Structuring the Design of Teaching/Learning Modules

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The development of teaching/learning modules for the Learning Bridge should be guided by what we know about how people learn. This document contains suggestions and ideas based in empirical research. The guidelines and principles for improved learning outcomes described below can be used as a basis for structuring Learning Bridge teaching/learning modules. However, rather than review the full background of several years of empirical research in multiple disciplines, this overview provides brief summary statements and pointers to source materials which can be used to justify the design of teaching/learning materials. The principles and guidelines quoted on the last two pages of this document are taken directly from a National Academy Report on “How people learn.”


While the explanatory discussion in Donovan et al may appear to be focused primarily on children and K-12 education, the material is intended to be applicable to adults as well as young people. Also the material is applicable to the design of teaching modules, classroom environments and to teaching/learning environments in general. For any of principles and guidelines on the last two pages that are not self explanatory, the reader can consult the original Donovan et al. report or the excerpt of section 2 of that report which can be found here:


Note: The full report may be available in through your library, and is also available for purchase here:

http://www.nap.edu/openbook.php?record_id=9457

Notice that the Donovan et al principle number 2 under key findings below is an illustration of what might be thought of as a spiral approach in which students learn key concepts, return to the material at a higher level to learn about those concepts in the context of their relationships to other key concepts and then return to the concepts again at yet a higher level to learn and organization of those materials in a way that enables them to remember and apply them. Another illustration of what can be described as a version of a spiral approach to teaching thermodynamics can be found here:

http://homepage.mac.com/tomhewett/filechute/Manteufel%20Thermodynamics.pdf

Finally, if you are not familiar with the term “meta-cognition,” in the context of learning, meta-cognition basically refers to the student thinking about and exercising some control over their own thinking while learning, i.e., thinking about how and what they are learning while they are learning. This is basically an example of what Donald Schoen means by “reflection in action” in his book, “The Reflective Practitioner.”

Note: Everything from here on is quoted directly from the Donovan et al report and should be attributed to those authors if quoted or referred to in anyway.

Key Findings:

1. Students come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for purposes of a test but revert to their preconceptions outside the classroom.

2. To develop competence in an area of inquiry, students must: (a) have a deep foundation of factual knowledge, (b) understand facts and ideas in the context of a conceptual framework, and (c) organize knowledge in ways that facilitate retrieval and application.

3. A “metacognitive” approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them.

Implications for teaching:

1. Teachers must draw out and work with the preexisting understandings that their students bring with them.

2. Teachers must teach some subject matter in depth, providing many examples in which the same concept is at work and providing a firm foundation of factual knowledge.

3. The teaching of metacognitive skills should be integrated into the curriculum in a variety of subject areas.

Designing classroom environments:

1. Schools and classrooms must be learner centered.

2. To provide a knowledge-centered classroom environment, attention must be given to what is taught (information, subject matter), why it is taught (understanding), and what competence or mastery looks like.

3. Formative assessments—ongoing assessments designed to make students’ thinking visible to both teachers and students—are essential. They permit the teacher to grasp the students’ preconceptions, understand where the students are in the “developmental corridor” from informal to formal thinking, and design instruction accordingly. In the assessment-centered classroom environment, formative assessments help both teachers and students monitor progress.

4. Learning is influenced in fundamental ways by the context in which it takes place. A community-centered approach requires the development of norms for the classroom and school, as well as connections to the outside world, that support core learning values.