the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

Museum Bldg. 434 · Campus Box 8010
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Volume 10 Number 5, September, 2002

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Unit Level Development: Why We Need to Think at Varied Scales

Welcome to ISU's one-page faculty development newsletter! I started *Nutshell Notes* in Platteville, Wisconsin, and ten years worth were written by me (Ed Nuhfer) at University of Colorado at Denver (UCD). Those archives remain accessible at http://www.cudenver.edu//OTE/nn/index.htm and should soon be duplicated here at ISU. Bookmark the UCD site for access for now.

William G. Perry Jr.* did pioneering work in the 60s at Harvard University on the stages of intellectual development of students that defined their ability to think according to discrete levels. Other workers investigated this same phenomena, and their findings replicated Perry's. A summary of the equivalence is shown in the table on the reverse side, and the implications that arise from this work are enormous for adult learners and higher education.

The most reasonable explanation for why varied workers can arrive at such similar conclusions is that education has a detectable effect on the brain at cellular levels. The brain learns by developing and stabilizing synaptic pathways. When a student persists long enough and confronts challenges that are part of a good plan to produce intellectual growth, a punctuated change occurs between Perry levels 4 and 5 that marks students' ability to effectively use evidence to solve open-ended problems. The ability arises only when the required synaptic pathways have been developed. The truly good news is that a student can literally "grow a brain," if he/she takes advantage of an educational program designed to facilitate the growth of the required neural networks. If the challenges are well planned and the student persists, the transition to higher level thinking will usually take place. Such thinking is not reserved for only "the gifted."

Open-ended problems are those that do not have specific right or wrong answers, but instead have reasonable or unreasonable ones. The process of confronting such problems involves formulating several sound working hypotheses and using evidence to discern the strongest among them. Most baccalaureate graduates do not possess this ability; they are stuck at level 4, which means that they cannot use evidence effectively or with sophistication.

Another profound outcome of this research is the indication that there are no shortcuts to acquisition of the necessary skills. This seems to be because required neural growth is not rapid enough to allow the challenges of any single course to produce the required result. Instead, the goal of high level thinking has to be reached through a series of courses, designed for this purpose, over several semesters—i.e. a curriculum. This is the primary reason that we need to begin thinking at scales beyond what happens to students in just our own courses, and begin to picture how our courses are part of an effort designed with our colleagues. We need to envision ourselves and our efforts as part of something larger, because we are ultimately in the business of credentialing: giving degrees, not just courses. Often these degrees, mostly derived from curricula at the departmental levels, have a larger scale signature that is imprinted by the general requirements of a college or university. The research presented here shows that we need to spend more planning than customary by having the necessary conversations with our colleagues for designing curricula that ultimately produce high-level thinkers. When this does not happen, the default is upper division courses that emphasize low level, closed-ended kinds of problems and programs that produce graduates stuck at Perry level 4 reasoning. Even the most difficult closed-ended challenges cannot produce graduates who can deal with real-life ambiguities.

"Assessment" describes a process by which a unit knows what it is about, why it has chosen particular content and learning objectives, and how it knows when the objectives are met—not just in content learning, but also in high-level thinking. ISU's Center for Teaching and Learning has tools that can help departments design sophisticated assessments. Call us!

See other side for Models of Adult Thinking Equivalence

*Quickly learn the Perry model! Go to http://www.cudenver.edu//OTE/nn/index.htm and look at v 8 n 1-7.

From Nuhfer, E. B., and Pavelich, M., 2001, Levels of thinking and educational outcomes: National Teaching and Learning Forum, v. 11, n. 1, pp. 5-8

General Equivalence of Some Models of Adult Thinking © E. B. Nuhfer

<table>
<tr><td>Emphases--></td><td colspan="3">content-intensive emphasis</td><td colspan="4">+ process-intensive emphasis</td><td colspan="2">+ self-reflection</td><td colspan="2">+ judgment from experience</td></tr>
<tr><td>Perry, 1968; 1999 2nd ed.</td><td>1.
Basic Duality</td><td colspan="2">2.
Multiplicity
Pre-legitimate</td><td>3.
Multiplicity
Subordinate</td><td>4.
Relativism
Subordinate</td><td>5.
Contextual
Relataivism</td><td>6.
Commitment
Foreseen</td><td>7.
Initial
Commitment</td><td colspan="2">8.
Multiple
Commitments</td><td>9.
Resolve</td></tr>
<tr><td>King & Kitchener, 1994</td><td>1.
Knowledge experienced</td><td colspan="2">2.
Experience and authority as source</td><td>3.
Unclear distinction of evidence from belief</td><td>4.
Evidence accepted that fits established belief</td><td>5.
Beliefs justified within context</td><td>6.
Beliefs justified by comparing evidence and opinion</td><td colspan="3">7.
Beliefs justified based on relative value of competing evidence</td><td rowspan="4">This area is not a product of cognitive development alone. This is largely the realm described under "Emotional Intelligence" by Goleman, 1995.

Actions and decisions are made with sophisticated frameworks of reasoning plus a recognized influence of an ethical framework, emotions and other affective factors</td></tr>
<tr><td>Blosser, 1973; 1991</td><td>1.
Cognitive Memory</td><td colspan="2">2.
Convergent Thinking</td><td colspan="3">3. Divergent Thinking
&
4. Evaluative Thinking (crude with poor justifications)</td><td colspan="2">4.
Evaluative Thinking (with better justifications)</td><td colspan="2">4
Evaluative Thinking (with increasingly sophisticated justification)</td></tr>
<tr><td>Bloom, 1956</td><td>1.
Knowledge</td><td colspan="2">2.
Comprehension</td><td colspan="3">3. Application 4. Analysis
5. Synthesis and 6. Evaluation
(5 & 6 done crudely)</td><td colspan="2">5. Synthesis (done better)
6. Evaluation (done better)</td><td colspan="2">6. Evaluation
(done with increasing sophistication)</td></tr>
<tr><td>Biggs & Collis, 1982 "SOLO"</td><td>1.
Pre-structural</td><td>2.
Unistructural</td><td colspan="3">3.
Multistructural</td><td colspan="2">4.
Relational</td><td colspan="2">5.
Extended Abstract</td></tr>
<tr><td>De Bono, 1985</td><td>White Hat (factual)</td><td colspan="5">+ Black Hat, Yellow Hat (advocacy based on facts & evidence)</td><td colspan="2">+ Green Hat
(creative thinking)</td><td colspan="2">+ Red Hat (emotional)
+ Blue Hat
(conscious synthesis of all hats)</td></tr>
</table>

Biggs, J. B., and Collis, K. F., 1982, *Evaluating the Quality of Learning*: London, Academic Press.
Bloom, B. S., 1956, *Taxonomy of Educational Objectives— The Classification of Educational Goals: Handbook I.* - Cognitive Domain, NY, David McKay.
Blosser, P. E., 1973, *Handbook of Effective Questioning Techniques*: Worthington, OH, Education Associates, Inc.
Blosser, P. E., 1991, *How to....Ask the Right Questions*: National Science Teachers Assoc.
De Bono, E., 1985, *Six Thinking Hats*: Boston, Little, Brown & Co.
Goleman, D., 1995, *Emotional Intelligence*: NY, Bantam.
King and Kitchener, K, 1994, *Developing Reflective Judgment*: San Francisco, Jossey-Bass.
Perry, W. G. Jr., 1999, *Forms of Ethical and Intellectual Development in the College Years*: A Scheme: San Francisco, Jossey-Bass (a reprint of the original 1968 work with some updates).