

# Enneagram: Exploring Learning Styles of Engineering Students.

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**Abstract:** The new and active learning environment in tertiary education is forcing academics to discuss the effectiveness of traditional teaching strategies that address the diverse learning styles of engineering students. A number of personality type indicators have been used in the past to determine students various learning styles. This paper introduces the Enneagram as a new tool to determine the student's learning style. The Enneagram can also be used to describe psychological preferences of engineering educators.

**Index terms –** Enneagram, Learning styles, teaching strategies.

## I. INTRODUCTION

Every academic is always occupied with the following questions: what teaching at university is meant to be, and how it should be conducted? Fortunately there are no straightforward answers to these questions and as a result academics adopt different strategies, approaches and philosophies of education. These questions can be approached from two different directions:

- From the academic side where a definition of philosophy of education is formulated and reviewed.
- From the student side by investigating the students various learning styles.

The combination of these two approaches can lead to an adoption of one or more teaching strategies based on self and student understanding. *“Imagine the benefits of understanding how our personality affects the way we teach. Conversely, imagine the benefits of knowing how the personality biases of our students affect how each learns and interacts with authority”* [1]. The author's understanding of good and effective teaching is a combination of 5 different perspectives; Dan Pratt and John Collins describe these perspectives [2], effective teaching:

- Requires a substantial commitment to the content (**Transmission**).
- Is a process of socialising students into new behavioral norms and ways of working (**Apprenticeship**).
- Must be planned and conducted from the learner's point of view (**Developmental**).

- Assumes that long-term hard, persistent effort to achieve comes from the heart not the head (**Nurturing**).
- Seeks to change society in substantial ways (**Social reform**).

The author believes that learning experience aims at creating the ability to think by knowing the facts and knowing what is contained in an idea in addition to being able to know how to use ideas. Academics develop teaching strategies to improve the learning experience at universities, some of these strategies are:

- Effective Group Work Strategies
- Problem-Based Learning
- Student-centered Learning
- Lifelong Learning
- Collaborative Learning
- Work Integrated Learning
- Online Learning
- Flexible Education

Students adopt different learning strategies and styles and hence they respond differently to the following delivery modes: data, facts, mathematical models, visual animation, diagrams, pictures, verbal information, working in a group or individually etc, and each student may develop a unique learning style based on a specific combination of these and other modes. However, working well in all learning style modes is a must for a successful professional graduate. In the case of Engineering there is a need to be competent in almost all learning styles *“competent engineers and scientists must be observant, methodical, and careful as well as innovative, curious, and inclined to go beyond facts to interpretation and theory. Similarly, they must develop both visual and verbal skills. Information routinely comes in both forms, and much of it will be lost to someone who cannot function well in both of these modes”* [3].

Is tailoring a learning style for each student or remaining with a single approach that dominates education (especially in engineering) the answer? In the author's opinion a balanced approach that will address the diverse needs of students may be the answer. This paper describes in general the widely used learning style models that have used in engineering and attempts to introduce a new learning style model based on the Enneagram of personality which is a psycho-analytical

model for personality type. The introduction of this learning style model might help to expand our understanding of the diversity of student learning styles and ultimately leads to a more balanced approach to teaching.

## II. LEARNING STYLES MODELS

According to R.M. Felder [4] the four learning style models that are used in engineering are:

**The Myers-Briggs Type Indicator (MBTI).** This model classifies students according to their preferences on scales derived from psychologist Carl Jung's theory of psychological types. Students may be [5]:

- Extraverts or introverts.
- Sensors or intuitors.
- Thinkers or feelers.
- Judgers or perceivers.

Engineering Academics usually orient their courses toward introverts, intuitors, thinkers and judgers.

**Kolb's Learning Style Model.** This model classifies students as having a preference for 1) concrete experience or abstract conceptualisation, and 2) active experimentation or reflective observation. The four types of learners in this classification scheme are [6]:

- Type 1 (concrete, reflective). A characteristic question of this learning type is "Why?".
- Type 2 (abstract, reflective). A characteristic question of this learning type is "What?".
- Type 3 (abstract, active). A characteristic question of this learning type is "How?".
- Type 4 (concrete, active). A characteristic question of this learning type is "What if?".

