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Empoderamiento de aprendices y educadores

Joseph D. Novak
Cornell University and Florida Institute for Human and Machine Cognition (IHMC), USA

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Empowering Learners and Educators

Empoderamiento de aprendices y educadores

Joseph D. Novak,
Cornell University and Florida Institute for Human and Machine Cognition (IHMC), USA
jdn2@cornell.edu

Abstract
The most important factor leading to empowerment of individuals is the ability and commitment to achieve high levels of meaningful learning. Meaningful learning requires integration of new concepts and propositions into the learner's cognitive structure to achieve high levels of organized knowledge that can be represented as knowledge models. Concept mapping and new educational strategies can facilitate the process.

Resumen
El factor más importante que lleva al fortalecimiento de las personas es la capacidad y compromiso para alcanzar altos niveles de aprendizaje significativo. El aprendizaje significativo requiere la integración de nuevos conceptos y proposiciones en la estructura cognitiva para alcanzar elevados niveles de conocimiento organizado que puede ser presentado en forma de modelos de conocimiento. Los mapas conceptuales y nuevas estrategias educativas pueden facilitar este proceso.

Keywords
Empowerment, meaningful learning, scaffolding, concepts and propositions, concept maps, creativity, knowledge models, New Model

Palabras clave
Fortalecimiento, aprendizaje significativo, andamiaje, conceptos y proposiciones, mapas conceptuales, creatividad, modelos de conocimiento, Nuevo Modelo.

1. Introduction

One only needs to put "empowerment" into Google or other search engines to see an enormous range of ideas put forward for "empowerment". One might come away from such a search convinced that there is nothing new to be said about empowerment. That conclusion, I argue, is not correct and this paper seeks to add a new dimension to the query: "What is empowerment and how do we help people achieve this?"

I recall that as an elementary school student I wondered why some of my classmates had trouble understanding why 2X2 = 4, and 2+2 equals 4, but 3+2 =5 and 3X2 = 6. It took me many years to understand that what makes sense to a person very much depends on the quality of learning experiences that person has had, as well as innate aptitudes. It took even longer to understand a theory of learning and a theory of education that could explain why some students learn so little and recall so little, while other students leap forward to deep understanding. And why are some people so creative when faced with a new task and others simply flounder? So what have I learned? Over the past 60 years I have come to understand and appreciate the powerful impact that meaningful learning has on the thinking, feeling and acting of humans leading to empowerment in virtually any context. I shall seek to summarize this in this paper.

2. The Psychology of Meaningful Learning

None of the psychology I was presented as a student at the University of Minnesota was of value in understanding the dilemmas I note above. At Minnesota in the 1950's, behavioral psychology was taught exclusively. This psychology held to the dogma that we must seek to understand human learning by observing human *behavior*, not on speculation on what may be going on in the brain. And the causes of behaviors, it was assumed, can also be studied with rats and cats and other organisms because the "laws of behavior" once discovered could be applied to any organism. The champion of this view was B.F. Skinner, and the "bible" for behaviorists was his 1938 book, *The Behavior of Organisms*, written while he was a professor at Minnesota. I recall telling my educational psychology professor, Gordon Mork, that behaviorism was useless for understand how people learn science, but he argued that this was the only learning psychology he knew. In fact, I did not learn about Jean Piaget's monumental works until I sat in on seminars with Professor Smock at Purdue University in the early 1960. While I found some of Piaget's ideas about children's development of cognitive operational skills interesting, they did not explain how I learned science or how I observed my children learning science, albeit the latter was mostly at home.

