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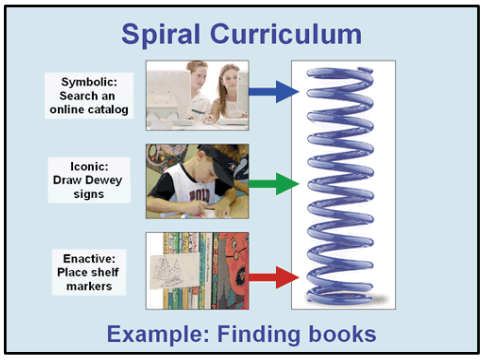
RESEARCH INTO PRACTICE

The Spiral Curriculum

The Spiral Curriculum is predicated on cognitive theory advanced by Jerome Bruner (1960), who wrote, "We begin with the hypothesis that any subject can be taught in some intellectually honest form to any child at any stage of development" (p. 33). In other words, even the most complex material, if properly structured and presented, can be understood by very young children.



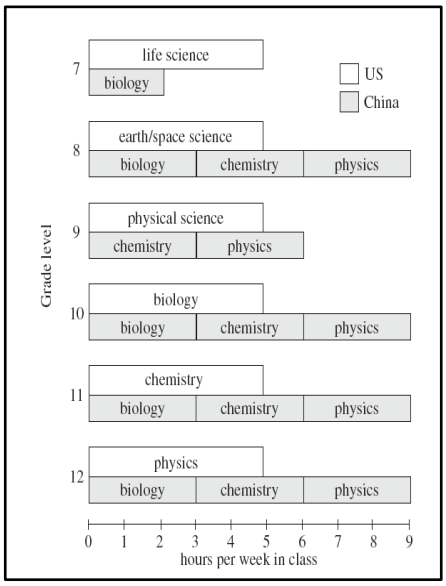
Bruner hypothesized that human cognition occurred in three relatively discreet stages: Enactive, or actually manipulating and interacting with objects; Iconic, or manipulating images of the objects or phenomena; or Symbolic, or the manipulation of representations of the actual objects or phenomena. The picture to the left shows how these stages would look if used to teach students about finding books in the library, and provides an example of a rudimentary "spiral curriculum." Key features of the spiral curriculum based on Bruner's work are:

- The student revisits a topic, theme or subject several times throughout their school career.
- The complexity of the topic or theme increases with each revisit.
- New learning has a relationship with old learning and is put in context with the old information.

The benefits ascribed to the spiral curriculum by its advocates are:

- The information is reinforced and solidified each time the student revisits the subject matter.
- The spiral curriculum also allows a logical progression from simplistic ideas to complicated ideas.
- Students are encouraged to apply the early knowledge to later course objectives.

This image by Norman Herr shows how the spiral curriculum used in China for teaching science contrasts with the "layered" curriculum common in the U.S.



In Chinese schools, students revisit each of the basic sciences each year of their secondary school experience. This, argues Herr, is the reason that their performance is so strong when compared with American students who study one subject per year.

Empirical Outcomes

Unfortunately, although the theoretical underpinnings of the spiral curriculum are sound and sensible, there is relatively little empirical evidence of its overall effectiveness. However, individual studies of specific curriculum manifestations of the spiral curriculum do reveal that it has positive outcomes, especially for teaching skills, such as reading, writing or technical skills. Because the spiral curriculum is often interwoven with other inquiry-based and constructivist

learning approaches, it is often quite difficult to assess the effects of the *curriculum*, rather than the *delivery* of that curriculum.

In essence, this body of research literature related to the spiral curriculum can be summarized as follows:

- Interactive, concrete, manipulative instructional approaches can be used in the early grades to introduce very sophisticated topics in almost any subject, although math and science provide the greatest amount of evidence of this approach.
- Activating prior knowledge, or building new learning on prior learning, produces good learning gains for almost all students, regardless of age or developmental level.
- When viewed as a feature of a national system of education (e.g., China or Taiwan), the use of spiral curriculum appears to produce very solid results.

The Bottom Line

Although there is no clear empirical evidence of the overall effects of the spiral curriculum on student learning, *features* of that curriculum have been linked to improved learning outcomes. In addition, the spiral curriculum incorporates many research-based approaches from cognitive science that have been linked, individually, to improved student performance as well.

References and Resources

1. Bruner, J. (1960). *The Process of Education*. Cambridge, MA: The President and Fellows of Harvard College.
2. Norman Herr, *The Sourcebook for Science Teaching*
   http://www.csun.edu/science/books/sourcebook/chapters/24-curriculum/graphics/layered-spiraling.html
   Outstanding reference from Professor Herr at Cal State Northridge.
3. Reference.com
   http://www.reference.com/motif/Education/bruner's-model-of-the-spiral-curriculum
   A brief explanation of Bruner's Model of the Spiral Curriculum and how it affects school programs.
4. General Teaching Council for England
   http://www.gtce.org.uk/tla/rft/bruner0506/
   This website provides an excellent overview of the theory and research behind the spiral curriculum, including Jerome Bruner's work on constructivist learning.

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This brief prepared by Howard Johnston, University of South Florida, March, 2012