BOOK CHAT

How Learning Works: 7 Research-Based Principles for Smart Teaching

Time: June 18 at 7:05—8:00 pm
Location: Fireplace Lounge

Facilitators:
Melissa Desjarlais (Valparaiso University) and Jim Morgan (Texas A&M University)

Abstract:
In this book, Susan A. Ambrose and her colleagues form a bridge between learning research and teaching practice. The Book Chat will explore seven principles for smart teaching and compare them to the principles of Process Education. Are process educators using research-based principles for smart teaching? Are there lessons we can learn from the examples in the book? Are there things we do that are not explicitly stated in our guiding principles? Join us as we explore this inspiring book & the boundaries of what we as educators can do to adapt the techniques of these research-based principles as we continue our journey to become better educators.

Facilitation Plan:
1. Introduce book
2. Provide an overview of principles to be used for the activity
3. Discussion of Introduction and comparison to Process Education principles
4. Form teams of 4 and complete Process Education comparison for a given chapter
5. Teams share chapter comparisons and then collect them to be put in session notes
6. SII of session

Resources:
Summary of Introduction and chapter comparisons with principles
Three sets of principles
Summaries of Chapters 1-7, Conclusion, and Appendices
Worksheet
Introduction: Bridging Learning Research and Practice

*A Bridge.* Instructors who want to examine things that promote student learning find two types of resources: research article with technical discussion of learning, or books and Web sites with concrete strategies for course design and classroom pedagogy. The first type focuses on learning but can be technical, inaccessible, and lack clear application in the classroom. The second type are written in accessible language but may not indicate why or whether the strategies promote learning. The book was written to provide a bridge between research and practice, between teaching and learning.

**What is learning?**

1. 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.
2. Learning involves *change* in knowledge, beliefs, behaviors, or attitudes. This change unfolds over time; it is not fleeting but rather has a lasting impact on how students think and act.
3. 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.

**Developmental and holistic perspective**

(a) learning is a developmental process that intersects with other developmental processes in a student's life

(b) students enter our classrooms not only with skills, knowledge, and abilities, but also with social and emotional experiences that influence what they value, how they perceive themselves and others, and how they will engage in the learning process.

While each principle is addressed individually, they are all at work in real learning situations and are functionally inseparable.

**Principles of Learning.** Brief summary of each principle in the order they are discussed in the book.

1. Students' prior knowledge can help or hinder learning
2. How students organize knowledge influences how they learn and apply what they know
3. Students' motivation determines, directs, and sustains what they do to learn.
4. To develop mastery, students must acquire component skills, practice integrating them, and know when to apply what they have learned.
5. Goal-directed practice coupled with targeted feedback enhances the quality of students' learning.
6. Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning.
7. To become self-directed learners, students must learn to monitor and adjust their approaches to learning.

Principal strength of the seven principles: based directly on research, drawing on literature from cognitive, developmental, and social psychology, anthropology, education and diversity studies, and research targeting not only higher education but also K-12 education. The principles are:

1. *Domain-independent:* They apply equally well across all subject areas; the fundamental factors that impact the way students learn transcend disciplinary differences.
2. *Experience-independent:* The principles apply to all educational levels and pedagogical situations.
3. *Cross-culturally relevant:* All the research identified has been conducted primarily in the Western world, faculty colleagues in other countries have resonated with the principles, finding them relevant to their own classes and students.
Comparisons of Ideas from HLW with Principles of Process Education: Introduction

For each chapter, identify a quote or idea and the principle(s) of Process Education that align with it. Then include a brief explanation of how or in what way the two pieces align. Repeat as appropriate.

