Guiding Educational Principles

1. **What is *learned* is more important than what is *taught.***
    a. What is taught is not necessarily what is learned.
    b. Teaching involves much more than just telling.

2. **Residents learn best within their *zone of development.***
    a. Teaching that focuses on what residents already know, is not helpful.
    b. Teaching well beyond the resident's knowledge/skill level limits learning.

3. **Foster *active engagement, rather than passive observation.***
    a. 'Active' means engaged in the work, intellectually and physically.
    b. Too much observation and too little engagement => less learning.

4. **C*ognitive overload* interferes with learning.**
    a. Short-term memory is limited to 7+/- 2 discrete bits of information.
    b. A few key points can be anchors for several other points.

5. ***Embarrassment and threat* diminish learning.**
    a. Excessive anxiety reduces ability to process information.
    b. Question up-the-ladder, when working with different levels of learners.

6. ***Program planning* is critical to effective teaching and learning.**
    a. Get the Big Picture. Be the "Maestro". Listen to the orchestra.
    b. Know how each learning episode relates to the overall program.

7. **Students learn from a *hidden curriculum*.**
    a. What you *do* teaches more than what you *say*.
    b. You are not your resident's only teacher

8. **Perception of *assessment and accountability* drives learning.**
    a. Smart learners figure out the assessment scheme and work accordingly.
    b. Students choose the most efficient route to the perceived evaluation.

Education Principle No. 1

What is *learned* is more important than what is *taught*.

a. What is taught is not necessarily what is learned.
b. Teaching is much more than just telling.

Example 1: You spend considerable time explaining a concept to your resident. Two weeks later as you watch him respond to someone else's question, you realize he has no real understanding of the concept you had so patiently explained only two weeks earlier.

Example 2: You explain in detail how you like to perform a certain type of operation. Three months later, you are doing the same operation with the same resident and you realize he has no recollection of how you like to perform the surgery.

Background

As a teacher, it is critical to recognize that residents will not necessarily learn everything we "teach" (i.e. tell or show) them. Furthermore, what is ultimately most important is what residents actually learn. Why don't residents retain everything we tell them? Here are some possible explanations:

- You explained too quickly or used terms the resident did not fully understand; and he was unwilling to point out his lack of understanding.
- The resident initially understood but "forgot" over time because she did not have the time, opportunity, or discipline to reflect on or to practice what you taught. Therefore she did not move it from short-term memory to long-term memory.
- The resident was too tired or too distracted to fully understand what you were trying to teach him.

Implications

- Be alert to what your residents are actually learning, not just what you are trying to teach them.
- Use non-threatening questions to probe for understanding of the concepts you have explained.
- Provide your residents with strategies for long-term retention of concepts and information.
- Teach concepts and principles rather than isolated facts.
- Revisit important concepts to ensure your residents have an accurate understanding.

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Education Principle No. 2

Residents learn best within their *zone of development.*

a. Teaching that focuses on what residents already know, is not helpful.
b. Teaching well beyond the resident's knowledge/skill level limits learning.

Example #1: You have a chief resident and a junior resident on your service. You are explaining a concept to the junior resident. The chief resident sits patiently, but is obviously bored.

Example #2: You are lecturing to third year medical students on a topic you believe is very basic. After ten minutes, many students have a glazed look in their eyes and it is clear they don't understand most of what you are saying.

Background

Every learner brings prior knowledge and skills to each teaching situation. Background knowledge and skills can vary widely between students and residents, and not necessarily in proportion to the person's year in training. To foster the acquisition of new knowledge and skills, teachers must identify what learners already know and can do. Teaching should be directed to the learner's zone of development – the difference between what they understand and can do without you, and what they understand and can do with your guidance.

Implications

- Ask questions in a non-threatening manner to probe for level of understanding.
- Identifying a resident's level of understanding or lack of understanding should provide a point of entry for your teaching.
- The target of your teaching should be your learner's zone of development.
- When teaching residents with different knowledge and skill levels, devise questions that are appropriate to each resident's level.