The breakthrough for me and my students came with Ausubel's 1963 book, *The Psychology of Meaningful Verbal Learning*. Here was a learning psychology that made sense to us and we sought immediately to try to understand and apply his ideas. We were further helped with his 1968 book, *Psychology of Learning: A cognitive view.* Subsequently I had the opportunity to coauthor a revision of his book (Ausubel, Novak, and Hanesian, 1978). Ausubel very carefully described the differences between meaningful learning and rote learning. In meaningful learning, the learner makes a conscious effort to integrate new concepts and propositions with related ideas already held by that learner. In contrast, when rote learning, the learner makes no effort to integrate new ideas with existing ideas and arbitrarily incorporates the new information into his/her cognitive structure. Later Marton and Saljö (1976 a,b) Described *deep* learning and *surface* learning in a manner somewhat similar to Ausubel's meaningful and rote learning, respectively, but without the detail of Ausubel's theory. *Concepts* are a central idea in our work so we are careful to define concept: a perceived regularity or patter in events or objects, or records of events or objects, designated by a label (usually a word). Concepts alone have little meaning until they are combined with *linking words* to form *propositions*. Propositions acquire meaning through meaningful learning. Creative people find new patterns in events or objects and thus create new concepts and new relationships or propositions. These are the building clocks of all knowledge.

While a teacher can do things to encourage meaningful learning, it is the learner who must choose to perform the knowledge integration. Moreover, the depth and quality of the learning will depend on how well organized the learner's relevant knowledge is and on how skillful she/he is in integrating not only the new knowledge with prior relevant knowledge but also on the concomitant feelings and actions that may be pertinent. To become a highly meaningful learner in any domain often requires years of practice at integrating new knowledge with prior relevant knowledge and also integrating the acting and feelings during the learning. Achieving high levels of meaningful learning in any domain

can be a lifelong pursuit. When done superbly well, it can also be a truly creative process. This is illustrated in Figure 1.

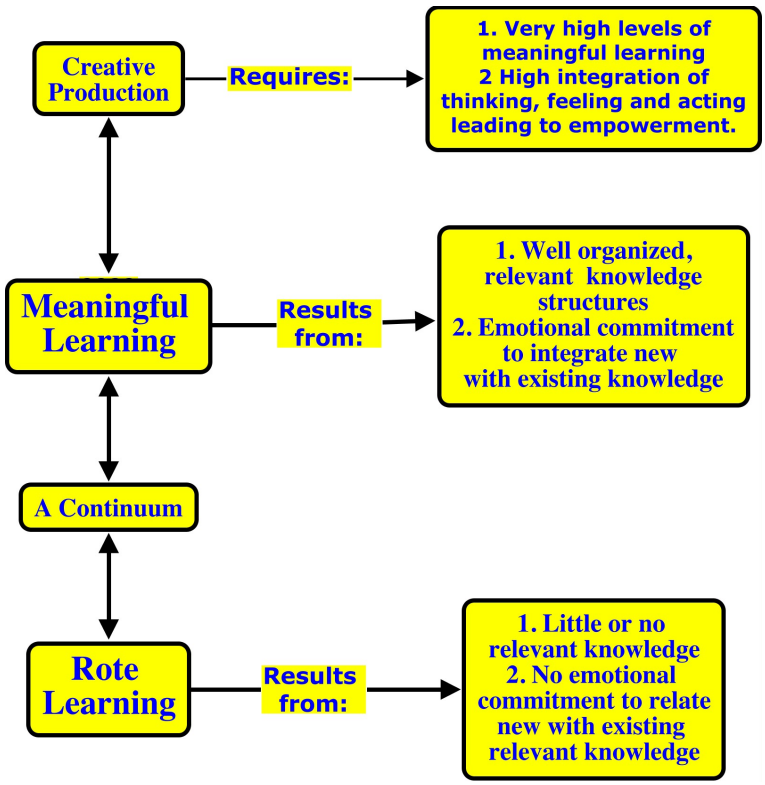

Figure 1. Learning approaches can vary from simple rote memorization to very high levels of meaningful learning, and only the latter leads to empowerment of the learner and creativity.

