

## EFFECT OF CONCEPT MAPPING ON MYERS-BRIGGS PERSONALITY TYPES

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**Abstract.** The process of constructing a concept map is approached differently by each of the Myers-Briggs personality types because these types are characterized by different preferences for information processing. Sensing types are most at ease with linear thinking that sees knowledge in the form of lists of facts and procedural rules (linear learners), whereas intuitive types are most at ease with pattern thinking that sees knowledge as interconnected concepts (integrative learners). The need for certainty in the sensing type creates a significant barrier to both learning and implementing concept mapping, while the need for big picture learning makes concept mapping a satisfying intellectual exercise for intuitive types. Because concept mapping includes several orders of cognitive complexity, it is a tool that can be used to sensing types overcome the tendency to avoid the use of higher order thinking skills. The result is better developed critical thinking and improved long-term memory. Concept mapping benefits each of the Myers-Briggs personality types by helping to develop the use of their non-preferred mental functions.

### 1 Introduction

It is logical that a learning tool such as concept mapping, designed to develop analytic thinking (Novak and Gowan, 1984), would be used differently by students who process information differently. These differences can be identified with the Myers-Briggs Type Indicator (MBTI), a personality instrument developed to sort preferences within several dimensions of thinking (Myers, et al., 1998). The Myers-Briggs personality types represent different mental habits used for problem solving and, as such, they represent predictable skills and attitudes with respect to the construction of concept maps. Since the Myers-Briggs preferences do not represent limitations in thinking, they are opportunities for development of learning skills. This paper summarizes 20 years of experience in teaching both concept mapping and Myers-Briggs psychological type principles to medical students and to their teachers.

### 2 Myers-Briggs personality type and learning styles

The Myers-Briggs Type Indicator is a validated psychological instrument that was developed to reliably determine the personality preferences first described by Jung (Myers, et al., 1998). When taken together, the mental functions of sensing, intuition, thinking, and feeling can be organized into steps in a problem solving model. The process can be summarized as: 1) information input (sensing function), 2) generation of alternative possibilities indicated by the information input (intuitive function), 3) deduction of the most logical possibility (thinking function), and 4) assessment of human outcomes/values (feeling function). Meaningful learning can be seen as an outcome of this problem solving process and, thus, a learning style can be described as a preference for which one of the four mental functions is emphasized over the others.

The MBTI only measures normal differences in behavior that are established as mental habits. Thus, personality type is nothing more than a comfort zone where thinking occurs with less effort and with the greatest trust. When a student of a given personality type uses a non-preferred mental function, they use more mental energy and tire easier. Any non-preferred mental function that is neglected can act as a “weakest-link” in learning. But, like any tactile/kinesthetic skill, the non-preferred function can be developed and mastered. Concept mapping is a tool that is highly effective in facilitating the development of the non-preferred mental functions.

#### 2.1 Extraversion and Introversion Preferences

Students differ in their preference for whether their best thinking is achieved through “talking it out” or through “thinking it through.” Those students who have extraversion preferences will have an easier and more effective learning experience if they can verbalize their learning as it is happening. Although verbalizing learning is impractical in some learning settings, it has an energizing effect on study groups. The opposite preference for introversion is seen in students who have a more effective learning experience

when they are able to process new information quietly before it is discussed. While this type of learning can lead to isolation from others, if used regularly in a study group it will bring depth of thinking to the group process. Thus, extraverts talk-to-think while introverts think-to-talk.

## *2.2 Sensing and Intuitive Preferences*

Students differ in their preference for the way they give their attention to new information. Those students who have sensing preferences tend to trust information that is perceived directly by the senses, i.e. vision, hearing, touch (manipulation), taste, and smell. This information exists in the present as facts and details and carries a high degree of certainty. If a pattern or relationship exists, it is also perceived as a fact...but is only “discovered” as a relationship with great effort. When studying in a group, the sensing student is always alert to completeness of the facts.

The opposite preference for intuition leads students to trust their ability to find patterns and relationships. This information exists in the future as a possibility and several ways of organizing these relationships might be perceived. While a minimal set of facts is needed to form a pattern, once the pattern is decided the remaining facts are ignored by the intuitive type student. When studying in a group, the intuitive students help with the discovery of patterns and bring the alternative points of view that are essential to critical thinking. Thus, sensing types think about “what is” while intuitive types think about “what if.”

## *2.3 Thinking and Feeling Preferences*

Students differ in their preference for the way they react to new information. Those students who have thinking preferences tend to trust their logic to evaluate the facts and possibilities. They are impersonal and objective in their analysis since they seek to obey the laws of deductive and inductive reasoning. While they have feelings, they do not trust their feelings in reaching a decision or making a judgment. When studying in a group, the thinking types draw attention to the “correctness” of relationships and the clarity of thinking.

The opposite preference for feeling judgment leads students to trust learning decisions based on personal and subjective analysis. This analysis is still a rational process, but it references against human outcomes rather than laws of logical reasoning. When confronted with a conflict between a logical alternative or a personally valued alternative, the feeling type will choose the latter, even while realizing the former is also valid. When studying in a group, the feeling type students bring harmony and enhance communications. Thus, thinking types need to include feelings and values as facts in their thinking while feeling types need to realize that thinking types have difficulty trusting feelings and values.

## *2.4 Judging and Perceiving preferences*

Students differ in their preference for the way they conduct their learning activities. Those students who have judging preferences tend to organize their time around a plan. They are motivated to obtain closure by completing their plan or checking off items on their task list. They will tend to sacrifice learning additional information if that learning prevents them from completing their schedule. When studying in a group, they keep the group on task and help it to be more efficient. The opposite preference for perception leads students to conduct their learning in a flexible and adaptable manner. They are motivated to discover new information that makes a more complete set of facts or a more complete pattern. They may attempt to follow a schedule, but they will value the acquisition of additional information over meeting a deadline. When studying in a group, they keep the group open to new information in resolving learning issues. Thus, judging types seek “the joy of closure” while perceiving types seek “the joy of discovery.”

