

Learning Progressions in Science Education: Two Approaches for Development

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Objective

To look at how researchers have been using the term “learning progressions” in science education.

Method

A review of the recent literature on learning progressions is the basis for the work.

Main findings

- **Two approaches** for development of learning progressions were identified, named and explained (figure 1a and 1b): **the escalator approach and the landscape approach.**

- For each of the approaches, **a particular iterative process** is conducted to produce the characteristic progression (figure 2a and 2b)

Some details

The **escalated approach** constructs progressions in terms of levels, which extremes represent, in the school context, the scientific preconceptions students have when entering school (*lower anchor*) and the societal expectations –or standards– posed on students after they graduate from high school (*upper anchor*). **This approach has a strong empirical component** intended to provide evidence of the students’ learning progression, which is mainly understood as a description of students’ learning paths (e.g., Merrit et al., 2008; Mohan et al., 2008; Smith et al., 2006).

The **landscape approach** constructs progressions in terms of relationships among domains and scientific concepts using levels and threads. **This approach has a strong analytical component** and the data gathering around it is mainly used to validate the analysis that produces the learning progression, which is mainly understood in terms of complex relationships among concepts and domains (e.g., Catley et al., 2004; Roseman et al., 2006; Duncan et al., 2007).

References:

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Representation of a Learning Progression resulting from an escalated approach

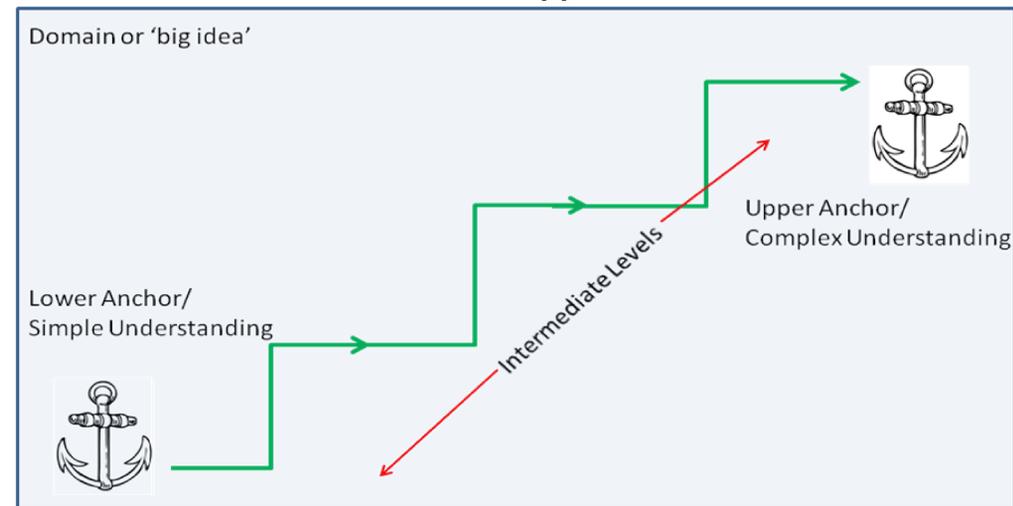


Figure 1a. Visual representation of the escalated approach to learning progressions. The term “escalated” was constructed for the purposes of this paper. It illustrates the idea of escalation, which means levering from one level to another higher level. It also refers to an increasing in intensity, such as in an escalating conflict. In conceptual change theory, learning occurs after a cognitive conflict is in place, which relates to the use of the term “escalated” here.

Representation of the design process to learning progressions of an escalated approach

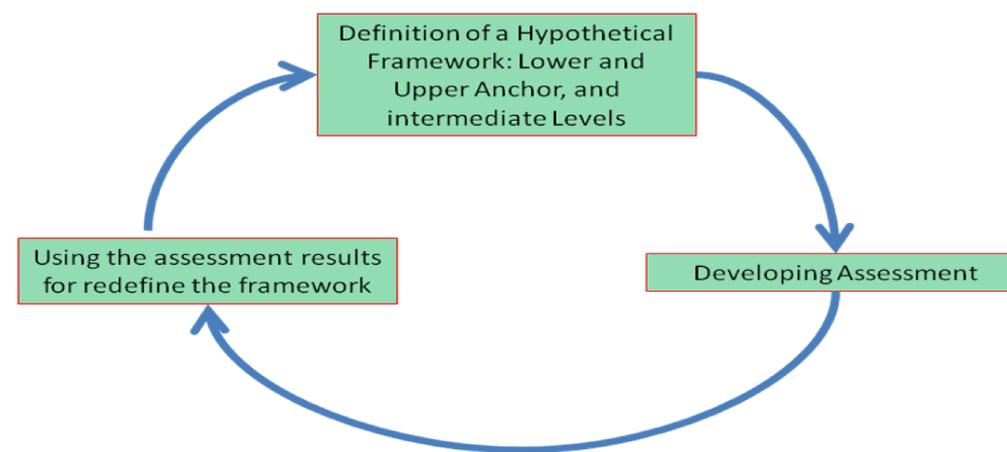


Figure 2a. Visual representation of the design process used in the escalated approach to learning progressions. An iterative process is used to refine the learning progression and validate it as the description of students’ learning path.

