

Research basis for OpenBook's learning styles tools

OpenBook's learning-styles assessment is founded on research begun by Harvard University developmental psychologist Howard Gardner in the early 1980's and published in his book, *Frames of Mind*. OpenBook Vice-President, Frank Sopper, worked directly with Dr. Gardner in 1986 to translate Gardner's theories into educational practices at the Buckingham Browne and Nichols School in Cambridge.

Sopper went on to lead curriculum and faculty development at the Buckley School in Los Angeles. His introduction of multi-modal instruction based on Gardner's principles led to a 26 percentage point improvement in Buckley students' language skills based on nationally standardized tests. As a result, UCLA School of Education chose the Buckley Elementary School as a teacher-training site for students in its Masters of Education program.

Working in parallel, Harvard clinical psychologist, Dr. Charles Drake, at Boston Children's Hospital, was part of a team that developed successful assessments that distinguished learning disabilities in children from other learning problems. Drake began work to develop practices for improving the learning performance of students with diverse learning styles.

In 1974, Drake founded the Landmark School in Prides Crossing, Massachusetts, as a laboratory school for the development of successful learning-performance solutions. In 1985, he founded Landmark College to apply the successful results of this work to high-potential adult learners.

In 1998, as a result of a consultancy with Landmark College's senior management team, organizational psychologist, Robert Lefton, Ph.D., CEO of Psychological Associates, a nationally recognized executive development firm, recognized the implications of Landmark's methods to the field of executive performance. Lefton encouraged the college to further develop its practices for delivery to corporate learning organizations.

Landmark College's Dean of Admissions, Frank Sopper, consulting with Lefton and other members of Psychological Associates, headed up the preparation of learning-performance materials for the commercial market. Sopper, with Psychological Associates, researched the existing commercial products and determined there were no instruments on the commercial market developed to point users to specific performance solutions based on an assessment of learning style. Sopper then bundled and refined several of the decision trees, many of which were used in admissions and placement at Landmark and which were based on the most current research in the

cognitive sciences and evaluated each semester by corresponding them with student performance.

The learning-styles assessment underwent further revision in 2000, following evaluation by Carnegie Mellon researcher Suguru Ishizaki, Ph.D. MIT Media Lab. Dr. Ishizaki reviewed the OpenBook process prior to the creation of the on-line version of the assessment. The diagrams and descriptors below include a condensation of his evaluation.

OpenBook has developed a method/process to assess cognitive styles of individuals, and make constructive suggestions for how they can take advantage of their cognitive styles.

Learning Styles Process

Figure 1 presents a schematic view of the process OpenBook has developed. There are two large modules, and several small steps.

