Mathematical Habits of Mind Subgroup C Report

Small (Possibly) Tacit Habits (or Behavioral Schemas)

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There are two parts to a (small, possibly tacit) habit of mind:

(1) interpreting the situation;

(2) responding to the situation, i.e., the doing, or execution, of the habit.

We came to the consensus that the interpretation of the situation is the key (or important) part of a habit.

We made some basic assumptions:

- We agreed that habits of mind must develop over time (as there must be a time when one did not have a particular habit).
- People have profiles (or constellations) of related habits of mind.

- Research Question: How do such small, possibly tacit habits of mind, or other habits of mind, develop?
- We discussed the automaticity of such small, possibly tacit habits of mind. We considered whether there were habits with and without understanding (underlying the habit).

- For example, students establish many trig identities using results they do not understand (and cannot justify), e.g., $\sin^2 + \cos^2 = 1$. We asked is that a mathematical habit of mind?

Dick Lesh made the observation that he had not found a habit of mind that was not sometimes counterproductive.

We asked: Why does it matter to have a small, possibly tacit mathematical habit of mind?

One answer is that having such an automated habit doesn't take up much working memory, so one can concentrate on other things.

We reiterated that there are two components to a small, possibly tacit habit of mind:

(1) The doing component, of which one is (usually) not aware;

(2) The interpretation component, of which one is aware.

The doing part depends on:
(1) Automaticity;

(2) Getting more powerful interpretations.

The possibly tacit part of habits is absolutely critical.

Observations:

(1) The tacit part of some small habits of mind is absolutely critical.

(2) People can have habits of mind (and other habits) and not know they have them. E.g., Some people walk in a certain way. Other people know this and can recognize them from their walk, but they don't know they walk in a certain way.

(3) What people who study problem solving have observed. When we say a student is drawing a picture, that's what we think was going on. But the student may say that's not what he/she was doing. If one questions the student, the student may say, "I was trying to figure out what was going on [not drawing a picture]."

Example from a recent study of Dick Lesh

There were two groups of students. One watched a PBS program, "Cyberquest," about problem-solving teams. Both groups of students were given two problems to solve at the start and two problems to solve at the end. The researchers were given a list of things to notice: the roles of individuals (leader, etc.); group functioning; data gathering, data processing. Most were habits of mind.

At the start, both groups did the same number of habits of mind. At the end, they did the same habits of mind, but the kids who watched the program got the problems right.

There was no correlation between the number of processes (habits) and whether the kids got the problems right.

So, what was the difference between the two groups?

The group that got the problems right did them (the habits of mind) at the "right time" and for the "right reasons."

P.S. We (John & Annie) feel there is a difference between tacitly learned and automatically enacted habits of mind (as in Dick Lesh's above example) and our examples of habits of mind for proving which are often explicitly learned and automatically enacted after practice, but for which one can provide a justification if asked (e.g., Mary's learning to prove a universally quantified statement).