Seven Levers for Deeper Learning – A Working Draft
Research-based Guidelines for Effective, Efficient Teaching and Learning

Overall, research suggests that virtually all students can learn more – and more deeply – when we help them to . . .

1. Become explicitly aware of their own relevant prior knowledge, beliefs, preconceptions, habits and values – and to self-evaluate, revise and unlearn, as needed

2. Set and maintain realistically high and personally meaningful learning goals and expectations for success

3. Learn how to manage their own learning – in order to become increasingly self-directed, self-improving and independent learners

4. Understand the criteria, standards, and methods used in assessing and evaluating their learning and seek and use feedback on their performance against those standards

5. Seek and find connections to and real-world applications of concepts and skills they are learning

6. Collaborate regularly and effectively with other learners and with teachers to achieve meaningful, shared learning goals

7. Invest as much actively engaged time, deliberate practice, and high-quality effort as possible in their learning
Lever 1

**Plus-Minus-Question Mark ( + / − / ? ) Exercise**

Some key terms and concepts that *might* be of use . . .

- Formative and Summative assessment
- Backward design
- Constructive alignment
- Surface, Strategic, and Deep learning approaches
- Intended learning outcomes vs. Observed learning outcomes
- Performative tasks
- *Bus Test, Parrot Test, and Parking Lot Test*
- Cognitive load
- Cognition and Metacognition
- *The Dance Floor and The Balcony*
- Deliberate practice
- Novice-Expert differences
- Concept Inventories and Concept Tests (also spelled ConcepTests)
- Threshold and Core concepts and skills
Lever 1

The Minute Paper

Please answer each question in 1 or 2 sentences:

1) What was the most useful or meaningful thing you learned during this session?

_________________________________________________________________________

_________________________________________________________________________

2) What question(s) remain uppermost in your mind as we end this session?

_________________________________________________________________________


The "Muddiest" Point*

What was the "muddiest" point in this session? (In other words, what was least clear to you?)

_________________________________________________________________________

_________________________________________________________________________

* This Classroom Assessment Technique was developed by Dr. Frederick Mosteller, a distinguished professor of statistics at Harvard University. For a detailed account of its development and use, see his article, The "Muddiest Point in the Lecture" as a Feedback Device in On Teaching and Learning: The Journal of the Harvard-Danforth Center, Vol. 3, April 1989, pp. 10-21.
Lever 6

Collaborative Learning Technique (CoLT)

Buzz Groups

Useful for stimulating engagement in discussions and, and encouraging students to rehearse, express, and compare their ideas, opinions, and/or reactions with others.

Estimated Time and Effort Required for

| Faculty to prepare this CoLT | LOW |
| Students to use this CoLT | LOW |
| Faculty to assess/follow up | LOW |

Complexity | LOW
Risk of Failure | LOW

Duration and Location | 10-20 minutes/In class or online

Group Size and Structure | Triads to Quintets Informal/Little or no pre-organising

Description

Buzz groups give students the opportunity to exchange ideas, opinions, and information in a low stress environment. Because buzz groups can build interest in and enthusiasm for a subject, they are useful in introducing a new topic and in assessing students’ prior knowledge or beliefs about that topic. Buzz Groups can also serve as in-class lead ins to out-of-class assignments.

Procedure

1. The instructor prepares a list of open-ended discussion questions that will tap students’ ideas, prior knowledge, or opinions about the topic at hand. These should be questions for which there is no one correct answer.
2. In the context of a semi-structured, time-limited conversation, small groups of students discuss their responses to the prepared questions. It may be useful to assign roles such as time keeper, summarizer, and reporter.
3. Groups summarize their responses – including the range of agreement and diversity – and report them to the instructor in writing and/or, if useful, to the entire class, orally. Alternately, in a large class, the instructor can sample responses from a few groups.
Lever 1
ConcepTest

Liquid hazardous waste is disposed of by pumping it down injection wells. Which well location would be the most suitable to use for an injection well? Why?

A  B  C

Thanks to Dr. David McConnell, of NCSU, for the Geology ConcepTest above.

Stats for Everyday Life – Spring 2004 - Angelo

First Concept Review

Circle the variable in each pair that you would expect to have the larger standard deviation:

1.1 adult humans’ heights  adult humans’ weights
1.2 domestic dogs’ weights  domestic cats’ weights
1.3 oral language skills of 12-year-olds  math skills of 12-year-olds
1.4 hours students spend in this classroom  hours students spend studying for this class
Levers 3 & 4

“BLOOMING” – A SIMPLE EXAMPLE

A Revision of Bloom’s Cognitive Domain Taxonomy (Anderson & Krathwohl, 2001)

(6) CREATE
Generate, Plan, Synthesize, Produce the New

(5) EVALUATE
Critique or Judge based on Explicit Standards/Criteria

(4) ANALYSE
Break Down, Relate Parts and Whole, Organize

(3) APPLY
Follow Procedures to Solve Problems or Carry Out Tasks

(2) UNDERSTAND
Connect New Learning to Prior Knowledge by Interpreting, Classifying, Comparing, Summarizing, etc.