The concept of *meaningful learning* is profound. There are three requirements for meaningful learning. First, the material to be learned must be inherently meaningful. Nonsense syllables cannot be learned meaningfully. Virtually all school subject matter is potentially meaningful. Second, the degree of meaningfulness of material to be learned will depend partly on how much relevant knowledge the learner already has and on how well it is organized in her/his cognitive structure. Third, the *learner must choose* to incorporate new concepts and propositions into her/his relevant existing cognitive structure. The latter affective dimension can vary widely depending on how much effort the learner is willing to make to integrate the new information with relevant existing ideas. Where some form of performance is required in a learning task, it becomes imperative that the learner seek actively to integrate thinking, feeling, and acting, and also to consider constantly how the actions, feelings and ideas come together to form the most powerful meanings. This is what we see in experts in any field from sports to poetry, science, math or dance.

Another distinction that Ausubel made clear is that quality of learning is distinct from style of instruction. He characterized instruction as varying on a continuum from direct *expository or reception* teaching to autonomous *discovery or inquiry* learning. The orthogonal relationship between learning approach and instructional approach is shown in Figure 2.

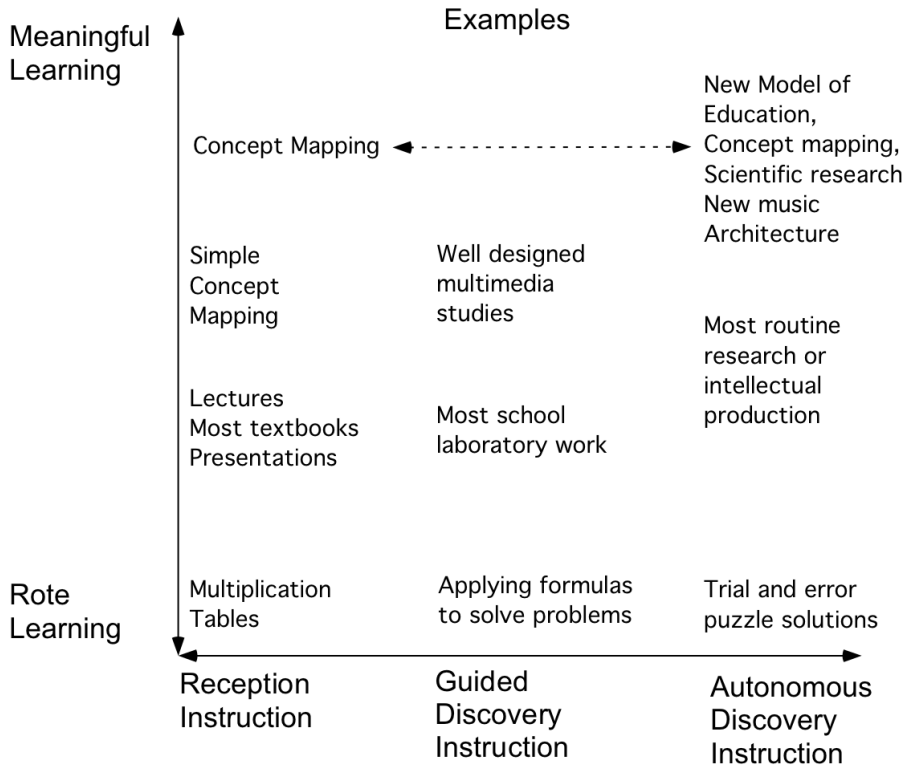

Figure 2. Learning approach can vary from very rote to highly meaningful, and instructional approach can very from direct reception learning to highly autonomous discovery or inquiry learning. (From Novak, 2010, figure 5.7).

What makes quality education so challenging to achieve is that there are many interacting factors that need to be considered simultaneously. Furthermore, we usually are dealing with a relatively broad spectrum of individual learners. Figure 3 shows the five *elements* involved in any educational event that interact in the construction of meanings. In my theory of education, all five of these elements interact to achieve high levels of meaningful learning. Simply stated, my theory of education states: *Meaningful learning underlies the constructive integration of thinking feeling and acting leading to* ***empowerment*** *for commitment and responsibility.* A full discussion of the five elements and their interactions and my theory can be found in Novak, 2010. The more we learn about he nature of human brain functions, the more we see support for the educational ideas presented here (e.g., Gazzaniga, 2008).