<table>
<thead>
<tr>
<th>Quote/Idea from HLW</th>
<th>Principle of PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning is a process that leads to change, which occurs as a result of experience and increases the potential for improved performance and future learning.</td>
<td>PE 1. Every learner can learn to learn better. PE 3. An empowered learner uses learning processes and self-assessment to improve future performance.</td>
</tr>
<tr>
<td>Students enter our classrooms not only with skills, knowledge, and abilities, but also with social and emotional experiences (p. 3)</td>
<td>FGB 2.3.3 Classification of learning skills</td>
</tr>
<tr>
<td>All the principles are at work in real learning situations and are functionally inseparable (p. 4)</td>
<td>FGB 2.3.4 Cognitive Domain: Learning skills are inseparable entities</td>
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</tbody>
</table>

The book begins with the authors describing their definition of learning and stating that their principles of learning come from a perspective that is developmental and holistic. Process Education is also a developmental and holistic philosophy. The authors point out that students do not only have cognitive skills, but also social and emotional. The Classification of Learning Skills have a cognitive, affective, and social domain. Finally, Ambrose and her colleagues emphasize that, while they may discuss the principles in different chapters, they principles are functionally inseparable. This aligns with Process Education's perspective on learning skills.

**Principle 1. Students' prior knowledge can help or hinder learning**

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<tr>
<td>Students come into courses with knowledge, beliefs, and attitudes … it influences how they filter and interpret what they are learning. (p. 4)</td>
<td>PE 1. Every learner can learn to learn better, regardless of current level of achievement.</td>
</tr>
<tr>
<td>Prior knowledge can provide a strong foundation for building knowledge or it can impede new learning (p. 4)</td>
<td>FGB 2.3.8 Learning Process Methodology: Step 5 is to identify prior knowledge that is necessary as background for new learning</td>
</tr>
</tbody>
</table>

The first principle is based on the significance of prior knowledge to learning. If the prior knowledge is accurate and activated at the correct time, it can form a good foundation for new knowledge, while if the prior knowledge is inactive or activated inappropriately, it can interfere with or impede new learning. The Learning Process Methodology, which can be used to elevate knowledge from Level 1 to Level 3 in Bloom's Taxonomy, has a step which states that prior knowledge serves as a foundation for new learning which aligns with the first principle.
Principle 2. How students organize knowledge influences how they learn and apply what they know

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<tr>
<td>When knowledge structures are accurately and meaningfully organized, students are better able to retrieve and apply their knowledge effectively and efficiently. When knowledge is connected in inaccurate or random ways, students can fail to retrieve or apply it appropriately.</td>
<td>FGB 2.2.1 Bloom's Taxonomy—Expanding Its Meaning: Level 2 involves linking items of knowledge together</td>
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<tr>
<td></td>
<td>FGB 2.2.2 Elevating Knowledge from Level 1 to Level 3: Teachers can help connect new concepts to prior knowledge to enlarge knowledge structure</td>
</tr>
</tbody>
</table>

The second principle of learning emphasizes the importance of the connection between organization of knowledge and learning. Good organization can aid learning while poor organization can hinder learning. Two modules in the Faculty Guidebook refer to Level 2 in Bloom's Taxonomy which is related to organization of knowledge. Thus, the Faculty Guidebook addresses this principle.

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

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<tr>
<td>“When students find positive value in a learning goal or activity … they are likely to be strongly motivated to learn” (p. 5)</td>
<td>FGB 2.2.8 Process Education as a Motivation and Self-Regulation System: PE is an integrated approach that address many motivational factors relevant to learning and growth.</td>
</tr>
<tr>
<td>“When students … perceive support from their environment, they are likely to be strongly motivated to learn” (p. 5)</td>
<td>QLE 1. Establish a high degree of trust and respect. QLE 9. Create a collaborate learning space.</td>
</tr>
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The third principle of learning refers to motivation and how it can influence student learning. Value in the learning activity and support from the environment increase a student's motivation to learn. Process Education emphasizes establishing a quality learning environment—which includes a high degree of trust and respect, and a collaborative learning space—as a way to increase motivation.

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

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<td>Students must develop ... component skills and knowledge to perform complex tasks (p. 5)</td>
<td>PE 6. To develop expertise in a discipline, a learner must develop a specific knowledge base in that field.</td>
</tr>
<tr>
<td>Students must practice combining and integrating skills and knowledge to develop greater fluency and automaticity (p. 5)</td>
<td>FGB 1.2.1: Theory of Performance: Reflective practice help people learn from experiences FGB 1.2.2: Profile of a Quality Learner: integrates new concepts</td>
</tr>
<tr>
<td>Students must learn when and how to apply the skills and knowledge they learn (p. 5)</td>
<td>FGB 2.2.2 Elevating Knowledge from Level 1 to Level 3: Knowledge expertise becomes stronger as the learner transfers and applies skills in slightly different contexts.</td>
</tr>
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</table>
The fourth principle of learning highlights the importance of mastery which can happen when students acquire component skills, integrate them, and know when to apply them. Each of these three components of mastery are addressed in modules in the Faculty Guidebook.