Assessment Module

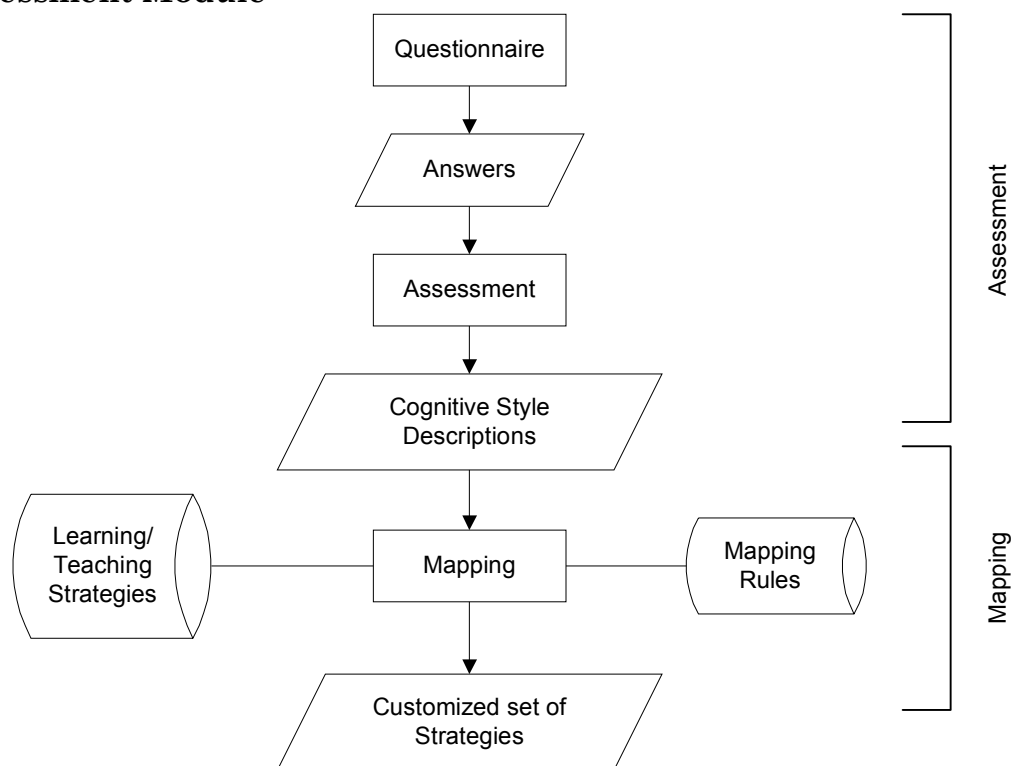


Figure 1. Schematic Diagram of OpenBook's Method

Describing Cognitive Styles

The output of the Assessment Module is a description of a particular cognitive style. Cognitive styles can be described by using feature-value pairs.

Table 1 shows a simple example of how we may be able to describe cognitive styles.

Feature	Value (0.0=Low, 1.0=Height)
Associative Thinker	0.8
Listener	0.7
Mover	0.2

Table 1. An Example of Cognitive Style Descriptions

The model recognizes the brain has structures for processing information in a series and has structures for processing information in a way that links data to other data. These structures work in tandem or independently; individuals may have strengths or weakness in one domain that may be independent of strengths and weaknesses in other domains. Cognitive researchers use observation and sophisticated brain scanning techniques to document an individual's learning process. OpenBook's learning-styles assessment is based on the tested observation that a finite number of key behaviors are highly revelatory in making a determination of learning-style dominance.

Once processing dominance is established - - OpenBook uses the terms linear and associative to describe the dialectical relationship of the dominant traits - - OpenBook instructs the observer, which may be human or computer, to collect data regarding the subjects' dominant modes of collecting and expressing information. In the OpenBook model these include text fluency, speech fluency, auditory processing skills, facility with semiotics, and kinesthetic fluency. Once again, the OpenBook assessment is based on the tested observation that a finite number of key behaviors are highly revelatory of an individual's dominant learning acquisition and expression.

Mapping Module

The second module is mapping. Given a cognitive style description for an individual, OpenBook can provide an individual with a set of learning strategies, or learning tips. The end result of this process is a personalized set of learning and instruction strategies for the individual.

OpenBook has carefully collected and edited available scientific findings into a practical form. They are unique in the following two ways:

- it has collected a wide enough range of strategies that are useful and practical; and,

- it has edited the strategies and mapping rules so that these are usable in their environment.