Traditional engineering instruction focuses almost exclusively on formal presentation of material (lecturing), a style comfortable for only Type 2 learners.

**Herrmann Brain Dominance Instrument (HBDI).** This method classifies students in terms of their relative preferences for thinking in four different modes [7]:

- Quadrant A (left brain, cerebral). Logical, analytical, quantitative, factual, critical.
- Quadrant B (left brain, limbic). Sequential, organized, planned, detailed, structured.
- Quadrant C (right brain, limbic). Emotional, interpersonal, sensory, kinesthetic, symbolic.
- Quadrant D (right brain, cerebral). Visual, holistic, innovative.

Engineering academics on the average are strongly Quadrant (A) and would like their students to be that way as well.

**Felder-Silverman Learning Style Model.** This model classifies students as [8]:

- sensing learners or intuitive learners
- visual learners or verbal learners
- inductive learners or deductive learners

- active learners or reflective learners
- sequential learners or global learners.

For the past few decades, most engineering instruction has been heavily biased toward intuitive, verbal, deductive, reflective, and sequential learners. However, relatively few engineering students fall into all five of these categories.

Next the author will introduce a relatively new psycho-analytical tool that help to map every possible learning style that is used by students. This mapping can lead to a more comprehensive approach to the task of designing a teaching strategies to accommodate the diverse needs of students since most engineering students receive an education that is mismatched to their learning styles.

## III. ENNEAGRAM

The Enneagram is one of the newest personality systems in use emphasising psychological motivations. Its earliest origins are not completely clear the circular symbol may have originated in ancient Sufi traditions, and was used by the esoteric teacher George Gurdjieff (1866-1949). The Enneagram of Personality Types is a modern synthesis of a number of ancient wisdom traditions, but the person who originally put the system together was Oscar Ichazo. Ichazo was born in Bolivia and was raised there and in Peru, but as a young man, moved to Buenos Aires, Argentina to learn from a school of "inner work" he had encountered. Thereafter, he journeyed in Asia gathering other knowledge before returning to South America to put together a systematic approach to all he had learned [9].

The word Enneagram stems from the Greek (ennea) meaning "nine" and (grammos) meaning "points". The Enneagram's structure appear complex, however it is actually simple. Draw a circle and mark nine equidistant points on its circumference. Designate each point by a number from one to nine, with nine at the top, for symmetry and by convention. Each point represents one of the nine basic personality types, see figure 1 [10].

The nine points on the circumference are also connected with each other by the inner lines of the Enneagram. Points Three, Six and Nine form an equilateral triangle. The remaining six points are connected in the following order: One connects with Four, Four with Two, Two with Eight, Eight with Five, Five with Seven and Seven with One. It is common to find a little of yourself in all nine of the types, although one of them should stand out as being closest to yourself. This is your basic personality type. Everyone emerges from childhood with one of the nine types dominating their personality



Figure 1. The Enneagram

The theory of personality upon which the model is predicated takes that everyone was born in their “essence” but chose an “ego” fixation around age three or four and in an effort to defend against parental fixations, the child develops a “neurotic” habit that characterizes the Chief Feature of acquired personality. This neurotic habit obscures the child's essence, which is otherwise pure and unadulterated, evincing no conflicts of thought, emotion or instinct. It must be noted that people do not change from one basic personality to another and every one is a unique mixture of basic type and usually one of the two types adjacent to it on the circumference of the Enneagram. There is an internal structure within each personality type that indicates the level of development and provides a framework for seeing how all the different traits comprising each type fit into a large hole [11]. In addition, the nine personality types of the Enneagram are not static categories. There are two lines connected to each type, and these lines are connected to two types. One line connects with a type that represents how a person of the first type behaves when they feel more secure and in control of a situation. This is called the Direction of Integration or the Security Point. The other line goes to another type that represents how the person is likely to act out if they are under increased stress and pressure [12].