### **3 Contribution of Map Construction to Learning In Different Types**

Concept mapping helps to develop the learning skills that characterize each of the type preferences in different ways (Pelley and Dalley, 1997). This is described below for each of the four dimensions of MBTI type.

#### *3.1 Concept Mapping for Extravert and Introvert Types*

Extraverts prefer action oriented learning, especially when it can be verbalized. Each step in the construction of a concept map can be verbalized, from the development of a list of terms to be mapped to the discovery of cross-links. Introverts prefer quiet thinking time to process and discover. If they don't verbalize their learning, however, they cannot test their thinking. Thus, introverts can discuss their finalized map with other students to express the thinking that originally occurred quietly. Students in study groups have frequently remarked that they would not have realized that their thinking was incorrect if they had not had to explain their map. The map serves as a visual platform to focus dialogue.

#### *3.2 Concept Mapping for Sensing and Intuitive Types*

Sensing types give their attention to specifics. This results in a linear reading style that involves a slow but steady process moving from the beginning of the assignment to the end without digressing or returning to material previously covered. The only reading of previous material occurs when the entire assignment has been finished and the linear progression through the material begins again. This is in stark contrast to the more spontaneous, random focus of the intuitive type who will frequently complain of difficulty with staying on task. Concept mapping helps intuitive types stay on task due to the goal oriented nature of the reading while it forces sensing types to refer to previously read concepts to evaluate the grouping terms and the potential for cross-links. Sensing type students respond strongly to a personal review of their maps with a teacher. Often, their early maps are a single linear array of nodes connected from the top of the page to the bottom, a reflection of how they read. This allows for a brief discussion of their thinking and an active learning moment as they modify their maps. They experience visible feedback on how to develop their thinking and they take away a greater sense of confidence in their ability to identify more complex knowledge independently. It will be rare for any student to request this assistance more than twice. They do return for a third visit, but only to report how much higher they have scored on their examinations.

#### *3.3 Concept Mapping for Thinking and Feeling Types*

Thinking types will evaluate a map for its logical consistency. Its appearance will not matter as long as the construction makes sense to them. They may construct alternative maps to determine the most logical map and they will readily use technology to make the process more efficient and more effective. Their logical orientation can lead them to challenge what they have been taught. A concept map drawn by a medical student resulted in an instructor modifying a lecture after trying to help a student who had mapped it (personal communication). The instructor concluded after attempting to make sense of the student's map that his lecture needed to be re-organized. While a correct organization is also valued by a feeling type student, it is equally important for the map to be pleasing in appearance. They will use color and other decorative additions to enhance the map and make it visually pleasing. This makes their learning more enjoyable. The emotional attachment to a map enhances memory during examinations and allows for recall of the details of the map. Feeling types tend to be intimidated by technology.

#### *3.4 Concept Mapping for Judging and Perceiving Types*

Judging types will tend to see a map as a final document due to their orientation toward closure. A completed map that is correct should not be altered in their view because they will believe that all possible alterations are already in the map. This leads to a rigidity that is not open to new learning except as a new experience that starts over at the beginning. Starting over is not a need for the perceptive type student, since they see the map as a living document – new nodes appear as they are discovered and nodes that have

become mastered disappear. Thus, concept maps reflect the student's understanding at a given point in time, but they need to be updated as understanding deepens.

#### **4 Summary**

Concept mapping is used differently by students who process information differently. The Myers-Briggs Type Indicator was developed to help identify different preferences within several dimensions of thinking that give insight into how students of different types will process the same information in solving a problem. These dimensions are related to: 1) whether the thinking is spoken or silently processed, 2) whether attention is given to specifics or to patterns, 3) whether the response to new information is logical or subjective, and 4) whether learning is open-ended or closure-oriented. Learning is most effective for all students if they can develop the skill of their opposite way of thinking in addition to their preferred way of thinking. Concept mapping helps to achieve this goal. Maps can be verbalized (extraversion preference), but require focus and concentration (introversion preference) as they are organized. Maps are composed of as many details as needed (sensing preference), but the patterns of specific relationships among the details (intuitive preference) are needed to develop a complete map. Maps can be represented with differing, but equally correct organizational hierarchies (thinking preference), but maps that are pleasing to look at (feeling preference) take advantage of the essential contribution of emotion to long-term memory. Maps acquire new propositions and lose unnecessary propositions as experience is acquired by the student (perceptive preference), but at any point in time all of the relevant information must be included during map construction (judging preference).

Concept maps help students develop an ability both to identify more complex relationships and to include more facts during study. This helps sensing students since they will tend to avoid looking for levels beyond the recall of facts unless they have a systematic process for constructing groupings and relationships between groups. Intuitive students will tend to avoid including all of the details in their learning if they cannot attach these details to a pattern such as a concept map. Students eventually realize that concept mapping changes the way they read. It requires them to actively seek out major terms that organize and group information. They must then read to actively prioritize terms that form the most inclusive groups and evaluate various organizational designs. Then they read to find all of the detailed information that makes the map a complete representation of what they have read. This type of reading prohibits the linear study habits of the sensing type student by requiring constant scanning for relationships to show levels of hierarchy or cross-links. Because sensing type students have a high need for certainty in their learning, they will initially resist mapping to avoid the anxiety of "doing it wrong." A few brief feedback sessions that require the student to talk about how they were thinking as they constructed their maps will be sufficient to encourage the student to trust their maps. In general, any personality type will develop the "weak-link" in their learning style when they employ concept mapping as a learning tool.

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