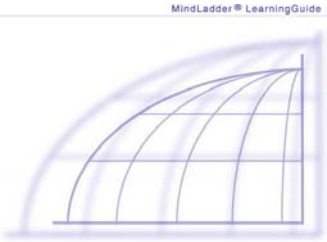

Printout of MindLadder® Advisor Section B-5•

R-9: Appraisal of Effort (Precision, Accuracy, Persistence and Intensity)

This knowledge construction function orients the student to allocate the amount and type of energy that is required to perform a mental activity. The function plays a role in each of the three phases of the mental act. It can develop unevenly: Learners may allocate energy correctly in one or two phases yet not do so in the remaining phase. For example, a student may take great care to be precise when collecting information yet is careless when communicating information. For this reason it is discussed separately for Reception, Transformation and Communication: For Transformation look under T-14: Establishing Relationships and for Communication look under C-7: Appraisal of Effort.

One way to understand the role of this function is by way of analogy with a car. Having a car is good but without fuel a car doesn't go anywhere. Having good subject area knowledge and good knowledge construction functions are good but without the proper allocation of effort all of that may not mean anything.

Effort refers to the exertion of physical or mental energy. Tasks vary greatly in the types of effort that are required to accomplish them and complex tasks often require that different types of effort be allocated to complete different segments. The amount of effort that a task requires decreases with increases in familiarity and proficiency. There is both an objective and a subjective aspect to effort. Small improvements in proficiency may be associated with large changes in the subjective perception of needed effort. The allocation of effort is sensitive to variables of both motivation and attitude that influence the learner's orientation towards the self and the world. The development of this knowledge construction function enables the learner to better manage these influences and more deliberately meet

the changing requirements for effort in the learning process. Effort is regulated by varying four dimensions: precision, accuracy, persistence and intensity.

Precision refers to the exactitude or meticulousness of the effort. Timing a casual walk to the supermarket requires less precision than timing a track event in an athletic competition. Cutting in surgery requires more precision than cutting a pizza.

Accuracy refers to the correctness of the effort. An accurate effort is an error free effort. A surgical task requires a high degree of freedom from mistakes. A gala performance requires more accuracy than a rehearsal. Precision and accuracy often coincide but the two are not the same. A student may be precise, but not be accurate. That is a student may clearly tell you to use two teaspoons of sugar, which is a precise statement, but it may not be accurate. It may be two tablespoons of sugar. Or a student may submit a detailed report with precisely stated facts, but the stated facts may not be correct or relevant.

Persistence refers to the *duration of exertion*. Holding a weight of 20 lbs. for 2 minutes requires more persistence than holding the same weight for 1 minute. Staying focused on a task for 30 minutes requires more persistence than staying focused on the same task for 15 minutes.

Intensity refers to the *degree of exertion*. An operator who pushes a button 50 times a minute exerts more intense effort than when pushing the button 5 times a minute. Lifting a weight of 100 lbs. involves more intense effort than lifting a weight of 10 lbs. Taking a difficult timed test in 5 minutes involves a more intense effort than taking the same test in 15 minutes.

When we mediate this knowledge construction function we develop students' ability to appraise and allocate appropriate effort when collecting information. Students who have difficulties with this function often invest their effort in ways that impair their ability to learn. Here are some examples (1) A child who needs to copy and analyze a diagram allocates too much time to its aesthetic appearance leaving insufficient time for the analysis of the information it contains; (2) A student taking dictation lowers the intensity of the effort and is soon out of the picture; (3) Taking research notes in the library a students lowers accuracy: The boiling point for water becomes 100 degrees Fahrenheit and Paris becomes the capital of Great Britain.

Students needing mediation of this knowledge construction function often stumble in the classroom because they do not know how to adjust their effort when and where it may be important to do so. The need for the development of this knowledge construction function should not be confused with the incorrect appraisal of effort that may accompany a novel task. It is common not to know the amount of effort needed when encountering a novel task. Indeed, part of learning a new task is to learn how to allocate the effort that is needed to work out its various parts.

To mediate this function engage your students in situations where they can learn to identify and discover in their own behavior each of the variables of intensity, persistence, precision and accuracy. Simple tasks will do. How many times can you write down the alphabet in 2 minutes? What's the fastest you can go? What happens to precision and accuracy when you increase the pace? What happens to persistence if you work very hard over just a short interval of time?

It may be necessary to help your students develop the need to be precise and accurate. You can help your students understand the importance of being precise and accurate by discussing circumstances or situations where precise meaning is very important. For example, "What would happen if you only gathered half of the directions to your friend's house? Would you be able to find your way?" or "What would happen to your plant if you were supposed to use a 1/4 of a cup of water and you put 4 cups of water into the pot?" In addition, be sure that you are accurate and precise in your communications with your students so that they have good role models for their behavior. For example, "Please bring me the red book that is on the top right hand shelf."

A simple pencil-and-paper task has been created to enable teachers and students to explore the four dimensions of precision, accuracy, persistence and intensity of effort ('PAPI'). The task presents the learner with a series of similar signs arrayed in rows and columns. The learner needs to strike a line only through the target signs. Four levels of difficulty are formed by varying the number of target signs, the number of distracting signs and the total number of items in the grid.

The similarity of the signs and their number create a perceptual overload that puts precision, accuracy and persistence into play. Intensity is put into play by imposing a time constraint ("Let's see how many we can do in 60 seconds"). Remember that the objective of this activity is to gain familiarity with the four dimensions of effort. Students do not need to complete any of the grids although some may

wish to do so simply for the sake of stepping up to the challenge. Introduce the grids in a lighthearted manner and have fun with them on the way to learning about the dimensions of effort. Connect the work on these tasks and the insights gained to other situations in and out of school where students need to regulate their effort. Download the PAPI activity here.

When your students have developed this knowledge construction function it is easy for you to guide them to make adjustments in the effort they allocate. You can guide them to allocate more effort to intensity or persistence and your students will know what you mean. At the onset of tasks and projects engage your students in an analysis of their likely effort requirements. Similarly, upon their completion, have your students take a little time to review the effort requirements that were encountered. Students should make it a habit to plan for and review their allocation of effort before and after they engage in learning events and projects.