#### IV. ENNEAGRAM TYPES DESCRIPTION

**Type one:** The perfectionist, organiser, activist, Moraliser. This is a Reformer rational idealistic, reasonable, principled, orderly, perfectionist and self-righteous type. Ones have an enormous internal critic berating and judging them, continually finding them wanting. Ones are often surprised when others accuse them of being critical, since they share only the tiniest fraction of their ongoing internal critique. In the belief that everyone is as focused on improving as they are, Ones feel that they are simply sharing the best they have to offer. Perfectionists have an innate ability to assess potential for improvement in any situation. Ones attention to error can lead to criticism and judgment of

self and others. Fear of making mistakes or appearing foolish can lead to procrastination in decision-making [13]. One in general:

- Practical. Reshapes abstract approaches into step-by-step procedures.
- Likes schedules and accountability, knowing who's responsible for what.
- Keeps track of detail.
- Prefers doing over feeling.
- Is aware of critical points about a program but has a hard time proposing broad solutions. Too much room for error.
- Is secure in a formal role. Wants to respect hierarchy and authority.
- Compares own effort to others'. "If they work, I work. If they don't, I won't."
- Finds it hard to delegate responsibility. Worries about getting the job done right.
- Doesn't want to be compromised by the mistakes of others. Will hold a loner's stance until the source of error is assigned.
- Avoids risk. Risk leads to mistakes. When in doubt, wait. Don't take chances. .

**Type two:** The caretaker, the enabler, the altruist. This is a **Helper** caring, nurturing, concerned, generous, well-meaning, possessive, and manipulative type. Twos have a natural ability to make empathic connections with others. Helpers actually feel what others feel or need. They are driven to connect with others emotionally and fill their needs. Twos often are so tuned into other's needs/ feelings that they are not aware of their own. As a result, they can find themselves drained, and then angry. If we look at life from the perspective of the Helper, we find a conviction that survival and getting love depend on sensing and meeting the needs of others. In general two:

- Takes own identity from authorities who can offer support. The right-hand person. The secretary who knows the secrets. The power behind the throne.
- Is highly responsive to approval and encouragement. Crushed by disapproval.
- Associates with "worthwhile" people. Sidesteps those who aren't.
- Has complicated office strategies. Backs favorites. Often an unrecognized conflict between an ambition to be first and wanting to please.
- Works for the respect of important people in the field, the power elite. "Who do we know that will endorse our project?"
- Fears opposing power alone.
- May choose work because it has value to a loved one.

**Type three:** The motivator, the achiever, the communicator, the status seeker. This is a motivator success-oriented, pragmatic, adaptable, ambitious, goal-

oriented, image conscious and arrogant type. Threes are multitasking, high energy people, performers get things done. They make things happen. Threes can adapt to any situation or group with a chameleon-like ability to match the environment. Three's focused attention on goals and tasks can overshadow other aspects of their lives. Threes can become so identified with the image they present or with what they do that they lose themselves. Three in general:

- Assumes own ability. The instant expert.
- Takes on the image and feelings of a task. Prototype of the profession.
- Takes the shortcut. Does several things at once. "Details later."
- Feels rage when tasks and goals are interrupted. Anger is usually task specific.
- Values product over process. "How much did I produce?"
- Being respected for ability as a worker is more important than being liked.
- Is a Machinelike achiever. Expects others to work in the same way.
- Projects a high-profile image -- credentials, social standing, "who's who."
- Exerts power over people; competes for leadership roles.
- Avoids failure. Switches tracks. Finds a presentation that works.

**Type Four:** The individualist, the special one, the artist. This is an Individualist sensitive, withdrawn intuitive, artistic, aesthetic, self-absorbed, and depressive type. Fours have a singular ability to be present with life's more intense situations: grief, death, depression. Fours bring originality and creativity to any enterprise. Often blessed with a strong sense of the dramatic and/or aesthetic, they prefer to make a unique contribution in life. Insistence on exhibiting their uniqueness or difference can be counterproductive to their own goals and off-putting to others. Four feels that something is missing in his/her life. Other people have it and the Romantic envies them. Four in general:

- Wants distinctive work. A job that calls for creativity, even genius, an eccentric edge in presentation, a unique approach to business life.
- Must feel respected in the workplace for personal vision and ideas.
- Efficiency is tied to mood. Attention gets displaced from tasks when emotional life takes over. Can sabotage business life over a love affair.
- Wants to be connected to special authority, to those in the field who stand for quality rather than popularity.
- Feels called to emotionally intense lines of work: grief counselor, animal rights activist, the suicide hot line late at night.