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

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<tr>
<td>Learning and performance are best fostered when students engage in practice that 1. focuses on a specific goal or criterion 2. targets an appropriate level of challenge 3. is of sufficient quantity and frequency to meet performance criteria</td>
<td>FGB 2.4.5 Learning Outcomes: Good instruction begins with a statement of objectives. QLE 5. Set clear and high expectations. FGB 2.3.8. Learning Process Methodology: Long-term transfer requires that the learner uses “spaced practice”</td>
</tr>
<tr>
<td>Practice must be paired with feedback that is 1. explicit relative to target criteria, 2. provides information to help students progress 3. is given in a time and frequency to be useful.</td>
<td>QA 1. Assessment focuses on improvement, not judgment. QA 2. Assessment focuses on performance, not the performer. QA 6. Assessment requires agreed-upon criteria.</td>
</tr>
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HLW and PE both point out the important of having objectives, practice, and feedback to enhance learning, which are the elements of the fifth principle of learning. In particular, there should be clear and high expectations and a sufficient amount of practice. Whenever there is practice there should also be feedback, and this feedback should be based on criteria, focus on improvement, and be giving in a timely manner.

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

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<tr>
<td>Students are still developing the full range of intellectual, social, and emotional skills. Classroom climate has implications for students. A negative climate may impede learning while a positive climate can energize students' learning.</td>
<td>The Classification of Learning Skills includes cognitive, social, and affective domains. FGB 3.1.1 Overview of Quality Learning Environment: Principles for Establishing a Quality Learning Environment</td>
</tr>
</tbody>
</table>

The sixth principle notes that student development and course climate have an interaction that affect learning. In Process Education, the Classification of Learning Skills has social and affective domains in addition to the cognitive one. There are also principles for establishing a quality learning environment to enhance student learning. Again, elements of Process Education align with one of the principles of learning.

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

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<tr>
<td>Learners may engage in a variety of metacognitive processes to monitor and control their learning 1. assessing the task at hand 2. evaluating … strengths and weaknesses 3. reflecting on the degree to which their current approach is working (pp. 6-7)</td>
<td>PE 2. Although everyone requires help with learning at times, the goal is to become a capable, self-sufficient, lifelong learner. FGB 4.1.1 Overview of Assessment: principles of quality assessment FGB 3.4.4 Team Reflection: reflection paired with assessment can improve future performances</td>
</tr>
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</table>

Both HLW and PE stress the importance of becoming a lifelong learner, and some metacognitive strategies include reflection and self-assessment. Students should reflect on how their current approach is working and do self-assessment where they identity strengths and areas for improvement.
The Ten Principles of Process Education (PE)
IJPE June 2009 article Process Education—Past, Present, and Future

1. Every learner can learn to learn better, regardless of current level of achievement; one’s potential is not limited by current ability.
2. Although everyone requires help with learning at times, the goal is to become a capable, self-sufficient, lifelong learner.
3. An empowered learner is one who uses learning processes and self-assessment to improve future performance.
4. Educators should assess students regularly by measuring accomplishments, modeling assessment processes, providing timely feedback, and helping students improve their self-assessment skills.
5. Faculty must accept fully the responsibility for facilitating student success.
6. To develop expertise in a discipline, a learner must develop a specific knowledge base in that field, but also acquire generic, lifelong learning skills that relate to all disciplines.
7. In a quality learning environment, facilitators of learning (teachers) focus on improving specific learning skills through timely, appropriate, and constructive interventions.
8. Mentors use specific methodologies that model the steps or activities they expect students to use in achieving their own learning goals.
9. An educational institution can continually improve its effectiveness in producing stronger learning outcomes in several ways: (1) By aligning institutional, course, and program objectives; (2) By investing in faculty development, curricular innovation, and design of performance measures; (3) By embracing an assessment culture
10. A process educator can continuously improve the concepts, processes, and tools used by doing active observation and research in the classroom.