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Education Principle No. 3

Foster *active engagement,* rather than passive observation.

a. 'Active' means engaged in the work, intellectually and physically.
b. Too much observation and too little engagement => less learning.

Example #1: Your resident mentions that he does not learn much during Grand Rounds presentations, especially when he is post call and the lights are dimmed.

Example #2: One of your residents reports that she finds it very helpful to draw a series of diagrams outlining each new operation she has witnessed.

Background

Learning is more intense when the learner's mind is actively engaged. Experiences that actively engage the learner in the process will typically lead to deeper and more sustained learning. Educational strategies such as Problem-Based Learning are designed to take advantage of the benefits of active learning. Wherever possible, residents and students should be engaged in authentic and genuine tasks—not 'make-work' activities.

Implications

- Create learning environments where your residents' minds are active. Asking probing questions at an appropriate level can serve this purpose.
- Physically involve your residents in the learning environment. Strive to actively involve your residents in surgery, even when they are not operating.
- Encourage your residents to find study methods that require mental and physical activity. Writing summary notes or drawing diagrams while studying can capitalize on these strategies.
- Devise authentic, 'hands-on' tasks appropriate to their level of knowledge and ability.

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Education Principle No. 4

C*ognitive overload* interferes with learning.

a. Short-term memory is limited to 7 +/- 2 discrete bits of information.
b. A few key points can be anchors for several other points.

Example #1: One of your residents seems overwhelmed as you explain what you assumed was common knowledge for a resident at his stage of training.

Example #2: You have difficult remembering a long distance telephone number or a grocery list unless you employ a memory strategy.

Background

It's no coincidence that there are Seven Wonders of the World, Seven Deadly Sins, and (formerly) seven digits in your phone number. The typical person can retain only 7+/-2 discrete bits of information in short term memory. And often, even seven is more than we can remember. To retain more information, the brain employs various cognitive strategies (e.g., rehearsal, chunking, visualizing). Many residents already have adequate methods of organizing information, but they still struggle with new information. Effective orthopaedic educators are cautious not to overload residents and students with information that may be familiar to us, but is new to them.

Implications

- When teaching, present new information in a clearly organized manner.
- Teaching is often more effective when it is done "in context" because the learner can tie the new information to the realities of the context.
- Pace your delivery so as to not overwhelm learners.
- Sometimes 'less information' can provide 'more learning'.
- Question your residents on their learning methods. Ask them how they intend to retain the information they have learned today?

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Education Principle No. 5

***Embarrassment and threat* diminish learning.**

a. Excessive anxiety reduces ability to process information.
b. Question up-the-ladder, when working with different levels of learners.

Example #1: A resident who is embarrassed in morning rounds is unable to adequately answer a question you are sure she knows.

Example #2: One of the junior residents appears so focused on pleasing his attending surgeon that he does not appear to be learning from the clinical experiences he is being exposed to.

Background

Residents may forget what you said, but they will never forget how you made them feel. Emotions and cognition are interactive. As a result, a negative learning environment, for whatever reason, is likely to have adverse effects on a resident's ability to process, synthesize, and retain information. Learning requires a receptive mind; negative emotions interfere with our cognitive functioning. High expectations should be accompanied by a positive learning environment and support, until residents have gained a measure of mastery over the new material. Performance assessment and feedback should consider a resident's effort and achievement. Positive assessments should never be seen as the result of favoritism or of effort alone in the absence of actual achievement.

Implications

- Student learning is better in a positive learning environment.
- Demeaning or embarrassing residents is never justified.
- Appreciate that there can be a fine line between evaluation and intimidation.
- Give residents a few minutes to 'gather their thoughts' before you call on them.
- Make the learning environment positive and non-threatening for residents while still challenging them to push themselves to their limits.

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Education Principle No. 6

Program planning is critical to effective teaching and learning.

a. Get the Big Picture. Be the "Maestro". Listen to the entire orchestra.
b. Know how each learning episode relates to the overall program.