- Is aggressive and cutting toward competitors or peers in the same field. Attracted to successful people outside his or her own sphere of interest.
- Does not flourish in a work environment that requires close cooperation with others who are more skilled, more valued, or better paid.

**Type five:** The investigator, the expert, the specialist, the observer, the innovator. Fives are independent, self-contained people. This is a Thinker cerebral analytic, perceptive, original, innovative, provocative, and eccentric type. Fives delve deeply into areas of knowledge that excite them, often becoming experts in subjects they explore. They exhibit a highly developed capacity for systematization of thought, for analyzing and synthesizing complex information. Observers accumulate knowledge; they want to understand. Fives often feel safer if they do not share all that they know keeping some knowledge in reserve. Five in general:

- Has a sense of limited energy reserves. Does not want time and energy to be used for other people's agendas.
- Works hard for the rewards of privacy and the freedom to pursue personal interests. Works to buy autonomy.
- Needs predictability. Wants to foresee in order to be prepared. Expects to have minutes from the last meeting and names of those who will attend the next one.
- Freezes when unexpectedly questioned or when a spontaneous reaction is called for. Needs to withdraw in order to figure things out.
- Strictly avoids conflict. Puts up a wall of memos and secretaries as protection against emotional scenes.
- Is extremely productive when in a decision-making role that is protected from frontline interactions.

**Type six:** The loyalist, the traditionalist, the doubter, the troubleshooter. This is a Loyalist committed, traditionalistic, engaging, responsible, hardworking, cautious, and anxious type. Sixes are often committed, dutiful, behind-the-scenes workers or team players and can instantly see the downside or danger in any situation. Sixes keep looking for an authority that they can trust, but believe that most people in authority abuse their power. Six in general:

- Has a strong analytic power. Attention shifts to questioning and examining the opposite position. Doubt and a suspicion of the obvious develop clarity.
- Reacts against own weakness by either seeking protection from authority (loyalist) or attempting to bring it down (rebel). "At your feet or at your throat."
- Is Able to act, to go full out when up against the odds. Will compete when the odds are against a win. Defends the underdog. A business turnaround.

- Tests an argument. Sensitive to the weak spots in any position. The loyal opposition. "Yes, but..." The devil's advocate. "Let's consider the other side."
- Finds it hard to keep moving forward effectively when success begins to materialize and hard to focus when there is no opposition. Doubt sets in until positive options begin to seem unreal.

**Type seven:** The energizer, the enthusiast, the multitasker, the generalist. Sevens are great Idea people spinning out seemingly endless visions and potentials. This is an Enthusiast, hyperactive, uninhibited enthusiastic, accomplished, versatile, excessive, and manic type. Sevens are synergistic thinkers who make connections between seemingly unlike things. When a Seven has a great idea or vision, they almost feel like they've done it already - in the mind. So it isn't necessarily important to complete a project when they've already had the satisfaction of the idea. Seven in general:

- Can become insistent about impractical ideas and inefficient approaches. Prefers ideas and theory to implementation. Will open a task to new approaches rather than face routine.
- Is excellent performer in open-ended projects that do not move into routine. Networks, plans, synthesizes ideas and approaches. Aligns the project with other areas of interest.
- Has an inner sense of capability and high self-worth. Measures self against others to keep this sense of self alive. "Am I superior or inferior?" "Do I stand above or below?" "Am I on top of this project, or will it get me down?" Positive self-image can be punctured by negative feedback.
- Is delightful to work with. Can be forgiving and creative during hard times. The office person who wins the popularity poll.