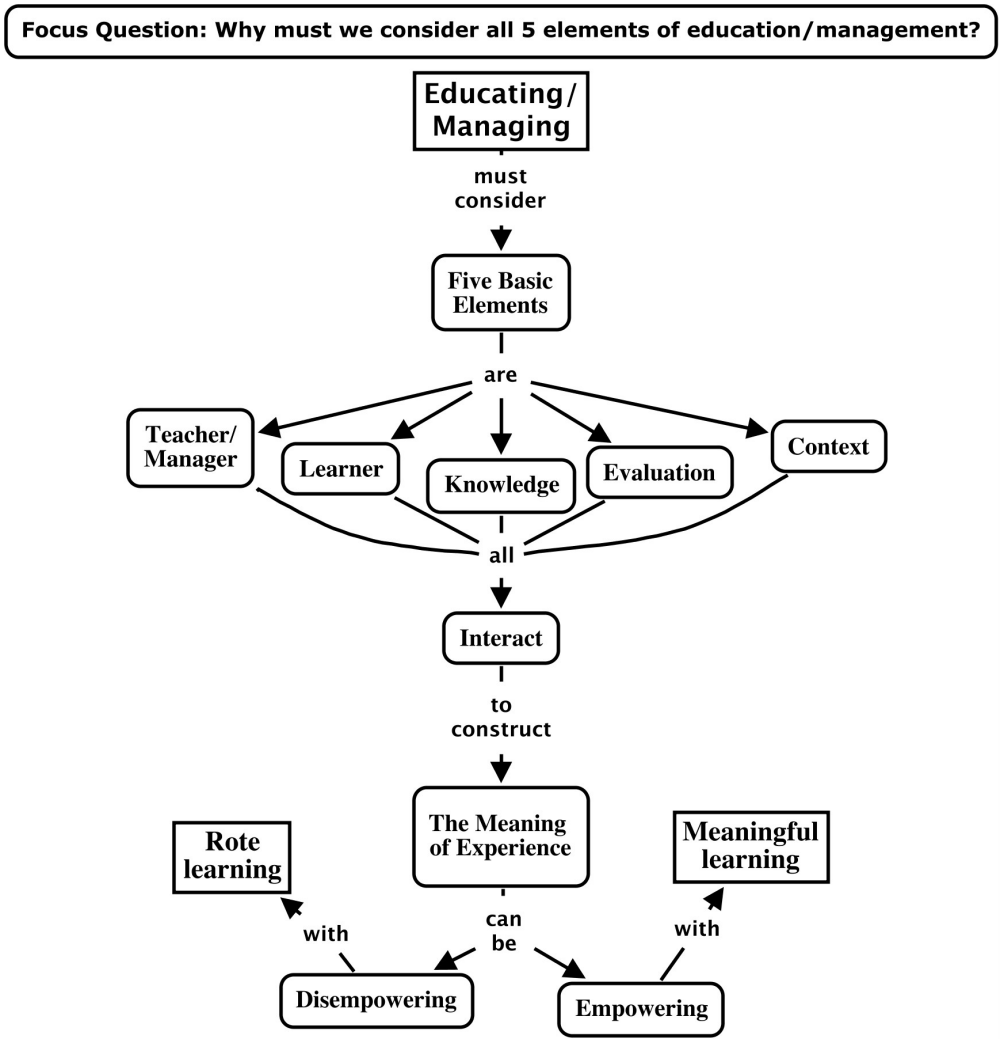

Figure 3. Education and management involve five elements, each of which interact in the construction of new meanings. When well done, education leads to empowerment of the learner or worker (From Novak 2010, figure 2.2).

