Library Instruction Geared to the Personality of Engineering Students

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Abstract

Engineering professors and psychologists have extensively studied the personality of engineering students. This paper offers applications for library instruction that take into account the predominant personality characteristics of engineering librarians’ typical audience. It outlines several suggestions for tailoring library instruction to the traits of engineering students. Implications for lecture-oriented instruction, activities, and instructional modules are given. The Myers-Briggs and Holland Vocational systems have been used extensively in characterizing engineering students and are reviewed here. In addition, differences between librarians’ traits, those of engineering students, and those of engineering faculty create interesting dynamics for library instruction.

Myers-Briggs

Myers-Briggs is a system of 16 personality types generated by preferences along four polar dimensions: Extraversion/Introversion; Sensing/Intuition; Thinking/Feeling; and Judging/Perceiving. Individuals who take the Myers-Briggs Type Indicator have four letters assigned to them, one for each dimension. Thus, someone who is an “INTJ” prefers Introversion, iNtuition, Thinking, and Judging.

Introverts prefer to focus energy on their inner experience. Extraverts prefer to focus their energy on objects and people in the environment. Sensing types focus primarily on information from their five senses. Individuals who prefer Intuition focus on patterns and interrelationships. Thinking types base conclusions on logical analysis, exhibiting objectivity and detachment. Feeling types consider social and personal values in forming conclusions. Judging types prefer to exhibit decisiveness and closure in dealing with their outer world. Finally, Perceiving types prefer to exhibit flexibility and spontaneity in dealing with their outer world.

A wide variety of studies using the Myers-Briggs Type Indicator have characterized engineering students as predominantly Thinking and Judging individuals, as opposed to their polar opposites, Feeling and Perceiving types. Between 64 percent and 75 percent of the engineering students studied preferred Thinking. Thinking refers to preferring to make decisions using objective, logical analysis, rather than by considering personal reasons. Between 52 percent and 61 percent of the students...
studied preferred Judging. Judging types have a need for closure and prefer to live in an organized manner. In contrast, the types underrepresented among engineering students make decisions with personal or social ethical values in mind (Feeling), and in a flexible manner, considering all the information before making a decision (Perceiving).

Several implications for library instruction based on the Thinking and Judging characteristics emerge.

1. Lecture. Thinking-Judging types prefer lectures over group activities, although engineering students’ regular instructors may want to include group activities in order to inculcate “people skills.”
4. Challenge. Present problems to the students. They have great analytical skills and enjoy the challenge of figuring things out. Brief problems can liven up the lecture and be presented even during a 50 minute library lecture. One that may be used with success is the “oral pop quiz” where the librarian asks the students to apply facts or principles presented earlier in the hour. For example, after going over library call number locations, the librarian might ask a class to figure out on which floor a book is located.

In presenting library instruction, the Sensing/Intuition dimension of the Myers-Briggs system also proves important. Sensing individuals tend to like to take in information through their five senses. They have excellent memories for facts and their previous experiences and are highly observant. Intuitive individuals, by contrast, tend to like abstract information. They read between the lines and focus on the “gist” of information. They are attuned to the future rather than the here-and-now. Obviously, these are diametrically opposed types, and engineering students fall into both camps. To appeal to both Sensing and Intuitive engineering students, the engineering librarian needs to plan with both types in mind.

1. For intuitive students, mention the principles illustrated in the lecture. For example, when teaching about “and” and “or” the librarian could mention that these operators follow Boolean logic. Also, in preparing an outline, make sure that it is not overly detailed. Have some “big categories” organizing the lecture that are indicated, while also providing a wealth of factual information.
2. For sensing students, make an effort to provide at least one real-world example for every generalization made. Luckily the database demo forces the librarian to go step-by-step and to provide details. One may also want to try to relate information literacy concepts to students’ prior knowledge and experiences, because Sensing types like to link new information to things they already know. Make sure the outline is not too brief and “conceptual.”
The most common single type among engineering students is Introverted, Sensing, Thinking, Judging (ISTJ), which makes up 13 percent to 20 percent of all engineering students in a variety of samples. Consider tailoring class activities (if any) and tutorials to the characteristics of this type: the Introversion and Sensing suggest other implications for instruction beyond Thinking and Judging, which were discussed above. ISTJs are described thus:

Quiet, serious, earn success by thoroughness and dependability. Practical, matter-of-fact, realistic and responsible. Decide logically what should be done and work toward it steadily regardless of distractions. Take pleasure in making everything orderly and organized—their work, their home, their life. Value traditions and loyalty.

