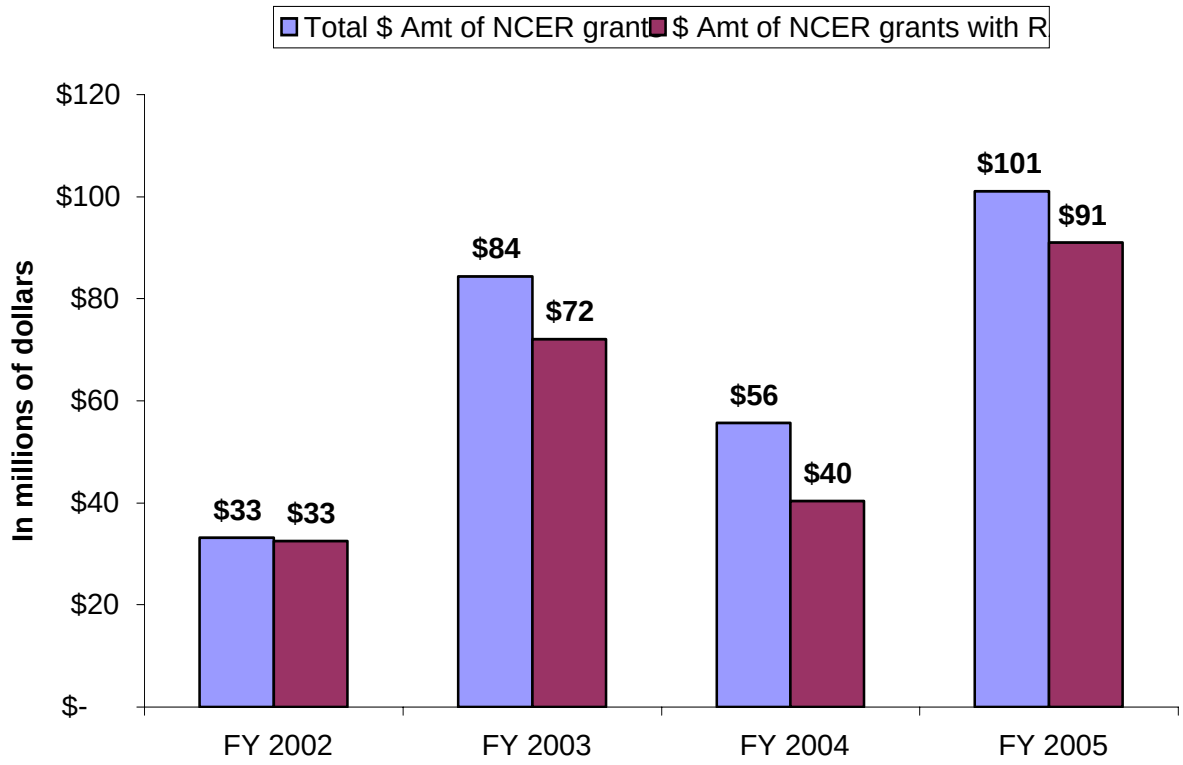
The case of educational research

- « *Consider the efforts to develop more effective educational practices in schools: even if we do know more about educational practices that we did previously, knowledge creation in this domain has been slow and there have been severe difficulties in diffusing « new and superior » knowledge* » (Nelson, 2003)

- « *R&D should not be viewed as creating 'programs that work'; it only provides tidy new technologies to schools and teachers. It is thus a mistake to think of educational R&D in the same way as industrial R&D* » (Murnane and Nelson, 1984)
- « *For novice teachers, practical problems in classrooms are not usually perceived to be solvable by drawing upon the psychology of education or child development, that have been studied in universities* » (Hargreaves, 2000)

- *« There is no more than a weak equivalent in the field of pedagogical knowledge to the systematic recording and widespread use of cases found in surgery and law and the physical models in engineering and architectural practice. Such records, coupled with comments and critiques of experts, allow new generations to pick up where earlier ones left off »*
- *« The beginner in teaching must start afresh, uninformed about prior solutions and alternative approaches to recurring practical problems.*

Funding of Field-Initiated Grants from FY 2002 to FY 2005



RA studies: 98% 85 72 90

How to evaluate whether an educational intervention is supported by rigorous evidence: An overview

Step 1. Is the intervention backed by "strong" evidence of effectiveness?

Quality of studies needed to establish "strong" evidence:

- Randomized controlled trials (defined on page 1) that are well-designed and implemented (see pages 5-9).

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Quantity of evidence needed:

Trials showing effectiveness in —

- Two or more typical school settings,
- Including a setting similar to that of your schools/ classrooms.

(see page 10)

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"Strong" Evidence

Step 2. If the intervention is not backed by "strong" evidence, is it backed by "possible" evidence of effectiveness?