(1) REMEMBER
Elaborate, Encode, and Retrieve Information from Long-term Memory

Directions: Using the numbers 1-6 to represent the levels of Bloom’s revised taxonomy (above), please identify the level of each question below.

____A.  Give an example of “seasonal change”

____B.  Why do the Earth’s seasons change?

____B.  What causes the Earth’s seasons to change? (Explain how it works.)

____C.  When it is winter in Charlotte, NC what season is it in Canberra, Australia?

____D.  Why is there relatively little seasonal variation at the Equator?

____E.  Where on Earth would you predict the greatest seasonal variation? Why?

____F.  What contribution, if any, will global warming likely make to seasonal change? Explain your answer.

____G.  What would happen to seasonal change in New Orleans if the Earth’s degree of tilt on its axis changed to: i. 45 degrees? ii. 90 degrees? iii. 180 degrees? iv. 0 degrees?

____H.  If the Earth’s orbit moved it significantly further away from the Sun, what difference, if any, would you predict that increased distance would make to seasonal change? Explain your answer.

____I.  If you were teaching why the seasons change to a 7-year-old, how would you explain it?

____J.  If astronomers discovered an Earth-like planet with no seasonal variation, what would you predict about that planet’s orbit, etc.? Explain your reasoning.

____K.  Could changes in the Earth’s tilt on its axis affect global climate change? Explain your reasoning.
Levers 4 & 7

**WHY GIVE LEARNERS FEEDBACK?**

- To improve performance & academic success
- To increase interest & motivation to learn
- To illuminate and undermine misconceptions
- To promote self-assessment
- To develop independence

**To Use Feedback Well, Learners Need M.O.M.**

- Motivation – reasons to use it
- Opportunities – for safe, guided practice
- Means – Knowledge & skills for improvement

**The Order in Which We Give Feedback Matters**

Consider the following five steps:

1st - **Good News:** What was done well
2nd - **Bad News:** What still needs improvement
3rd - **Options:** What can be done to improve it
4th - **Plans:** What the learner intends to do
5th - **Commitments:** What both parties agree to do, how, to what standard, and by when
### Applications Card

| Interesting IDEAS/TECHNIQUES from this session | Some possible APPLICATIONS of those ideas/techniques to my work |

Lever 6

Making Groupwork Work: A Design Checklist

☐ How does groupwork relate to the course/program’s stated outcomes?
   Are you convinced groupwork will help students achieve any/all of
   the relevant course learning outcomes?  (If yes, which?)

☐ How authentic is the groupwork assignment or task?
   Is it something that typically requires groupwork in the “real world”?
   Is the assignment/task one that can only/best be done by a group?
   (Or can well-prepared individual students do it as well or better on their own?)

☐ How challenging is the groupwork assignment/task?
   Is the combination of challenge level of the assignment/task and time available
   to complete it high enough to justify groupwork.
   (Or might students view it as busywork?)

☐ How appropriate are the group structures, group size, and composition?
   Are the size and composition of the group appropriate for the task/assignment?
   Is the group structure (e.g., strategy or technique) appropriate?

☐ Have you built in obvious ‘positive interdependence’?
   Will students understand immediately that they need each other’s cooperation
   and best efforts to succeed in the task/assignment?
   Do your assessment and grading processes make these obvious and
   consequential?

☐ Have you built in explicit individual and group accountability?
   Will students understand immediately that they each are responsible and
   accountable individually for making the group’s work succeed?
   Do your assessment & grading processes make that explicit and consequential?

☐ How well prepared are students to carry out the groupwork?

☐ Do all students already have the skills & knowledge required to succeed?
   Are the interpersonal “rules of engagement” clear and understood by students?
   If not, how and where can they get training, help and/or support?
A Few Useful References on Teaching, Learning and Assessment


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Workshop #2 – Assessment and Feedback Form

Overall Feedback – Please circle the rating for each item which best represents your overall experience and evaluation of this session.

1. Overall, the value of what I learned in this session is

   5  4  3  2  1
   Very High High Adequate Low Very Low

2. Overall, the quality of this session is

   5  4  3  2  1
   Very High High Adequate Low Very Low

3. Overall, I rate the facilitator’s effectiveness as

   5  4  3  2  1
   Very High High Adequate Low Very Low

Comments on this session

4. Which two or three specific aspects of this session were most useful/helpful?

5. Which specific aspects of the session could have been improved?

6. What kind of follow up, if any, might be useful?