Principles for Establishing a Quality Learning Environment (QLE) in Faculty Guidebook 3.1.1
- Establish a high degree of trust and respect.
- Make sure both learner and mentor are committed to the learner's success.
- Get student buy-in very early in the process.
- Challenge students.
- Set clear and high expectations.
- Encourage risk-taking.
- Seek student feedback regularly by using assessment on a consistent and timely basis.
- Measure and document process and growth.
- Create a collaborative learning space.
- Create a balance between structure and flexibility.

Principles of Quality Assessment (QA) in Faculty Guidebook 4.1.1
1. Assessment focuses on improvement, not judgment.
2. Assessment focuses on performance, not the performer.
3. Assessment is a process that can improve any level of performance.
4. Assessment feedback depends on who both the assessor and the assessee are.
5. Improvement based on assessment feedback is more effective when the assessee seeks assessment.
6. Assessment requires agreed-upon criteria.
7. Assessment requires analysis of the observations.
8. Assessment feedback is accepted only when there is mutual trust and respect.
9. Assessment should be used only where there is a strong opportunity for improvement.
10. Assessment is effective only when the assessee uses the feedback.
Chapter 1: How Does Students’ Prior knowledge Affect Their Learning?

**Principle:** Students’ prior knowledge can help or hinder learning.

What does the research tell us about the role of student prior knowledge?

It is important to recognize that college students bring prior knowledge and beliefs to our classroom. Students connect what they learn to what they already know, interpreting incoming information, and even sensory perception, through the lens of their existing beliefs, and assumptions.

<table>
<thead>
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<th>Prior Knowledge</th>
<th>Implications of this research</th>
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<tbody>
<tr>
<td>Assessing what students know and believe is critical to build on knowledge that is accurate and relevant.</td>
<td>Instructors must help students: (1) fill in gaps and insufficiencies; (2) help students recognize inappropriate application of prior knowledge; &amp; (3) help students revise inaccurate knowledge</td>
</tr>
</tbody>
</table>

Strategies that address prior knowledge

- Methods to gauge Extent & Nature of Students’ Prior Knowledge
  - Talk to colleagues
  - Administer a diagnostic assessment
  - Have students self-assess
  - Use brainstorming to reveal Prior Knowledge
  - Assign Concept Map Activity
  - Look for patterns of error in student work
- Methods to activate prior knowledge
  - Ask students what they already know about a topic
  - Explicitly link new material to knowledge for previous courses
  - Explicitly link new material to prior knowledge from your own course
  - Use analogies and examples to connect to students’ everyday life
  - Ask students to reason based on prior knowledge
- Methods to address insufficient prior knowledge
  - Identify prior knowledge you expect students to have
  - RemEDIATE insufficient prerequisite knowledge
- Methods to help students recognize inappropriate prior knowledge
  - Highlight conditions of applicability
  - Provide heuristics to help students avoid inappropriate application of knowledge
  - Explicitly identify discipline specific conventions
  - Show where analogies break down
- Methods to correct inaccurate knowledge
  - Ask students to make and test predictions
  - Ask students to justify their reasoning
  - Provide multiple opportunities for students to use accurate knowledge
  - Allow sufficient time
Chapter 2. How Does the Way Students Organize Knowledge Affect Their Learning?

**Principle:** How students organize knowledge influences how they learn and apply what they know

**Knowledge organization:** how pieces of knowledge are arranged and connected in an individual's mind. Knowledge can be organized in ways that either do or do not facilitate learning, performance, retention.