As introverts, ISTJs need time to reflect before speaking. Group activities, if used, should be brief and well-structured. Consider letting the students work in pairs if incorporating group activities at all. Keep in mind that Sensing types do not enjoy open-ended, reflective exercises.

Tutorials are a good idea for ISTJs, on the other hand. A study of videodisc instruction found that Sensing types responded well to the linear, step-by-step teaching of this format. For an example of a web tutorial designed with ISTJs in mind, see “Jo-Ann and John Go to the Library” at http://www.lib.utk.edu/refs/engineering/active/. This tutorial stresses complete, step-by-step information, while also attempting to appeal to ISTJs’ and other Thinking types’ logical sides by listing pros and cons of particular search strategies. “Jo-Ann and John Go to the Library” presents a sequential story of two typical engineering students going about library research. A wealth of sensory information is provided, such as descriptions and pictures of different departments in the University of Tennessee Libraries. The process of library research is described in a step-by-step and realistic manner. Pro and con screens shown in the screen shot below in the hopes that the logical approach would appeal to engineering students. There are plans to incorporate additional images to appeal better to Sensing students when this tutorial is revised. Sensing types are accurate problem solvers, so librarians might also want to incorporate an interactive quiz in a web tutorial, although there is none in this one.
There are significantly more Intuitive (62 to 77 percent) and Thinking (82 to 84 percent) engineering professors than students. The preference for Intuition is probably most important for librarians to keep in mind. Librarians can expect many professors to be less detail-oriented and more conceptual than engineering students. To appeal to Intuitive professors, librarians may want to discuss some of the theoretical concepts to be covered in instruction, such as information literacy and Boolean logic.

### Holland’s Vocational Personality Hexagon

John Holland’s theory of vocational personalities and environments is less well-known to the general public than Myers-Briggs. Tests that employ the Holland system include the Self-Directed Search, the Vocational Preference Inventory, and the Strong Interest Inventory. Holland’s system is a hexagonal arrangement of six types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Realistic types prefer to manipulate machines, tools and things. They value material awards, are practical, normal and frank, and tend to avoid interaction with people. Investigative types prefer exploration, understanding, prediction, or control of natural or social phenomena. They are analytical and skeptical, and they tend to avoid persuasion or sales activities. Artistic types prefer literary, musical, or artistic activities. They are open to experience, unconventional, and avoid routines and conformity to established rules. Social types prefer helping, teaching, counseling or serving others through personal interactions. They are empathic and patient and avoid mechanical and technical activities. Enterprising types...

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**Figure 1: Screen Shot from tutorial, Jo-Ann and John Go to the Library**

<table>
<thead>
<tr>
<th>Pros:</th>
<th>Cons:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Jo-Ann and John were able to read about a number of articles from many different journals on their topic, “tissue engineering”.</td>
<td>1. For journals to which there was no online subscription, Jo-Ann and John would have had to find the print or microform journal.</td>
</tr>
<tr>
<td>2. They were not limited to reading about articles in journals from a single publishing company.</td>
<td>2. It was complicated to remember all the ins and outs of library locations and search methodology. In fact, they even ran into some problems that Jeanine did not tell them about beforehand.</td>
</tr>
<tr>
<td>3. They learned about resources appropriate for future engineering courses (Compendex and the Library Catalog), and which they could even use as professionals.</td>
<td></td>
</tr>
<tr>
<td>4. They got a good introduction to some of the steps usually involved in finding information, such as finding out what has been published on a topic and locating those publications.</td>
<td></td>
</tr>
<tr>
<td>5. They would have been able to get the</td>
<td></td>
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</tbody>
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**Recommended Choice**
types prefer persuading, manipulating, or directing others. They have sales ability, are gregarious, and avoid scientific or intellectual topics. Conventional types prefer to establish or maintain orderly routines or to apply standards. They have business skills, are careful, and avoid ambiguous or unstructured undertakings.\footnote{8}

These categories share similarities according to their proximity on the hexagon. Opposite types on the hexagon, such as Artistic and Conventional, are the least similar to one another.\footnote{11} Studies show that engineering students, as well as professional engineers, are usually Realistic and Investigative types.\footnote{7,11} Other types, such as Enterprising, may enter into the equation for different engineering specialties, such as Industrial Engineering.\footnote{8} Because average scores rather than percentages are generally given for Holland types, no percentages are provided here. Since tests measure individuals’ scores on all six Holland categories (R, I, A, S, E, C), the highest two or three scores are the individuals’ types.