3. The Importance of Metacognitive Learning

Over the last few decades there has been a great increase in understanding of the importance of helping learners learn about learning and the use of strategies to facilitate this process. Collectively these ideas are know as *metacognitive learning*. Among these ideas is that we can assist learners by providing *scaffolding* for facilitating learning (Wood, et al, 1976; Hogan and Pressley, 1997; Novak, 1990; 2010). In meaningful learning, new concepts and propositions need to be integrated with existing relevant ideas in the learner's cognitive structure. A common form of scaffolding is to present a learner with sample problems and possible solutions, thus aiding the learner to see ways to solve this class of problems. Another scaffolding tool is a sample concept map that shows some of the key concepts in a given domain of knowledge and key relationships between these concepts. Other important concepts might also be suggested, and the learner's task is to determine how these can be meaningfully incorporated into the sample concept map. We call these small sample maps "expert skeleton" concept maps, since they were prepared by a person who has expertise in this domain of knowledge and serve as the "skeleton" for addition of other concepts and propositions. Some additional suggested concepts, that might be offered in a "parking lot", help the learner build on the skeleton map. It is also important for the learner or teacher to identify a *focus question*; that is, a key question that the concept map will help to answer. To be effective, it is essential that the learner identify and incorporate additional relevant concepts on their own and figure out valid ways to incorporate these additional concepts to form meaningful *propositions*. While concepts are the building blocks of knowledge, propositions are really the *units of meaning*. Concepts alone convey very little meaning. Thus the learner moves beyond this given scaffold structure of knowledge in this

domain and creatively builds her/his own elaborations. The additional concepts might be identified through a variety of learning strategies that will be discussed below. Figure 4 shows an example of an expert skeleton concept map with some additional relevant concepts in the "parking lot".

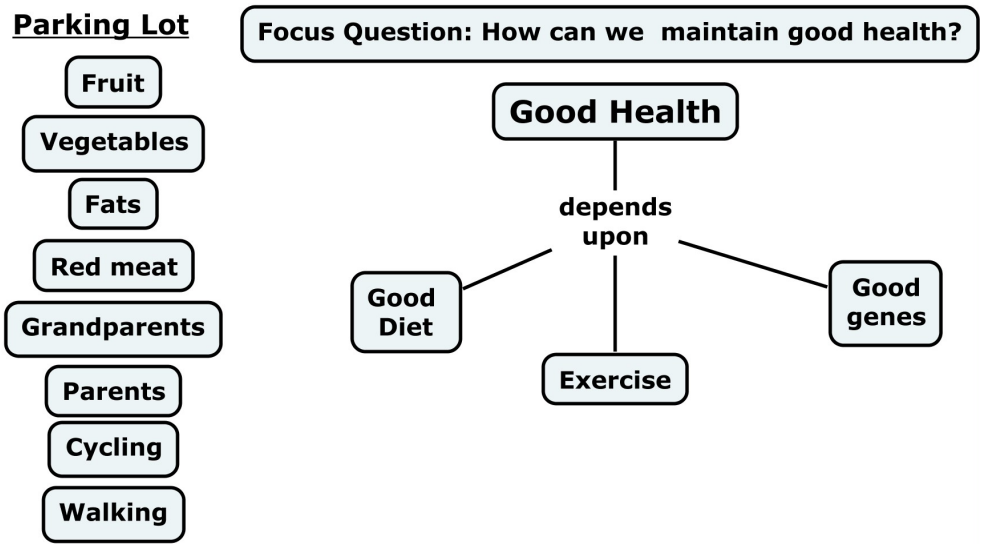

Figure 4. An expert Skeleton concept map with a "parking lot" suggesting concepts that might be added.

