Students' Learning Styles vs. Professors' Teaching Styles

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Abstract
Wirz provides an interpretation of Felder and Soloman's Index of Learning Styles.

Most professors realize that students receive and process information in different ways. Some professors are even capable of identifying how most students learn. However, do the students themselves know how they learn? Even more important, how can students adjust their learning if a professor's teaching style does not match their own learning styles?

Nature of the Problem

In 1988, Richard M. Felder of North Carolina State University and Linda K. Silverman of the Institute for the Study of Advanced Development published the paper *Learning and Teaching Styles In Engineering Education.* Based on Dr. Silverman's expertise in educational psychology and Dr. Felder's in engineering education, they were able to provide insights about learning and teaching to engineering professors.

In another study, this one of college science instruction, Sheila Tobias (as cited in Felder, 1993) defines two tiers of students entering college. The first tier consists of students who complete their education earning a science degree; the second includes those who switched to nonscientific fields. The negative features of most introductory science courses include

- failing to motivate interest in science by establishing its relevance to the students' lives and interests;
- relegating students to a passive role in their learning;
- emphasizing competition for grades instead of cooperative learning; and
- concentrating on step-by-step problem solving rather than conceptual understanding (Tobias, 1990).

If students' learning styles are compatible with the teaching style of their instructors, they tend to retain more information, effectively apply it, and have a better attitude toward the subject. However, the points raised by Tobias about the poor quality of introductory college science instruction can be expressed directly as failures to address certain common learning styles. These failures result in the loss of over 200,000 science students each year who switch to other fields after their first college science courses (Felder, 1993).

Defining a Student's Learning Style

Felder defined a student's learning style by the answers to four questions:

- What type of information does the student prefer: *sensory* (sights, sounds, and physical sensations), or *intuitive* (memories, ideas, and insights)?

- How is information received: *visual* (pictures, diagrams, graphs, and demonstrations), or *verbal* (sounds, written and spoken words, and formulas)?

- How do they process information: *actively* (through engagement in physical activity or discussion) or *reflectively* (through introspection)?

- How does the student progress toward understanding: *sequentially* (in a logical progression of small incremental steps), or *globally* (in large jumps, absorbing material randomly)?

It is important to understand that the dimensions of this model are a matter of degree and not either/or categories. A student's preference for the different styles may be strong, moderate, or mild. It may also change with time, and may vary from one subject or learning environment to another.

Determining a Student's Learning Style

The *Index of Learning Styles* (Felder & Soloman, 1999) is an instrument used to assess preferences on the four dimensions of the learning style model. Dr. Felder and Barbara A. Soloman, also of North Carolina State University, developed the questionnaire in order to determine the magnitudes of students' learning styles preferences.

Based on the answers to a web-based bank of 44 questions, the students will be able to determine where they fall on the learning scale. Once they know their learning style, and the strength of that style, students will understand how they learn best.

Matching Learning Style and Teaching Style

Most students have a tendency for sensing, visual, and active styles of learning. However, most college courses follow the lecture teaching style (Felder and Soloman, 1999) that heavily favors the small percentage of students who are intuitive, verbal, reflective, and sequential.

What happens when students' learning styles do not match professors' teaching styles? Being able to answer this question is what differentiates this model from all the others. Dr. Felder and Barbara Soloman (1999), in *Learning Styles and Strategies*, describe how students can adapt to their instructor's teaching style. By using some of these suggestions, students can make the most of their learning capabilities in every class they attend.

Once students determine their learning styles, they must fully understand the implications in order to best use the information. To make it easier for my students, I presented an interpretation of the strategies in a table format. Sequential learning students apparently find the table a little easier to use than the standard text format presented in Felder and Soloman's article. The descriptive tables are reproduced here:

***LEARNING STYLES* Descriptive Tables**
An Interpretation by Dick Wirz of *Index of Learning Styles*
by Richard M. Felder and Barbara A. Soloman, North Carolina State University
http://www.ncsu.edu/felder-public/ILSpage.html

ACTIVE and REFLECTIVE LEARNERS:

Learning categories:	ACTIVE LEARNERS:	REFLECTIVE LEARNERS
How do they process information?	By doing something with the information: discussing it, applying it, or explaining to others.	Prefer to think about it for awhile, or to write brief summaries about what was just covered.
What might they say about the information presented to them?	"Let's try it out and see how it works."	"Let's think it through first."

Do they prefer to work in a group, or alone?	Group.	Alone or in pairs.
How do they handle lectures & taking notes?	Can't stand to just sit and take notes.	Don't like it much, but will do it if necessary.
Tendencies?	Jump into things prematurely, and get into trouble.	Spend too much time reflecting and may never get it done.
How can they help themselves (when the active learner finds himself in a class that has little time for discussion or problem solving, or when. a reflective learner is in a class that allows little time for thinking about new information)?	Study in groups and try to guess the questions to be asked on tests. Find ways to do something with information they have received.	They don't just memorize while studying, but try to review what they have read, thinking of possible questions and applications. They write short summaries of readings and class notes in their own words.
What do they do well?	Administration and team-oriented project work.	Individual research and design.
What is the favored teaching style?	Hands-on, labs, and discussions	Lectures with summaries.