**Organization of Knowledge**
Experts/Instructors: have rich, meaningful knowledge structures that support learning and performance
Novices/Students: tend to build sparse, superficial knowledge structures

**What does the research tell us about knowledge organization?**

<table>
<thead>
<tr>
<th><strong>Form fits function</strong></th>
<th><strong>Implications of this research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The way people organize their knowledge tends to vary as a function of their experience, the nature of their knowledge, and the rule that that knowledge plays in their lives</td>
<td>Knowledge organizations: develop to support tasks being performed and are most effective when they are well matched to the way that knowledge needs to be accessed and used</td>
</tr>
<tr>
<td><strong>Experts vs. Novices: Density of Connections</strong></td>
<td><strong>Implications of this research</strong></td>
</tr>
<tr>
<td>Novices: few connections among concepts, facts, and skills; and connections are arranged in a chain</td>
<td>Important to recognize the difference between expert and novice knowledge structures and provide structures that highlight to students how we organize disciplinary knowledge</td>
</tr>
<tr>
<td>Experts: knowledge organized hierarchically and/or highly connected knowledge structure</td>
<td><strong>Experts vs. Novices: Nature of Connections</strong></td>
</tr>
<tr>
<td>Novices: basis for organizational structures tend to be superficial</td>
<td>Important to realize differences in organizing knowledge. We need to provide students with appropriate organizing schemes or teach them how to abstract relevant principles, and monitor how students process what they are learning</td>
</tr>
</tbody>
</table>
| Experts: organize knowledge around meaningful features and patterns and can flexibly use multiple knowledge organizations | **Strategies to reveal and enhance knowledge organizations:** ways for instructors to assess their own knowledge organizations relative to students and help student develop more connected, meaningful, and flexible ways of organizing their knowledge.

4. Create a concept map to analyze your own knowledge organization
5. Analyze tasks to identify the most appropriate knowledge organization
6. Provide students with the organizational structure of the course
7. Explicitly share the organization of each lecture, lab, or discussion
8. Use contrasting and boundary cases to highlight organizing features
9. Explicitly highlight deep features
10. Make connections among concepts explicit
11. Encourage students to work with multiple organizing structures
12. Ask students to draw a concept map to expose their knowledge organizations
13. Use a sorting task to expose students knowledge organizations
14. Monitor Students' work for problems in their knowledge organization
Chapter 3: What factors motivate students to learn?

**Principle:** Students’ motivation generates, directs, and sustains what they do to learn.

**What does the research tell us about motivation?**

Three important levers influence motivation:
- Value
- Efficacy expectations
- Supportive nature of the environment

Neglecting any one of these will affect motivation – even in a supportive environment, students are not motivated to do something they do not value

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Implications of this research</th>
</tr>
</thead>
<tbody>
<tr>
<td>How perceptions affect interaction of values &amp; expectancies</td>
<td>If goal is valued &amp; expectancies for success are positive &amp; the environment is perceived to be supportive, then motivation will be the highest</td>
</tr>
</tbody>
</table>

**Strategies that address motivation**

- Strategies to establish value
  - Connect the material to students’ interests
  - Provide authentic, real-world tasks
  - Show relevance to students’ current academic lives
  - Demonstrate the relevance of higher-level skills to students’ future professional lives
  - Identify and reward what you value
  - Show your own passion and enthusiasm for the discipline

- Strategies that help students build positive expectancies
  - Ensure alignment of objectives, assessments, and instructional strategies
  - Identify an appropriate level of challenge
  - Create assignments that provide the appropriate level of challenge
  - Provide early success opportunities
  - Articulate your expectations
  - Provide rubrics
  - Provide targeted feedback
  - Be fair
  - Educate students about the ways we explain success and failure
  - Describe effective study strategies

- Strategies that address value and expectancies
  - Provide flexibility and control
  - Give students an opportunity to reflect
Chapter 4: How Do Students Develop Mastery?

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

**What does the research tell us about mastery?**

<table>
<thead>
<tr>
<th>Expertise &amp; Component Skills</th>
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</thead>
<tbody>
<tr>
<td>Development from novice to expert: unconscious incompetence, conscious incompetence, conscious competence, unconscious competence. Students need to practice component skills in order to improve performance on complex tasks</td>
<td>To build new skills and to diagnose weak or missing skills, instructors should break complex tasks down into their component parts. Develop skills through targeted practice either through isolated practice, whole-task practice, or both.</td>
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</table>

**Integration**

<table>
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<tr>
<td>To master complex tasks: integrate component skills. Cognitive load: total information-processing demands to complete a task. If limit is exceeded, people cannot complete task effectively.</td>
</tr>
<tr>
<td>Instructors should have reasonable expectations about the time and practice students will need, not only to develop fluency in component skills but also to learn to integrate the skills successfully.</td>
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**Application**