CmapTools software, that can be downloaded at no cost at: http://cmap.ihmc.us, allows for easy creation of concept maps (Cañas, et al, 1993; Cañas, et al. 2001). It also allows the addition of any kind of digital resource by simply "dragging" the icon for the resource and "dropping" it on a target concept. The resource then becomes part of the file for the concept map and can be later accessed by simply clicking on the icon for the resource, and selecting the desired resource when more than one of the same type is attached. Figure 5 shows an example of how the map in figure 4 might be expanded with additional concepts and additional resources of several types added. We refer to the elaborated concept map with attached resources as a *knowledge model*. There is virtually no limit to how creative a learner can be in creating a highly integrated, rich knowledge model for any topic of interest. These files can be stored and built upon later and/or combined with other knowledge models. CmapTools also allows for easy collaboration in building knowledge models, either working simultaneously or asynchronously at various times and locations. Collaborative learning can enhance learning for all participants and still permit considerable individual creativity. If the "History" tool is activated in CmapTools, a record will be made for each addition to the concept map.

Building knowledge models either individually or in small groups pays an extra dividend in that it engages learners in practices that help them understand the nature of knowledge and the process of knowledge creation. It also leads to better understanding and skill in learning how to learn *meaningfully*. In short, the practices involved help people *learn how to learn* (Novak and Gowin, 1984). In corporations or in science laboratories and many other settings, new knowledge creation is typically a team effort (Drucker, 1993; Nonaka & Tachiuchi, 1995). Examples of the value of concept mapping in organizations varying from governmental groups, to non-profits, to corporations can be found in Moon, Hoffman, Novak, and Cañas, 2011.

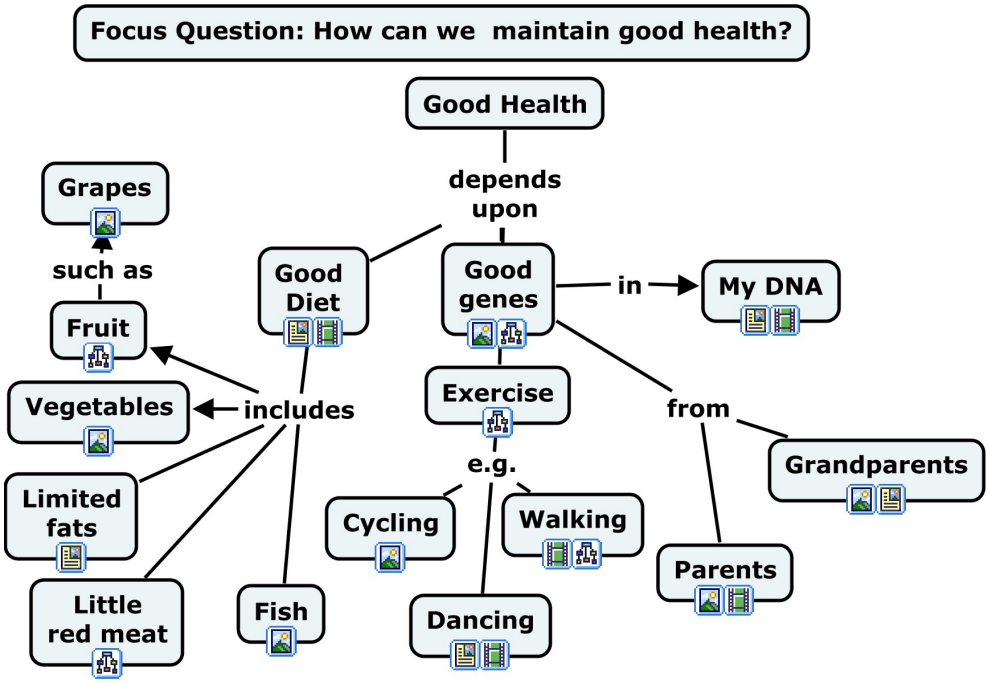

Figure 5. A concept map built by adding some concepts to the map in Figure 4, and also adding resources, including texts, subordinate concept maps with greater details, photos, and video clips. Resources can be mined from the Internet or be materials created in laboratory, field, library, or other sources (see Figure 6).