VISUAL and VERBAL LEARNERS:

Learning categories:	**VISUAL LEARNERS**	**VERBAL LEARNERS**
How is **information received?**	They remember what they see – pictures, diagrams, charts, films, demonstrations.	They remember words – written and spoken explanations.
Which is the most common type?	Most people learn better visually.	Most courses are taught verbally.
How can they help themselves (for the **visual learner** when the course is predominantly verbal, or for the **verbal learner** when the course is primarily visual)?	Find diagrams, photos, schematics, and other visual course material. Check on videotapes or CD-ROM displays. Prepare a concept map listing key points, and connecting them with lines. Color-code notes with different highlighters so everything on one topic is in the same color.	They write summaries or outlines of course material in their own words and work in groups to gain understanding by hearing classmates' explanations. They learn even more when by repeating the explanation.
What is the favored teaching style?	Labs and PowerPoint or Films.	Lectures or PowerPoint.

SENSING and INTUITIVE LEARNERS:

Learning categories:	**SENSING LEARNERS**	**INTUITIVE LEARNERS**
What **type of information** does the student prefer?	They like learning facts, observations, and procedures.	Prefer discovering possibilities and relationships.
How do they like information presented to them?	Favor information that comes through their senses (seeing, hearing, and touching)	Favor information that arises internally through memory, reflection, and imagination.
Preferences?	Problem solving by using well-established procedures. Don't mind detail work. Don't like unexpected twists or complications. Like hands-on lab work and memorizing facts.	Like variety in their work. Get bored with too much detail and repetition. Don't mind complexity. Better at grasping new concepts.
Tendencies?	Practical. Careful. Slow.	Imaginative. Quick. Careless.
Testing?	Uncomfortable with written words and symbols making them slow on	Don't mind abstract concepts, theories, and formulas.

	tests because they take time to process the information. Get lower grades in lecture courses, especially science courses.	
Complaints?	May complain that a course does not have anything to do with the real world. Resent tests on materials not explicitly covered in class.	Too much memorization and too many facts.
How can they help themselves (when the **sensing learner** is in a class where most of the material is abstract and theoretical, or when the **intuitive learner** is in a class that deals primarily with memorization and rote substitution in formulas)?	Ask the instructor for specific examples of concepts and procedures. Find out how the concepts apply in practice. Try brainstorming with classmates.	Although most classes are aimed at intuitive learners, too many facts can be boring. Find a connection to link the facts to the theories. Or ask the instructor for interpretations.
Testing precautions?	May rely too much on memorization and familiar methods. Need to concentrate on understanding relationships and innovative thinking.	Impatient with details and prone to mistakes in calculations and hands-on work. Need to take time to read the entire question before answering. Should double-check results.
What do they do well?	Good experimentalists because they are observant and methodical.	Good theoreticians because they are insightful and imaginative.
Favored teaching styles?	Labs and PowerPoint presentations and discussions.	Lectures with theories and concepts.

SEQUENTIAL and GLOBAL LEARNERS:

Learning categories:	**SEQUENTIAL LEARNERS**	**GLOBAL LEARNERS**
How does the student **progress toward understanding?**	Learn in steps, with each step following logically from the previous one. They acquire understanding of material in small, connected chunks.	Learn in large jumps, absorbing material randomly without seeing connections, then suddenly "getting it." Need teachers who can relate past experience and knowledge to present subjects.
Tendencies?	Follow logical steps in finding solutions.	Able to solve complex problems quickly, putting things together in novel ways once they grasp the big picture, but are unable to explain how they did it.
Testing?	Able to solve individual problems although the overall concept eludes them. May have difficulty relating specifics to different aspects of the same subject.	Need to grasp the big picture before they have any chance to understand the details of the subject. But once they do, they may see the specifics better than the sequential learner.
How can **sequential learners** help themselves when the instructor jumps from topic to topic, or skips steps? What if the **global learner's** instructor plunges into new topics without relating these to what they already know?	Fill in gaps by consulting the professor or references. Outline lecture material in logical order. Relate new topics to things they already know.	Before reading a chapter, they skim through the entire chapter to get an overview.
What do they do well?	Good analysts skilled at solving convergent (single-answer) problems.	Good synthesizers, able to draw material from several disciplines to solve problems that could not have been solved with conventional single-discipline approaches.
Favored teaching styles?	Lectures and PowerPoint that follow	Lectures and PowerPoint that relate

	logical steps.	to previous learning.

Should Instructors Change Their Teaching Styles?

The following points illustrate some of the concerns instructors have about learning styles and teaching:

- Students should be responsible for their own learning.
- Most instructors teach as they were taught.
- Changing one's teaching style may not benefit enough students.
- Changing one's teaching style may limit the instructor's ability to impart all the information that is necessary.

These statements are both valid and complex. At the very least, teachers must recognize that there are differences in the ways that students learn. If instructors cannot justify changes in their own teaching styles, they should help their students understand how some learning styles can be adapted to their own teaching styles. This is where the difference between scholarly teaching and the scholarship of learning becomes apparent.

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