A broad BACEIS for improving thinking

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Abstract. This article describes a theory of factors which affect intellectual performance. Many current programs and approaches to improving thinking skills tend to be overly narrow, often ignoring the affective domain and features of the environmental context. The BACEIS model is a comprehensive theory of internal and external factors affecting the development, retention and transfer of thinking and learning skills. The internal supersystem consists of cognitive and affective subsystems which interact with each other and with the external supersystem and its components. The external supersystem encompasses academic and non-academic subsystems. Three uses of the theory are discussed: for instructional design, to guide research, and to critique existing approaches.

Introduction

While many educators are now integrating the improvement of thinking and learning into instruction, few have demonstrated significant success in teaching students to retain and transfer what they learn across tasks and contexts. The learning strategies training literature has failed to demonstrate a real-world educational program which achieves the two sigma standard for impact on academic achievement (Derry and Murphy, 1986). Consequently, even programs which obtain statistically significant gains may not produce educationally significant effects. How can cognitive interventions promote greater internalization, retention and transfer of targeted objectives?

We argue that greater success could result from systematic attention to a broader perspective on intellectual skills training. Our model provides a comprehensive framework for teaching and research on improving intellectual performance. In-service and pre-service teacher training and curriculum development efforts for developing students' intellectual skills should be based upon a comprehensive and coherent theory. Sternberg (1983a) suggested that intellectual-skills training programs should address students' motivational as well as intellectual needs, and should explicitly link instruction received in school with real-world behaviors.

Our model is intended to help staff developers, researchers and teachers concerned with improving intellectual performance to systematically attend to both cognition and affect in addition to both academic and non-academic environments. After describing the model, we will illustrate its applications.
The BACEIS model

We identify systems and subsystems along with major subdivisions. The model's components are Behavior, Attitudes, Cognition and the Environment, which are viewed as Interacting Systems, thus giving rise to the BACEIS acronym.

Rationale and components

Most learning strategies and thinking skills approaches can be examined and possibly improved by implementing a comprehensive approach like the BACEIS model. We hypothesize that if our approach is used, students will develop a more differentiated, refined, elaborated, and interrelated structure of knowledge, skills and attitudes across contexts. Consequently, students will learn, retain and use this structure more readily than if a discrete skills approach is used. The four basic characteristics underlying the approach are that it is:

1) **Differentiated.** Major types of knowledge, skills, attitudes and characteristics of the environments involved in thinking and learning are recognized and explicitly attended to.

2) **Refined.** Existing knowledge, skills and attitudes are sharpened.

3) **Elaborated.** New knowledge, skills and attitudes, and new dimensions of existing knowledge, skills and attitudes are developed.

4) **Interrelated.** Skills and attitudes are developed in conjunction with (a) each other; (b) subject-specific content; (c) knowledge, skills and attitudes are connected across subjects; and (d) are connected to everyday life experience (Hartman, 1985).

Consider now the BACEIS model.

Components and system connections

The BACEIS model is compatible with Gruber's (1985) description of the evolving-systems approach to creative work, which views the creative person as a system of loosely-coupled subsystems (knowledge, purpose and affect). Each component system has a partially independent organization, different rules and different relevant time scales. These components are in constant interaction. The 'loose coupling' approach is important in contrast to a 'tightly meshed set of gears', because it suggests that each system can exhibit some independent evolution (pp. 175–176).