Representation of a Learning Progression resulting from a landscape approach

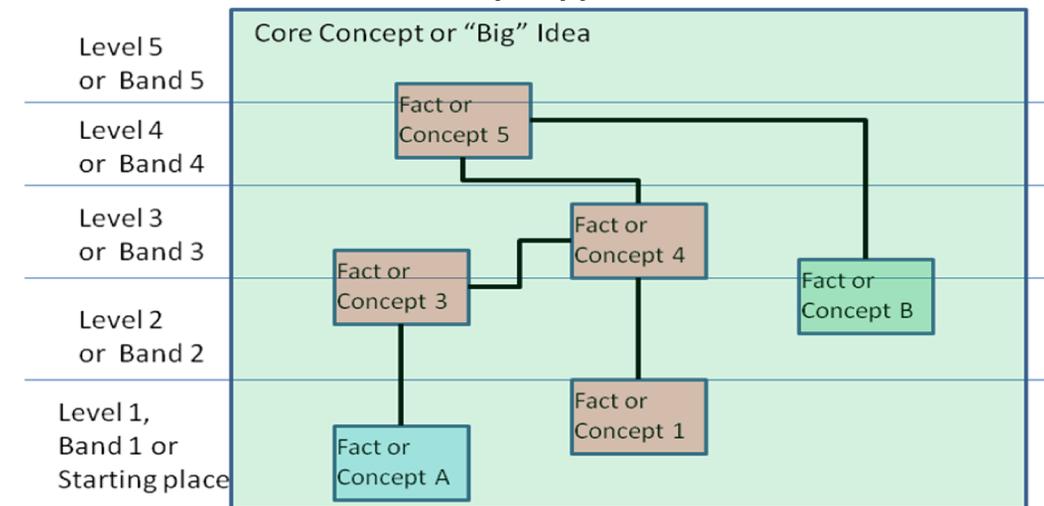


Figure 1b. Visual representation of the landscape approach to learning progressions. The term “landscape” is used here because it means and implies a complex set of interconnected elements that will shape a general situation. In this case, the general situation is the progression on students’ learning of a core concept or big idea.

Representation of the design process to learning progressions of a landscape approach

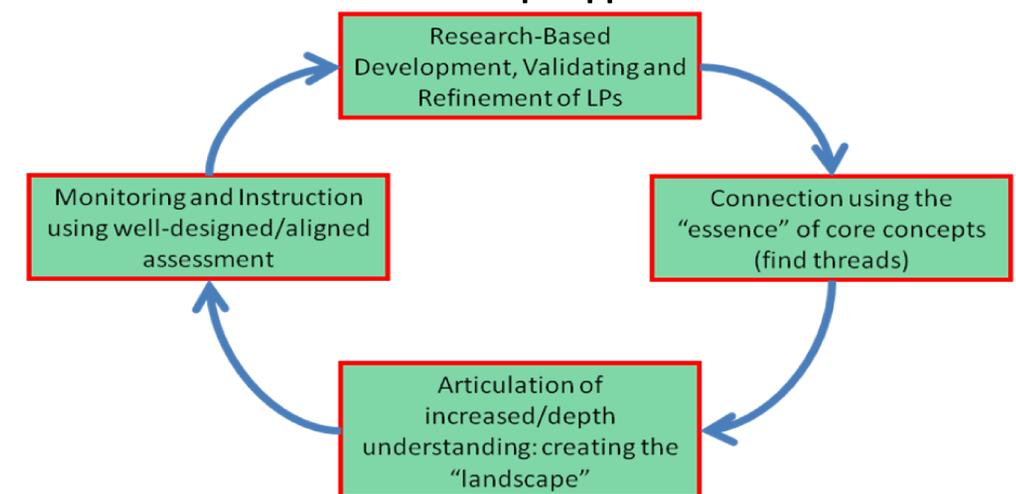


Figure 2b. Visual representation of the design process used in the landscape approach to learning progressions. An iterative process is mainly used in order to redefine the relationships among trends and to make instructional decisions.