**Type eight:** The leader, the provider, the challenger. Eights are straightforward, direct, what-you-see-is-what-you-get people. This is a Leader, powerful, dominating self-confident, decisive, challenging, authoritative, and combative type. They are able to take charge and make decisions quickly. Bosses are people of action. Unaware of their impact, they can steamroll over the emotions and wishes of others to get their own way. Bosses can't help taking command of a situation. They may not necessarily need to be in control, but Eights hate to be controlled. Eight in general:

- May see compromise as weakness.
- Will assume leadership. The focus of attention goes to others who are strong contenders for control of the project, the firm, the loyalty of followers. Respects honest leadership. Likes a worthy opponent.

- Can unwittingly polarizes people into factions. Wants to know where everyone stands. Will provoke to get clear answers.
- Is concerned about justice and protection.
- Sees own opinion as the correct approach. "My way or the highway."
- Enforces rules that support personal advantage. Bends the rules that don't.
- Demands to be fully informed. Changes in details can stimulate concern about being manipulated.

**Type nine:** The optimist, the utopian, the peacemaker. This is a Mediator easygoing, phlegmatic, receptive, optimistic, complacent, tolerant, and disengaged type. Nines are open and accepting of others without judgment. An open, calm demeanor exemplifies these easygoing people. Nines are capable of merging into deep connection with others. The mediator can adopt a passive role and wait for others to determine the course. Nines find it easier to go along with other's preferences rather than trying to find their own. Nine in general:

- Flourishes in conditions of positive support, but avoids self-promotions. Wants recognition but will not ask.
- Likes procedures, lines of command, and rewards to be well defined. Likes to adjust own energy output to a predictable set of guidelines. No sudden surprises, please.
- Energized by a productive routine and other people's enthusiasm for projects.
- Wants a structure to support decisions. Doesn't like to make decisions. Goes by the book; keeps spontaneous decision making at a minimum.
- Is cautionary in taking risks. Feels safer in known routes. Goes with what has worked in the past. Avoids risks that raise hopes, for fear of disappointment.
- Forestalls a decision by gathering information. Puts off essentials while the unessentials get done. Strategic use of deadlines produces magnificent last-minute saves.
- Feels overwhelmed with too much to do. Finds it hard to focus on a business priority when items of lesser importance seem like equally pressing concerns.

## V. DISCUSSION AND FUTURE WORK

Why do we need another personality model? In fact there are many personalities models used in determining the learning styles of students, however there is a major difference between and the Enneagram. The Enneagram describes the neurotic pattern in how attention is directed and measures motivation, underlying beliefs and attitudes. While other models describe what

functions are used in the placing of attention and measures how we collect and process data from life experience. In addition, the nine different Enneagram types arise from a consideration of three centers of intelligence: the head, the heart and the gut (instinct) see Figure 2.

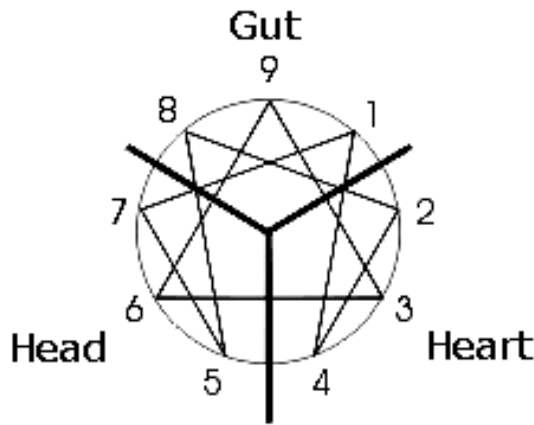


Figure 2. The triads of Enneagram

The function level for head is thinking and reflecting, heart is affecting and being affected, gut is instincts and habits. Another advantage of Enneagram is that self development and personal growth is a part of this theory. However, there are some disadvantages related to the fact that there is no common terminology or description for each of the nine types and the origins come from obscure esoteric teachers who have been secretive about this system [15]. The author plans to develop an approach for determining students learning style in Engineering using Enneagram and develop an index of learning style where an academic can use this index to design an appropriate teaching strategy.

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