

THE CONCEPT OF COMPETENCE AND ITS RELEVANCE FOR SCIENCE, TECHNOLOGY, AND MATHEMATICS EDUCATION

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Education – but why?

Labour market



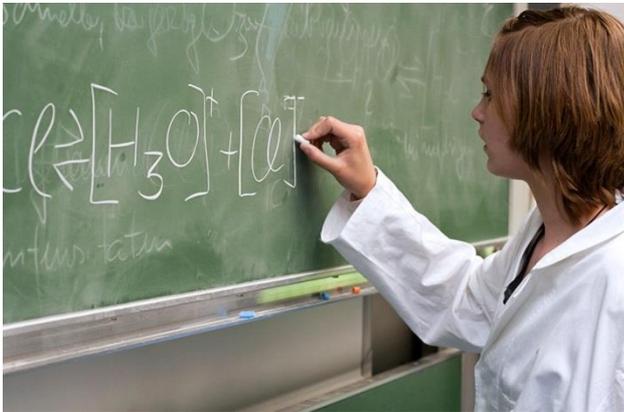
Participation in society



Innovation, research



Science, technology, and mathematics education



Large-scale assessment



Aims of chapter 1



Chapter 1 addresses these different perspectives by describing the concept of competence, by explaining its relevance for science, technology, and mathematics education, and by examining future directions.

Chapter 1 concludes with some remarks regarding commonalities and differences in the three domains.

The concept of competence

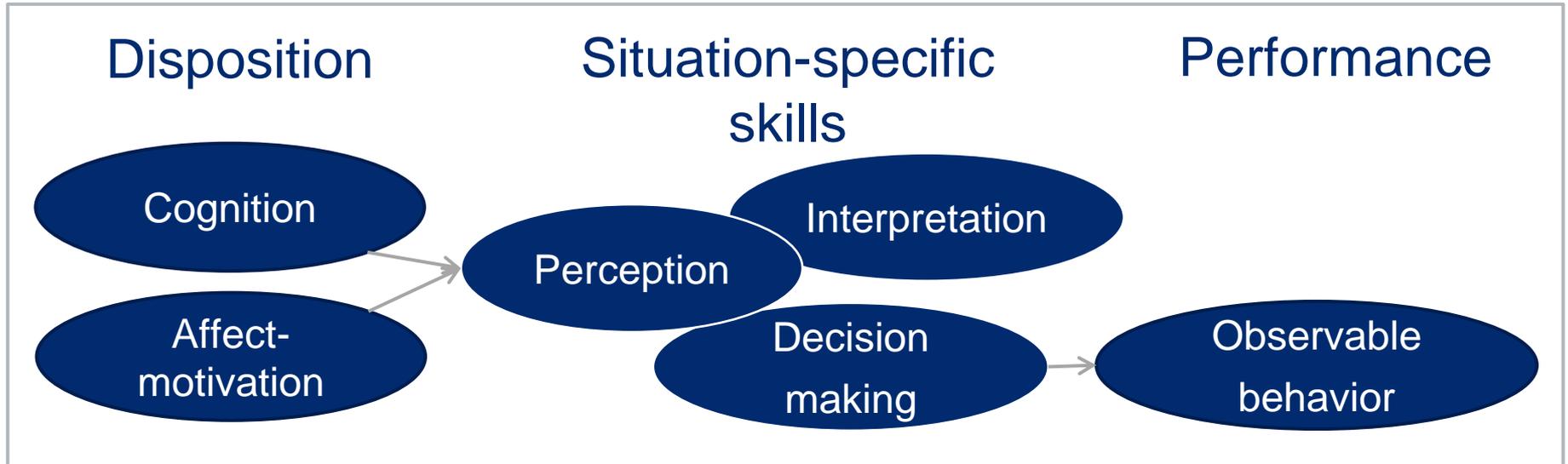


‘A competence is the ability to successfully meet complex demands in a particular context through the mobilization of psychosocial prerequisites (including both cognitive and non-cognitive aspects)’

(Rychen & Salganik, 2003, p. 43)

→ Possessing a competence includes an action component. Individuals always operate in specific contexts that set the criteria for effective performance. It is thus not sufficient to possess the different resources but one must be able to mobilize and orchestrate them in a complex situation.