Example #1: One of your residents reports that she learned a great deal while on Dr. Smith's rotation, even though Dr. Smith "didn't teach much." Apparently Dr. Smith had a coordinated set of readings he made the residents review in a systematic manner.

Example #2: Junior residents are complaining that they are 'not learning much' during the arthroplasty/bone tumor rotation. They complain that the volume of clinical work does not allow time for studying or sleep. In addition, they say that the large number of revision arthroplasties and complex tumors is beyond their present level of training.

Background

The learning experience that a resident has should not be left to chance. Successful program planners think about the types of experiences that residents need in order to acquire the requisite knowledge and skills. Many variables can affect learning during a particular residency rotation. Have residents been given realistic rotation objectives? What will residents do and see in clinic? What will they do and see in the operating room? Have any formal teaching sessions been planned? Have residents been given assigned readings or other directed learning activities? How will formative feedback be given to residents during the rotation? How will residents be evaluated? These are all important questions that directly affect the quality of resident learning during a rotation. Positive learning environments require an organized approach to resident learning.

Implications

- Think about the learning environment from the resident's point-of-view.
- Identify barriers to learning that your residents face and attempt to resolve them.
- Establish individualized rotation objectives/intended outcomes with each resident.
- Provide regular feedback to your residents regarding their performance.
- Develop consistent, fair methods for evaluating your residents.
- Obtain feedback on your rotation and your teaching methods from your residents.

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Education Principle No. 7

Students learn from a *hidden curriculum*.

a. What you <u>*do*</u> teaches more than what you <u>*say*</u>.
b. You are not your resident's only teacher

<u>Example #1:</u> During a tense moment in the OR the attending explodes in anger, swearing and shouting at one of the nurses. The resident that was in the OR during that episode is seen doing exactly the same thing later in the week when the attending is out of the room.

<u>Example #2:</u> After a series of three or four unusually busy days on the service, you apologize to your resident that it's been so busy that you really haven't been able to schedule time-out for teaching the last few days. She thinks to herself, but doesn't say, *Do you really think I'm learning only during scheduled time-outs? I'm learning all the time, from everyone here on the unit.*

Background

A large amount of learning during residency training occurs through a process of socialization. Residents observe how people speak to each other, how authority is expressed, how things are done, and by whom. They quickly see what is acceptable and what is not, irrespective of what you say. As teaching surgeons, it is critical to realize that what we do and how we act is probably more important than what we say – our actions speak louder than our words. As well, we need to capitalize on the learning potential of everyone and everything associated with the service. Other physicians, nurses, patients, and even equipment—all play a role in resident learning.

Implications

- You are a role model. Avoid negative actions and negative language.
- Create a work environment that your residents will want to emulate.
- Other personnel are important 'teachers' of informal student learning.
- The hidden curriculum is hidden from you, but not from residents.

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Education Principle No. 8

Perception of *assessment and accountability* drives learning.

a. Smart learners figure out the assessment scheme and work accordingly.
b. Students choose the most efficient route to the perceived evaluation.

Example #1: One of your residents spends a disproportionate amount of time studying old OITE questions. You do not believe she is doing enough reading around the various cases she is currently seeing.

Example #2: A list of your likes and dislikes is passed from resident to resident within your program. Although it is accurate, you had no idea this was happening.

Background

On route to obtaining board certification and a desirable job or fellowship, residents usually figure out what they believe each attending surgeon expects of them. However, sometimes what we say we are looking for in our residents (e.g., well-rounded, skilled, compassionate) is not what our actions show (e.g., putting major emphasis on OITE scores). This can send the wrong message to the residents. It is important to think about what your learners think is important to their learning and progression during residency (e.g., a good evaluation; an outstanding grade; a letter of reference). Assessment and accountability, or more correctly the students' perception of evaluation and accountability, strongly influences what they will learn.

Implications

- Think carefully about what you want your residents to know and to do.
- Make your expectations clear and explicit to students and residents.
- Clearly outline how you intend to evaluate them.
- Carry out the evaluation method you describe.
- Be consistent and fair in your evaluations.

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