Schwartz, M. S., & Fischer, K. W. (2006). Useful metaphors for tackling problems in teaching and learning. *About Campus, 2*(1), 2-9.

Texts and lectures should support learning that is based on students' activities and experiences. Textbooks frequently frame the problems of a discipline and offer solutions as well as many facts about the discipline. To the student, the textbook introduces a lot of new vocabulary, people, and ideas that are yet to be organized and understood.

Cognitively, students rarely move in a linear fashion toward understanding of the textbook and the lectures. Understanding requires creating new abstractions which take a lot of effort, time, and supporting activities to ground the concepts. Schwartz and Fischer envision learning as a rope pyramid that is sometimes found in children's playgrounds. The base of the pyramid consists of low-level comprehension necessary to support more complex ideas further up the pyramid. There are many routes to the top. In fact, coping with individual student differences is a major challenge for the teacher.

As an example, consider Newton's formula for force, F = m x a. Students at a basic level usually understand that they can solve problems algebraically if given two of the numbers. In order to progress beyond basic levels, however, students must relate the concepts of force, acceleration, and mass to their own experiences. Why does my car accelerate when it goes into a curve when I have not changed its speed? Just memorizing material will not form a solid basis for the pyramid if students expect to master the discipline and go on to higher levels.

Students need to build sophisticated understandings of disciplines today that require more than lectures and textbooks. Teachers need to help students build their own understandings on an individual pathway that is different for each student. Schwartz and Fischer have some suggestions for how to do this.