7 Research-Based Principles for Smart Teaching

“[A]ny conversation about effective teaching must begin with a consideration of how students learn” (p. 1).

Learning = “a process that leads to change, which occurs as a result of experience and increases the potential for improved performance and future learning” (p. 3). The authors identify 3 components to this definition:

- Learning is a process, not a product. However, because this process takes place in the mind, we can only infer that it has occurred from students’ products or performances.
- Learning involves change in knowledge, beliefs, behaviors, or attitudes. This change unfolds over time . . .
- Learning is not something done to students, but rather something students themselves do. It is the direct result of how students interpret and respond to their experiences—conscious and unconscious, past and present. (p. 3)

1. Students’ prior knowledge can help or hinder learning.

- Learning always involves connecting new knowledge to previous learned knowledge. “However, the extent to which students are able to draw on prior knowledge to effectively construct new knowledge depends on the nature of their prior knowledge . . .” (p. 15). Students do not automatically activate relevant prior knowledge when being exposed to new knowledge. Teachers can facilitate this activation with prompts (such as asking questions designed to trigger recall) and reminders of that prior knowledge.
- Some prior knowledge can be inaccurate, or students can recall irrelevant prior knowledge to connect with new knowledge, such as importing everyday understandings of concepts and words into more highly disciplinary contexts with different understandings of those concepts and words. The same problem can occur when importing understandings from a different discipline. Another use of inappropriate prior knowledge occurs when “students analogize from one situation to another without recognizing the limitations of the analogy” (p. 20).
- “Inaccurate prior knowledge can be corrected fairly easily if it consists of relatively isolated ideas or beliefs that are not embedded in larger conceptual models” (e.g., that Pluto is a planet) (p. 24). Inaccurate knowledge that is embedded in larger conceptual models is still susceptible to refutation, but that change may take time. And it is true that some misconceptions are very resistant to correction. But they may include accurate as well as inaccurate elements and so may still allow for learning.
- Teachers can assist students in activating relevant prior knowledge by identifying for students the prior knowledge they expect the students to have.
- Teachers can help students recognize inappropriate prior knowledge by highlighting conditions where the new knowledge is applicable and where it is not; by providing

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heuristics that help identify relevant and irrelevant knowledge; by asking students to justify their reasoning; by providing lots of opportunities for students to use accurate knowledge; and by allowing sufficient time for the new knowledge to subvert the inappropriate prior knowledge.

2. How students organize knowledge influences how they learn and apply what they know.

- Experts organize what they know differently from novices. Experts tend to automatically process information in coherent, meaningful chunks & use chunks to build more interconnected structures. Novices tend to organize information linearly and superficially in chains of information or separately in small sets of sparse, unsophisticated connections. Novices can develop into experts over time. Developing expertise takes experience connecting information in meaningful ways.
- Our writing assignments should provide our students practice synthesizing information, seeing meaningful connections among sources. Simply asking for students to reference a few sources will not provide them with experience organizing information in meaningful interconnections.

3. Students’ motivation determines, directs, and sustains what they do to learn.

- Motivation to learn is based on how much a student values what is to be learned, and value is based on an interest in and perception of relevance of what is to be learned.
- Motivation leads to goal-directed behavior. How important a goal is depends on how much value the person places on it. But value alone is insufficient to motivate behavior. Learners also need to believe that they can successfully achieve their goal.
- Self-efficacy is increased by successful experiences that suggest future success at achieving the desired goal; through vicarious experiences, observing others succeeding; and through verbal persuasion, such as a teacher expressing confidence that a student can succeed.
- Student motivation can be increased by providing authentic, real-world tasks, such as contextualizing writing assignments that ask students to role-play real-world writing situations; by providing rubrics that explicitly describe performance expectations that lead to goal achievement; by providing targeted feedback.

4. To develop mastery, students must acquire component skills, practice integrating them, and know when to apply what they have learned.

- Mastery/expertise takes time and is developmental, moving from unconscious incompetence to conscious incompetence to conscious competence (metacognition) to unconscious competence (automaticity).
- Not only do experts possess more knowledge than novices, they also organize knowledge into large, conceptual chunks, are then better able to recognize meaningful patterns, can connect new knowledge to deeper principles and schemas, can then access knowledge more easily than novices, and are better able to apply knowledge across contexts.
- Being more expert than their students, teachers can sometimes assume that students are able to do more than they can.
• A person’s performance tends to degrade when performing more than one task at a time. The demands on student information-processing can sometimes exceed what students can manage, causing cognitive overload.
• Breaking up assignments into smaller ones that students can accomplish incrementally and “scaffolding” (temporarily relieving some cognitive load) can significantly reduce cognitive overload.
• Mastery requires both storing knowledge and being able to apply that knowledge in situations beyond that in which the learning took place (“knowledge transfer”). Transfer is NOT automatic, and the more dissimilar the contexts are, the less likely a person will be able to transfer knowledge from one context to the other. Moreover, learning tends toward context dependence. Thus, teaching for transfer is needed.
• Contextualizing assignments in ways that mirror real-world use of learning and discussing the contexts in which particular skills are applicable can help students see possible applications of learning.
• Every writing situation has a purpose and audience. Having students practice identifying the contextual parameters of their writing situations can help them perceive how certain strategies fit particular kinds of writing situations.