4. A New Model for Education

The explosive development in the past twenty years of computers, CmapTools software, the Internet, and our understanding of how people learn make it possible now to engage in a **New Model for Education** (Novak, 2004; Novak and Cañas, 2004; Novak, 2010). In school or other settings, a wide array of learning activities commonly used in the past can now be deployed more effectively. Figure 6 illustrates how beginning with an expert skeleton concept map for an area of study, and employing some of the many strategies commonly used, can feed into elaboration of a knowledge model. The resulting knowledge models become a record of meaningful learn by groups or individuals an can aid and foster future meaningful learning. It is a common problem in many organizations that there are limited or poor records of the learning and the problem solving that has occurred, with the result that mistakes made in the past are repeated again. For individual learners, none have the comprehensive records of their learning that knowledge models provide. Thus the facilitating effect of building on past learning is usually poorly done. We also recommend that an individual or group identify a good *focus question* that will be answered by the knowledge model as it is developed. It is common for the focus question to be modified or changed as the model is built, since new insights arise in the process.

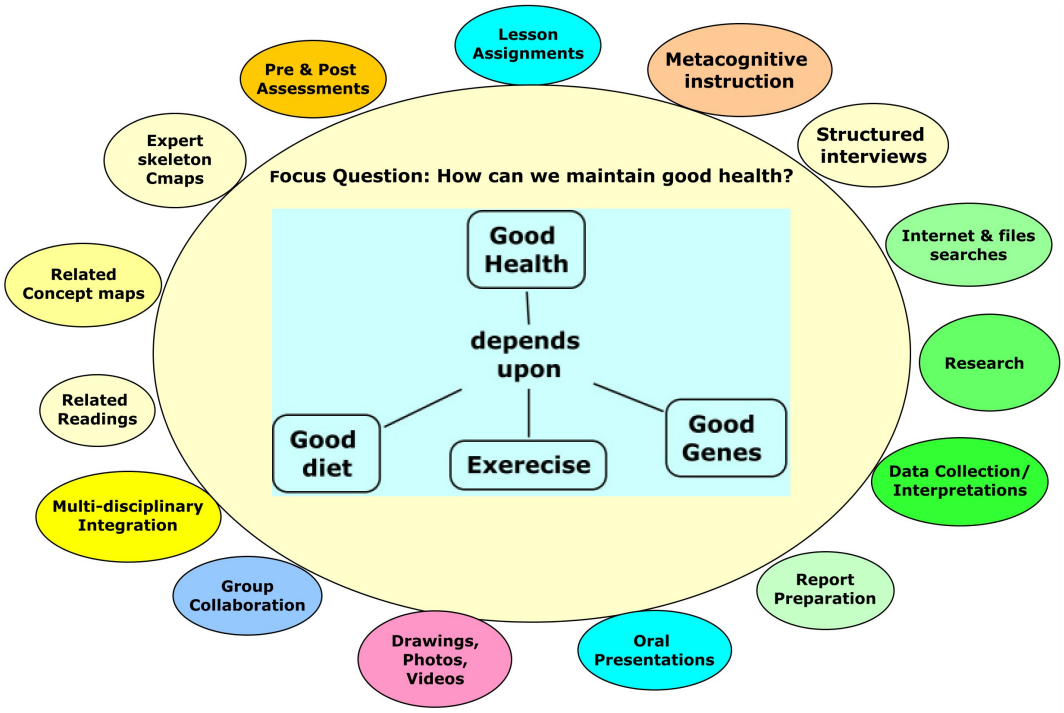

Figure 6. Schematic illustration for a New Model for Education. Starting with a good focus question and an expert skeleton concept map, individuals or groups can engage in a wide array of learning activities (small ovals) in guided meaningful learning resulting in a comprehensive knowledge model even much more elaborate that Figure 5.