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<tr>
<td>Application of skills learned in one context to a novel context is called transfer. Students are better able to transfer learning to new contexts when they can combine concrete experience within particular contexts and abstract knowledge that crosscuts contexts &amp; with structured comparisons.</td>
</tr>
<tr>
<td>Transfer does not happen easily or automatically, so it is important that to “teach for transfer:” use teaching strategies that reinforce understanding of structures and principles, provide diverse contexts in which to apply principles, &amp; help student make connections between skills and new contexts.</td>
</tr>
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</table>

**Strategies to expose and reinforce component skills:**
- Push past your own expert blind spots
- Enlist a teaching assistant or graduate student to help with task decomposition
- Talk to your colleagues
- Enlist the help of someone outside your discipline
- Explore available educational materials
- Focus students' attention on key aspects of the task
- Diagnose weak or missing component skills
- Provide isolated practice of weak or missing skills

**Strategies to build fluency and facilitate integration**
- Give students practice to increase fluency
- Temporarily constrain the scope of the task
- Explicitly include integration in your performance criteria

**Strategies to facilitate transfer**
- Discuss conditions of applicability
- Give students opportunities to apply skills/knowledge in diverse contexts
- Ask students to generalize to larger principles
- Provide prompts to relevant knowledge
- Use comparisons to help students identify deep features
- Specify context and ask students to identify relevant skills or knowledge
- Specify skills/knowledge and ask students to identify contexts in which they apply
Chapter 5: What kinds of practice and feedback enhance learning?

**Principle:** Goal-directed practice coupled with targeted feedback are critical to learning.

What does the research tell us about practice & feedback?

Carefully designed practice and feedback can help to make the learning-teaching process not only more effective but also more efficient.

<table>
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<tbody>
<tr>
<td>Learning and performance are best fostered when practice: (a) focuses on a specific goal or criterion for performance; (b) targets an appropriate level of challenge relative to the students’ current performance; and (c) is of sufficient quantity and frequency to meet the performance criteria.</td>
<td>To achieve the most effective learning, students need <strong>sufficient</strong> practice that is <strong>focused</strong> on a specific goal or set of goals and is at an <strong>appropriate level of challenge</strong>.</td>
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<td>Two features of feedback make students' learning more effective and efficient: content and timing. Content: communicating progress and directing subsequent effort. Timing: determine what is appropriate based on how soon and how often</td>
<td>Feedback must: (1) focus students on the key knowledge and skills you want them to learn; (2) be provided at a time and frequency when students will be most likely to use it; and (3) be linked to additional practice opportunities.</td>
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**Strategies that address**

- Strategies addressing the need for goal-directed practice
  - Conduct a prior knowledge assessment to target an appropriate challenge level
  - Be more explicit about your goals in your course materials
  - Use a rubric to specify and communicate performance criteria
  - Build multiple opportunities for practice
  - Build scaffolding into assignments
  - Set expectations about practice
  - Give examples or models of target performance
  - Show students what you do not want
  - Refine your goals and performance criteria as the course progresses

- Strategies addressing the need for targeted feedback
  - Look for patterns of errors in student work
  - Prioritize your feedback
  - Balance strengths and weaknesses in your feedback
  - Design frequent opportunities to give feedback
  - Provide feedback at the group level
  - Provide real-time feedback at the group level
  - Incorporate peer feedback
  - Require students to specify how they used feedback in subsequent work
Chapter 6: Why Do Student Development and Course Climate Matter for Student Learning?

**Principle:** Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning.

**What does the research tell us about student development & course climate?**

It is important to recognize the complex set of social, emotional, and intellectual challenges that college students face. By considering the implications of student development for teaching and learning we can create more productive learning environments.