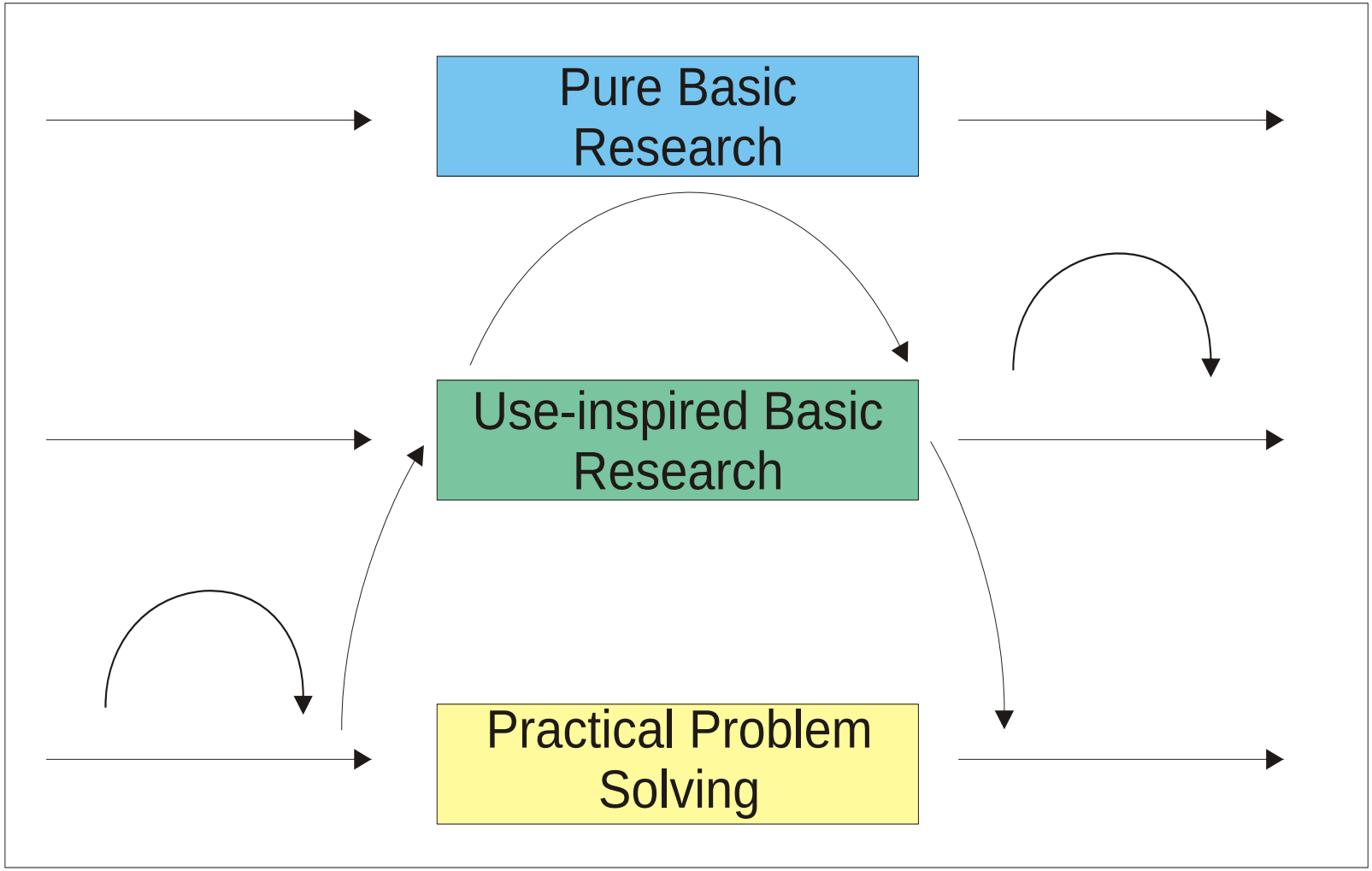
Types of studies that can comprise "possible" evidence:

- Randomized controlled trials whose quality/quantity are good but fall short of "strong" evidence (see page 11); and/or
- Comparison-group studies (defined on page 3) in which the intervention and comparison groups are *very closely matched* in academic achievement, demographics, and other characteristics (see pages 11-12).

Types of studies that do not comprise "possible" evidence:

- Pre-post studies (defined on page 2).
- Comparison-group studies in which the intervention and comparison groups are not closely matched (see pages 12-13).
- "Meta-analyses" that include the results of such lower-quality studies (see page 13).

Step 3. If the answers to both questions above are "no," one may conclude that the intervention is not supported by meaningful evidence.


Pure Basic Research
Use-inspired Basic Research
Practical Problem Solving