As of this writing, I am aware of only a small number of schools and other organizations using our New Model. One of the best examples is Otto Silesky's school in San Jose, Costa Rica. Otto is Principal of a small publically supported school that was set up to serve students who were not doing well in regular public schools. The school was having reasonably good success for a number of years, but in 2003, Otto and his teachers decided to move to implement essentially our New Model. Switching from relatively traditional instructional methods to practices that involved heavy use of computers, the Internet, and meaningful learning strategies was not easy for the teachers or the students, and scores on the National year-end exams declined somewhat from previous years. Nevertheless, both teachers and students felt that good things were happening with the new program and they continued with these efforts. Figure 7 shows that not only did National exam test scores improve, but 100% of the students were meeting the standards set. This is a rare level of success for any school, and especially for a school were most students had not been very successful in traditional schools. Moreover, a much higher percentage of graduates were applying for and admitted to college programs, and they were doing well in college. Otto's school was an exemplary case of how empowering learners through optimal learning programs can positively impact the lives of learners.

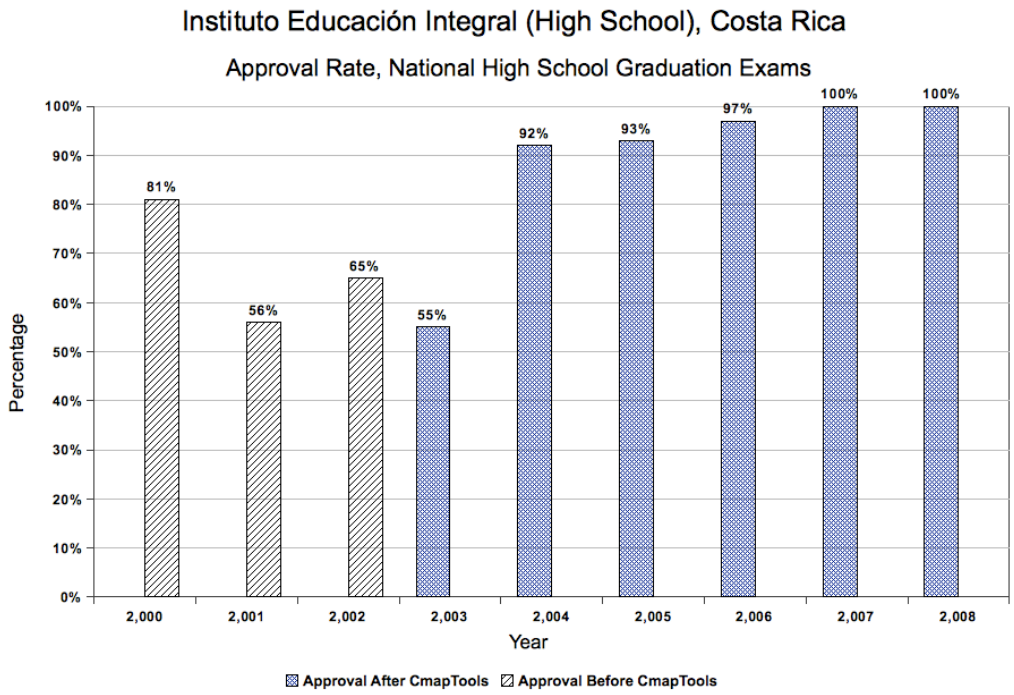

Figure 7. Approval rates on year-end National exams for students in Otto Silesky's school that moved in 2002 toward a New Model for Education.

At this writing, there are relatively few schools, corporations and other organizations employing essentially our New Model for education. Money has not been the problem (Hanushek, 1981); we are spending more that enough on education in most settings to implement the New Model. What we are lacking is the leadership needed to implement the tools and ideas encompassed in the New Model. However, as it continues to become more obvious that we need to do more to empower learners to take charge or their own meaning making, in school or work settings, it is inevitable that we shall see more changes toward this goal. The needs are huge, and the rewards for this kind of action can be enormous.

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