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<tr>
<td>Intellectual development: a student moves from simplistic to more sophisticated ways of thinking; movement forward may be propelled by a challenge that reveals limits of current stage Social identity development: a student proceeds through a trajectory that culminates with the establishment of a positive social identity as a member of a specific group</td>
<td>Instructors should make sure their expectations are reasonable given students current level of intellectual development. Development can be fostered by posing appropriate challenges and providing support. Pedagogical strategies should reflect an understanding of social identity development so we can anticipate tensions that might occur and be proactive about them.</td>
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<tr>
<td>Course climate is a continuum ranging from marginalizing to centralizing (explicitly or implicitly), and it can be experienced differently by different students. Four basic areas of climate: stereotypes, tone faculty-student and student-student interactions, content.</td>
<td>Learning does not happen in a vacuum but in a context where intellectual pursuits interlace with socioemotional issues. Climate works in both blatant and subtle ways, and many well-intentioned or seemingly inconsequential decisions can have unintended negative effects.</td>
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</table>

**Strategies that promote student development and productive climate**

- Make uncertainty safe
- Resist a single right answer
- Incorporate evidence into performance and grading criteria
- Examine your assumptions about students
- Be mindful of low-ability cues
- Do not ask individuals to speak for an entire group
- Reduce anonymity
- Model inclusive language, behavior, and attitudes
- Use multiple and diverse examples
- Establish and reinforce ground rules for interaction
- Make sure course content does not marginalize students
- Use the syllabus and first day of class to establish the course climate
- Set up processes to get feedback on the climate
- Anticipate and prepare for potentially sensitive issues
- Address tensions early
- Turn discord and tension into a learning opportunity
- Facilitate active listening
Chapter 7: How do students become self-directed learners?

**Principle:** to become self-directed learners, students must learn to assess the demands of the task, evaluate their own knowledge and skills, plan their approach, monitor their progress, and adjust their strategies as needed.

What does the research tell us about metacognition?

Student beliefs about intelligence and learning influence the metacognitive cycle.

<table>
<thead>
<tr>
<th>Metacognition</th>
<th>Implications of this research</th>
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<tbody>
<tr>
<td>• Assess the task at hand</td>
<td>Students tend not to apply metacognitive skills as well or as often as they should.</td>
</tr>
<tr>
<td>• Evaluate their own knowledge and skills</td>
<td>Students will often need our support in learning, refining, and effectively applying basic metacognitive skills</td>
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<tr>
<td>• Plan their approach in a way that accounts for the current situation</td>
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<tr>
<td>• Apply various strategies to enact their plan</td>
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<tr>
<td>• Reflect on the degree to which their current approach is working</td>
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</tbody>
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**Strategies that address metacognitive cycle**

- Assessing the task at hand
  - Be more explicit than you think necessary
  - Tell students what you do not want
  - Check students’ understanding of the task
  - Provide performance criteria with the assignment
- Evaluating one’s own strengths and weaknesses
  - Give early, performance-based assessments
  - Provide opportunities for self-assessment
- Planning an appropriate approach
  - Have students implement a plan that you provide
  - Have students create their own plan
  - Make planning the central goal of the assignment
- Applying strategies and monitoring performance
  - Provide simple heuristics for self-correction
  - Have students do guided self-assessments

- Reflecting on and adjusting one’s approach
  - Require students to reflect on and annotate their own work
  - Use peer review/reader response
  - Provide activities that require student to reflect on their performance
  - Prompt students to analyze the effectiveness of their study skills
  - Present multiple strategies
  - Create assignments that focus on strategizing rather than implementation

- Beliefs about intelligence and learning
  - Address students’ beliefs about learning directly
  - Broaden students’ understanding of learning
  - Help students set realistic expectations

**Strategies that promote metacognition**

- Modeling your metacognitive process
- Scaffolding students in their metacognitive processes
Conclusion: Applying the Seven Principles to Ourselves

The seven (interconnected) principles explain and predict a wide range of learning behaviors and phenomena and hence aid the design of courses and classroom pedagogy. Among the many strategies that help us to be effective teachers there are recurring themes: collecting data about students, modeling expert practice, scaffolding complex tasks, and being explicit about objectives and expectations.

Teaching is a complex activity and many of us have not received formal training in pedagogy. Learning to improve one's teaching is a process of progressive refinement, which, like other learning processes, is informed by the learning principles in this book.

This chapter applies the seven learning principles to the process of learning about teaching.