5. Goal-directed practice coupled with targeted feedback enhances the quality of students’ learning.

• Practice = “any activity in which students engage their knowledge or skills” (p. 125). Key to effective practice – it is goal-directed.
  Feedback = “information given to students about their performance that guides future behavior” (p. 125). Key to effective feedback – it is targeted. Too much feedback (e.g., marking every error in paper drafts) can overwhelm students. “However, the full potential of practice and feedback is not realized unless the two are effectively combined” (pp. 125-126).
• Effective practice “(a) focuses on a specific goal or criterion for performance, (b) targets an appropriate level of challenge relative to students’ current performance, and (c) is of sufficient quantity and frequency to meet the performance criteria” (p. 127).
• Goals need to be stated as something students do and can be monitored and measured.
• Scaffolding—that is, providing structure and support during the activity—facilitates learning and can be reduced as students gain greater mastery—thus, helping in finding the “appropriate level of challenge” for students.
• Time constraints often lead instructors to hurry learning, but research shows that learning takes a sufficient amount of time for practice.
• Errors should be viewed as part of learning. Practice allows for learning through trial-and-error.
• Practice should lead to targeted feedback, and targeted feedback should lead to revision based on feedback (more practice). Feedback should always be formative.
• Feedback should tell students where they stand in relation to the goals of the assignment and should be given “when students can make the most use of it” (p. 138).
• Rubrics that communicate to students the goals of the assignment have been shown to be effective.
• Effective feedback does not just point out inadequacies but also provide “a clear picture of how [students’] current knowledge or performance differs from the goal” and “information on adjustments that can help students adjust to reach the goal” (p. 139).
• Identifying patterns of error and prioritizing feedback have been shown to be effective.

6. Students’ current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning.

• Individuals do not develop intellectually, socially, and emotionally at the same pace. Nor is the movement always progressive but can be regressive. AND these developments often occur while the individual is in college, and in fact, educational experiences may well fuel these changes.
• Chickering (1969) suggests that cognitive development goes on within seven domains: (1) developing competences (intellectual, interpersonal, physical); (2) learning to manage emotions; (3) becoming an autonomous being, disengaging from parents, developing a personal authority; (4) establishing an identity, a sense of self; (5) achieving mature interpersonal relationships; (6) developing purpose; and (7) developing integrity, “a set of internally consistent values that guide and direct behavior” (Ambrose, p. 162).
• The models of intellectual development (Perry; Belenky, et al., Baxter-Magolda) present a movement from a simplistic dualism to a more sophisticated multiplicity to a fully mature commitment within relativism and more connected knowing (see especially Belenky, et al.). All of these models indicate that intellectual (and moral and emotional) development takes time. In fact, “Baxter-Magolda’s research . . . shows many students leave college still in multiplistic stages and that their development toward relativistic and committed stages continues well beyond college” (p. 166).
• The basic premise of theories of identity development is that identity is not a given but must be negotiated. Hardiman and Jackson (1992) suggest a progression through seven stages: (1) a naïve stage, without preconceptions and prejudices; (2) a conscious or unconscious acceptance of messages about different groups (the development of prejudices); (3) a resistance to the dominant group stage; (4) an immersion stage, involving a preference for socializing with one’s own group; (5) a disintegration stages, an abandoning of a previous identity and group (e.g., lesbian, gay, bisexual students coming out); (6) a redefinition stage; and (7) an internalization stage.
• Course climate (“the intellectual, social, emotional, and physical environments in which our students learn”) influences learning and development and can be thought of as a continuum from explicitly marginalizing climates to implicitly marginalizing climates to implicitly centralizing climates to explicitly centralizing climates. Such climates will be defined by faculty-student and student-student interactions.
• Research suggests a number of strategies for creating healthy course climates for student learning: (1) Explicitly valuing and encouraging the critical embrace of complexity (the no one right answer attitude); (2) modeling reasoned and supported stances; (3) reflecting on one’s own assumptions about students; (4) making a concerted effort not to stereotype students; (5) making a concerted effort to learn students’ names and providing opportunities for them to get to know each other; (6) modeling inclusive language, behavior, and attitudes (showing all students respect); (7) using multiple and diverse examples; (8) making sure course content does not marginalize students; (9) anticipating
any sensitive issues; (10) turning discord and tension into learning opportunities; and (11) providing processes for student feedback on course climate.

7. **To become self-directed learners, students must learn to monitor and adjust their approaches to learning.**

- Monitoring one’s learning involves assessing a task, evaluating one’s knowledge and skills, planning an approach to accomplishing the task, applying various strategies, monitoring one’s progress, and reflecting on how well the approach is working.
- Learning these processes requires metacognition, a heightened awareness of one’s ability, practice assessing, planning, applying, monitoring, and reflecting, and getting effective feedback on that practice.
- Important research finding: Students who reflect on their progress learning and explain what they are learning along the way tend to learn more than students who don’t.
- Students with low self-efficacy tend not to monitor their learning, but research suggests that teaching can influence changes in student beliefs and attitudes.
- Research in this area, then, suggests that assigning students to regularly (not just at the end of term) reflect on what they are learning (not simply their performance) can enhance their learning and help them become self-directed learners.
- Research suggests the following strategies for helping students learn to monitor their learning: (1) Be very explicit in defining learning goals and what students will need to accomplish to fulfill those goals; (2) provide performance criteria with each assignment (e.g., a rubric); (3) assign self-reflective writing regularly and maybe start with guided self-assessments and gradually make them more open and self-generated; (4) provide regular feedback on student performance; (5) assign planning as a central part of more complex assignments, such as longer papers, reports, etc.—and provide feedback on that planning; (6) assign peer feedback, which typically will require training; (7) create assignments that focus on “strategizing” as much as implementing, such as having students propose multiple potential strategies for achieving the purposes of their papers and work through deciding on the best approach; (8) make sure students set realistic goals; and (9) model metacognition.

**References**


Additional Recommended Resources