Competence as continuum



(Blömeke, Gustafsson & Shavelson, 2015, p. 7)

Perspectives from different countries



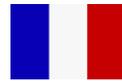
In the national standards (www.edk.ch) a competence includes both a **skill** (German: Handlungsaspekt, French: aspects de compétences) and a **content** (German: Themenbereiche, French: domaines thématiques). That is, a competence is determined by both a skill and a content.



Competence is such a development of person's **knowledge, skills, attitudes, values and self-regulation** in particular domain, that make the person able to cope with relevant challenges and demands



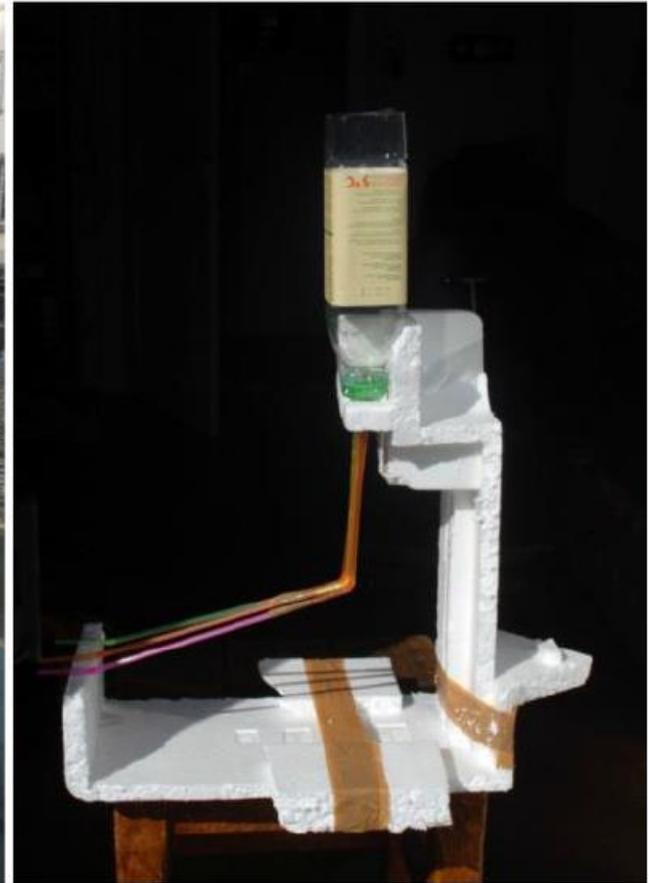
In France a competence has several meanings from **very general** to **specific** to situations or knowledge. It can be defined as a combination of basic **knowledge** relevant to live in our society, **capacities** to involve them in diverse situations but also lifelong necessary **attitudes** as to be opened to others, the appetite for search for truth, the respect of oneself and others, the curiosity and the creativity.



A person is scientific competent when she/he has the 'ability and commitment to act, alone and together with others, in a way that takes advantage of **scientific curiosity, knowledge, skills, strategies and meta-knowledge** to create meaning and autonomy and exert codetermination in relevant life contexts'.



Example – technology



(ASSIST-ME deliverable D4.4)

Example – science



Starting question given by the teacher:

- Usually when I am taking my effervescent Vitamin C drink I wait until it stopped fizzing before I drink it. Some mornings I am running late for school. Can I speed up this reaction?

Equipment students receive:

- Vitamin C effervescent tablets, boiling tubes, test tubes, 250 ml beakers, 100 ml measuring cylinders, stop watches, ...

Problems students have to solve:

- (1) Which variable should be changed?
- (2) How to measure the effect of the change?

(Black & Harrison, 2016, p. 25)