Realistic types (who enjoy building and repairing things and working outdoors) are described as:

- Emotionally stable and reliable
- Practical, thrifty, and persistent
- Shy, modest
- Likely to avoid being the center of attention
- Uncomfortable talking about themselves
- Inclined to take physical risks
- Likely to maintain traditional values
- Slow to accept radical new ideas\footnote{9}

These descriptors share some overlap with the Myers-Briggs Sensing type but add some new wrinkles for library instruction.

1. The thriftiness trait can be used to motivate Realistic engineering students. Mention a few prices of engineering journals or other resources, and they will pay attention. Mention that their tuition pays for library services.

2. Don’t embarrass Realistic engineering students by calling on them individually. Let them \textit{volunteer} when they do the “oral pop quiz.” If asking an individual to do a search in front of the class, a librarian should make the point that the class has to help him.

3. Give reasons for new ideas such as using peer-reviewed journals instead of Google. It helps to appeal to Realistic types’ practicality by telling them that being able to find technical information will make them more marketable for employment.

4. Remember that Realistic types are rather adventurous when it comes to sports or games. Thus, a competition serves as the most effective form of group exercise to use with engineering students.
Engineering students are also often Holland Investigative types (or some mixture of Realistic and Investigative). These types, who enjoy research, analysis, and inquiry, are described as:

- Independent, self-motivated
- Reserved, introspective
- Analytical, curious
- Task oriented (becoming absorbed in the job)
- Confident of scholarly and intellectual abilities
- Original, creative
- Nonconformist values and attitudes

Investigative types enjoy problems that make them think. A daring class activity would involve performing various searches and having the students derive the underlying principles of Boolean logic. Problem-based inquiry seems a natural approach for these types as well. However, since library instruction is usually limited to 50 minutes or less, the librarian should design briefer analytical questions for the students. One question to use is, “Why can’t you find peer-reviewed journals on Google?” Notice that information literacy concepts such as evaluating information sources will be easy to communicate to Investigative engineering students. They are excellent at critical analysis, although they may not have thought about turning this skill towards information. Investigative types, being reserved, like their shy Realistic brethren, do not appreciate being singled out in front of the class.

The research on engineering professors’ Holland types is limited, so no suggestions are presented here about incorporating knowledge of professors’ probable Holland codes in communicating with them. In the one study available, engineering professors’ scores were highest for the Investigative and Artistic types.

How do the Personalities of Librarians Enter into the Equation in Communicating with Engineering Students?

Librarians are rather similar in their Myers-Briggs types to engineering students, but rather different in their Holland types. Librarians, like engineering students, have ISTJ as their most frequent type (17 percent of librarians). Librarians are 63 percent Introverts, 59 percent Intuitives, 58 to 69 percent Thinking types, and 66 percent Judging types. Unlike engineering students, Librarians are most frequently Holland Artistic types, who enjoy creating or enjoying art, drama, music or writing, and are described as:

- Independent, nonconforming
- Impulsive, expressive
- Romantic, free-spirited
- Intuitive, complicated
- Sensitive, emotional
- Drawn to beauty and aesthetic qualities

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However, Investigative and Realistic were the next highest preferences for the librarians studied, which may ease communication with Realistic and Investigative engineering student. Clearly there are implications from the Holland characteristics of librarians for providing library instruction to engineering students.

1. Librarians’ verbal, artistic, and dramatic skills may help in making instruction entertaining for engineering students.
2. Keep in mind that engineering students may have different values than the librarian does. For example, engineering students may be more interested in using tools and machines than listening to a highly verbal library instruction lecture. Try to see their point of view.
3. If librarians with Artistic Holland codes are sensitive, they should try not to get their feelings hurt if students skilled at critical analysis notice an error or inconsistency in the lecture.

Conclusion

Research on the Myers Briggs types and Holland vocational personality types of engineering students offers several implications for instruction. Building on a knowledge of these systems, an engineering librarian can employ his or her own personality type to communicate in ways that engineering students will understand and appreciate.