Computability

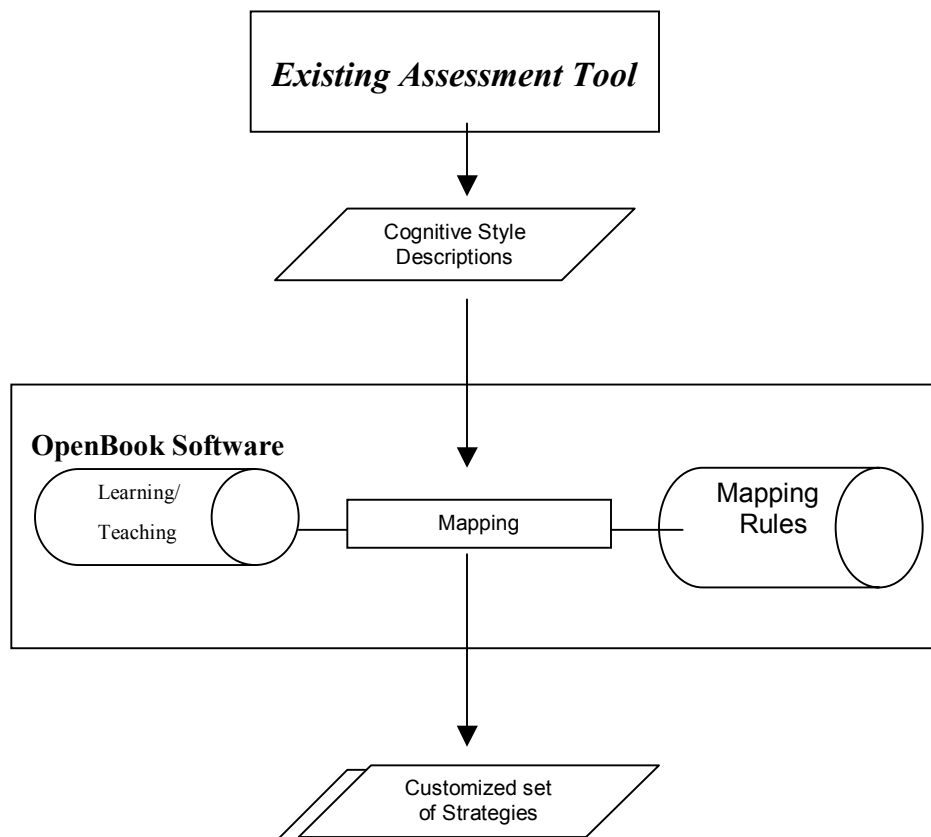


Figure 2. Schematic Diagram of OpenBook Program With an Open Interface to Existing Assessment Tools.

Mapping Module

Rules directly associate cognitive style descriptions to strategies. The following is a typical mapping rule:

If you are an associative thinker and are experiencing writer's block, then try writing sentences that make no sense grammatically.

This module can be implemented by using database queries. Based on the cognitive style, the system may dynamically generate queries that retrieve appropriate learning or teaching strategies from the strategy database.

The strengths are (1) the process, and (2) the strategies (i.e., content) that are carefully edited.

Scalability

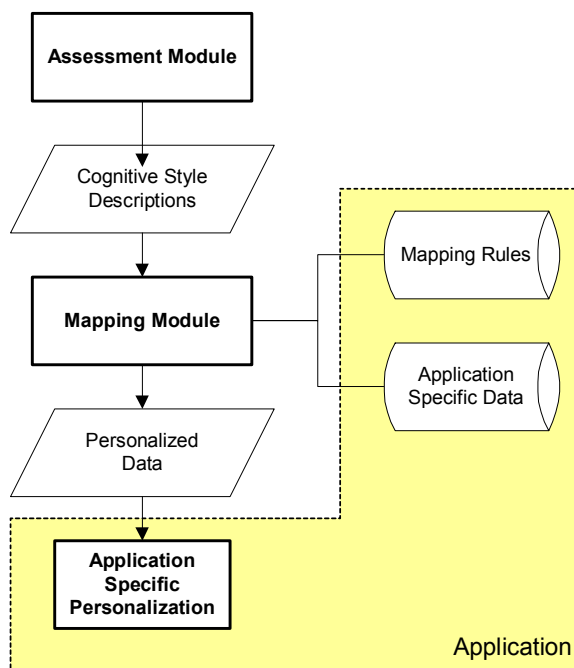


Figure 3. Generalized Process

Assessment Module

Some of the techniques useful to accomplish automated assessment include (but are not limited to) case-based reasoning systems, neural network based learning with fuzzy rule-based system, or Bayesian network etc.

Mapping Module

In this generalized process, the mapping module relates cognitive styles to some kind of application specific personalization data. These personalization data are used by a particular application in order to perform its application specific personalization.