U.S. INTERNATIONAL CHRISTIAN ACADEMY

Serving students since 2001

Owned and Operated by Teachers

25 years of experience in Teaching and Administration

www.USICAhs.org

admin@USICAhs.org

THE LONDON LIBRARY

http://www.usicahs.org/Library.html

http://www.usicahs.org/Curriculum.html

How Learning Works: The Seven Learning Principles

The biggest investment we can make to enhance our teaching is to understand the learning process in order to tailor our efforts to produce maximal learning.

Our teaching is only as good as the learning it produces. As experts in our respective fields, we already possess deep content knowledge, but that is only half of the story. What we try to pass on to students has to be interpreted and processed through their filters, often with unpredictable and surprising results. Therefore, the biggest investment we can make to enhance our teaching is to understand the learning process in order to tailor our efforts to produce maximal learning. Learning science is a very interdisciplinary field, drawing from cognitive, motivational, and developmental psychology; education; organizational and group learning; diversity and inclusion studies; and several other disciplinary perspectives. Ambrose, Bridges, DiPietro, Lovett, and Norman (2010) reviewed the literature on learning published over the course of the past 50 years or so and organized it into seven principles that can guide us in our teaching.

Ambrose, et al. (2010) have organized their findings into seven interrelated principles:

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.

Each of the seven principles is summarized below; click on each principle for more information.

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

We think of prior knowledge as the foundation and the building blocks for new knowledge. This is usually true, but in some cases prior knowledge can interfere with learning and performance. Sometimes, prior knowledge is demonstrably inaccurate, yet strongly embraced by the learners, as is the case with some misconceptions in the sciences. Learners can't make progress until they unlearn what they think they know (Minstrell 1989). In other situations, their prior knowledge is accurate, but it might be applied in inappropriate ways. For instance, in practicing a second language, a learner might apply sentence constructions from the native language that are inappropriate in the target language and impede her ability to communicate. Other times, prior knowledge might be insufficient. Learners might know how to do something by rote but not understand the conceptual underpinnings, resulting in overconfidence in their prior knowledge. And finally, even when people do possess the necessary prior knowledge, they can fail to activate it and bring it to bear on the current problem.

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

To learn something means to connect new knowledge with existing prior knowledge in long term memory. The brain is wired to do just that and it does it even without our awareness, creating networks of concepts connected in various ways. Unfortunately, not all connections are equally useful. Experts' networks are rich and meaningful. They have more nodes, because they know a lot. They also have many more connections, although the brain does not have the capacity to connect each node to every other node. Therefore, experts make strategic connections among nodes, organized around the underlying principles in their domain, and useful to solve problems. Novices, too, organize their knowledge in networks. Their networks are predictably smaller and with fewer connections. But the connections are more often built around superficial features, like visual similarity, and less likely to help in problem solving (Chi et al. 1981). The good news from this line of research is that novices too can develop productive connections, with the appropriate support.

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

Motivated learners display certain behaviors that are known to aid learning and performance. They make choices based on their motivation. They exert effort. They persist in the face of challenges. They seek help when they are stuck. Research shows that even though learners start with their own levels of motivation, educators can affect them based on two levers: goals and expectations (Wigfield & Eccles 2000). It is a truism that we are motivated to do what we consider important. If educators can affect the perceived importance of a topic or a task relative to others, it will cause a shift in motivation for learner. Common strategies to tap into involve activating relevance, novelty, and complexity of the material, as well as social and emotional goals.

In addition, we are motivated to expend our limited energies on tasks where we have a reasonable expectation of success. This expectation can be affected by establishing a clear linkage between the task and the learner's goals, by bolstering the learner's confidence in their own abilities, and in creating an environment supportive of their efforts.

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

Many of the skills we teach at the college level are complex and involve several sub-skills. Writing well, for instance, requires knowledge of grammar, spelling, punctuation, syntax, as well as a style, a good organization of ideas, and the ability to tailor the output according to specific purposes, audiences, and genres.

In order to master any skill, learners must master each sub-skill and learn to integrate them through a process that balances isolation and synthesis. Finally, learners mast acquire the ability to decide which sub-skill is needed in a specific situation. For instance, mastery of data analysis involves knowing each specific statistical tool (regression, ANOVA, Chi square), and knowing which tool applies with certain types of data. While this description seems straightforward, teaching skills can be complicated. Experts have automated their processes, and often lose the ability to verbalize them. This speeds up their performance, but can hinder their ability to unpack complex skills into component skills for the benefit of the learners if they are not vigilant against their expert blind spot (Sprague & Stuart 2000).

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

We commonly say that practice makes perfect, but that is not necessarily true. One could be practicing and reinforcing bad habits that hinder learning and performance.

Learning scientists have identified the characteristics of the kind of practice that makes indeed perfect, which they call "deliberate practice" (Ericsson et al. 2003).

Deliberate practice is informed by clear and measurable goals stated at the outset, so that learners can direct their effort appropriately. Deliberate practice hinges on constructive feedback—frequent, timely, and focusing on strengths as well as concrete steps for improvement. Just as important is the opportunity to incorporate feedback into further practice and iterate the cycle until mastery is achieved.

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

Each student in our courses is going through a process of maturation. As educators, we want our students to mature intellectually, developing more sophisticated conceptions of what it means to learn and to know something, of their role as learners and of our role as teachers. But students are more than their intellect, and they are simultaneously developing socially, emotionally, inter- and intrapersonally, interculturally, morally, and in their identity as members of dominant or minority social groups. Research has established clear links between levels of development and learning (Patton & Renn 2016). In addition, students will all be at different points in their developmental trajectories, creating a spectrum in the classroom. The course climate that results from those interactions has also been showed to impact learning (Whitt et al. 1999). As educators, we cannot force development, but we can encourage it, and we can certainly affect the course climate to make it conducive for learning.

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

Once instruction is over, we want our students to keep learning independently and strategically. For this to happen, student must develop their met cognitive skills. In order to be strategic about their own learning, when faced with a new complex task, learners must be able to: assess the task; evaluate their strengths and weaknesses in relation to the task; plan an appropriate approach; execute the approach and monitor the results; reflect and modify their approach as needed, in a cycle of improvement (Zimmerman 2001). At the center of the cycle rest their beliefs about intelligence and learning (whether intelligence is fixed or incremental and whether learning is fast or gradual). Research shows that people are in general weak at most of those skills, but that these skills can be taught successfully.