- We have a lot of prior knowledge which affects further learning and performance. We have content knowledge, but this is insufficient for effective teaching. A misconception is that good teaching is about entertainment and personality. We should not presume that the teaching methods that worked for us should work for our students, too.
- We need to think about the organization of our knowledge about teaching. It is common to keep one's knowledge of teaching compartmentalized by course, but this centers on surface features of the courses. The principles in this book offer a deeper, more meaningful structure for organizing one's knowledge of teaching and learning and building on that knowledge.
- It is important to consider our motivation to learn (and continue to learn) about teaching. Motivation is determined by value and expectancy. Instructors value efficiency. Several strategies in this book require an initial time investment, but they yield time savings later on. For expectation, we are more likely to stay motivated if we set teaching goals for ourselves that are realistic, so we are more likely to maintain confidence in our ability to achieve those goals.
- To develop mastery in teaching, we need to acquire its component skills, integrate them, and apply them appropriately. We need to unpack the multifaceted task of teaching, and then we need to develop fluency in each skill so that we develop enough automaticity to reduce the cognitive load of any one of them. Teaching requires learning when and where various teaching strategies and instructional approaches are applicable.
- Developing mastery in teaching is a learning process, and as such it requires the coupling of practice and feedback. For practice to be maximally effective, it should be focused on clear goals. In order to set appropriate goals for our teaching, we can be guided by timely and frequent feedback on what aspects of our courses are not working. The best feedback is formative feedback throughout the semester.
- Thinking of teaching as progressive refinement raises the notion of development, which happens in the context of a given climate. Instructors go through a process of intellectual development: first looking for the “right answer,” then view teaching as a matter of personal style, later think teaching is highly contextualized. The broader climate in which we learn about teaching matters. Being in a department can be energizing or demoralizing, based on to what extent it values teaching.
- These principles can help us be more reflective (metacognitive) about our teaching. Self-directed learning (metacognition) requires engaging in a cyclical process with several phases: consider our strengths and weaknesses in relation to our teaching, continually reassess the task of teaching, plan an effective approach, monitor our progress, evaluate, and adjust.

Refining our teaching practice requires being aware of our core beliefs about teaching and learning. All these beliefs will impact our metacognitive cycle. This book is a start in this process and an invitation to keep thinking and learning about teaching.
Appendices

There are many tools that can be helpful in enhancing the learning environment

Appendix A: What is student self-assessment and how can we use it?
A self-assessment can help students focus on the most important knowledge and skills addressed by your course, or required from pre-requisite courses, or desired from personal experiences. Accuracy depends on clarity of response options & connection to specific concepts or behaviors.

Appendix B: What are concept maps and how can we use them?
Graphical representation and organization of knowledge… map what they already know (& identify misunderstandings); track development over time; and reflect on changes in the map.

Appendix C: What are rubrics and how can we use them?
A rubric articulates explicit performance expectations, is given with the assignment, and can be used in scoring the assignment.

Appendix D: What are learning objectives and how can we use them?
Articulate knowledge and skills you want students to acquire (what will they be able to do…?)

Appendix E: What are ground rules and how can we use them?
Articulate expected behaviors & can create an environment supportive of course goals

Appendix F: What are exam wrappers and how can we use them?
A short handout, given when the exam is returned, that directs students to review and analyze their performance and the instructor's feedback with an eye toward adapting their future learning.
-- can return them a week or two before the next exam & use in structured class discussion.

Appendix G: What are checklists and how can we use them?
Expectations can be made explicit by providing a checklist (for process or for content).

Appendix H: What is reader response/per review and how can we use it?
Students read and comment on each others’ work as a way to improve their peers’ (and their own) writing
Worksheet
Chapter ___

For your chapter
1. Identify a quote or idea and the principle(s) of Process Education that align with it. Then include a brief explanation of how or in what way the two pieces align. Repeat as appropriate.
2. Generate a list of ideas that can immediately be implemented in our classrooms.

1 This page will be collected and the comparisons will be included in the session notes (available to all participants).
SII of the Book Chat: Please provide an SII assessment of the session (not the book).

**Strengths:** List two strengths of the performance, along with the reasons why it was a strength.

**Areas for Improvement:** List two areas for improvement, followed by an action plan explaining how the improvement might be made.

**Insights:** List two insights you gained during this session. An insight is sometimes described as an “AHA!” moment, where you gain a surprising understanding about something.