Addressing Learner Variables in an e-Learning Environment

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Abstract: This paper addresses learner variables in an e-learning environment. The authors present three different views of learning modalities from the literature: Kolb’s Classification of Learning Styles, Felder-Silverman’s Learning Style Model, and Gardner’s Multiple Intelligences. Each learning theory is addressed as it applies to e-learning. A case is made for a blended learning model, which combines traditional online instruction with face-to-face interaction of a traditional classroom experience to better address multiple learner variables. However, whatever pedagogical strategies are implemented in whatever modality – strict online learning or some variation of a blended learning model – the multiple individual variables that are present in any group must be addressed to provide the most powerful learning experience possible for all learners.

Introduction

It is well known that not all students learn in the same way. Each person has specific preferences and strengths in the way they approach learning and the way they best receive and process information presented to them. Some are comfortable looking at broad theoretical presentations; others prefer to deal with discrete facts. Some get more from verbal explanations while others prefer visual displays. Some function best working on an individual basis while others need to be actively engaged and seek out interaction.

A large body of literature now supports the benefits of e-learning programs. Both educational institutions and corporate training programs are finding generally positive financial benefits, in addition to the well-recognized advantages of convenience, standardized delivery, self-paced learning, and a variety of available content. Much of the discussion about implementing e-learning has focused on the technology, but as Driscoll (2001) and others have reminded us, e-learning is not just about the technology, but must also address many human factors.

The human factors that must be considered when designing any e-learning training program include a large variety of learner variables. Course designers need to recognize that individual students prefer one learning style to another and incorporate multiple intelligences in their learning process.

This paper gives an overview of these two fundamental models and examines how each may be addressed in a variety of e-learning environments.
Learning Styles

There are a number of ways of looking at learning styles. Two of the most notable are Kolb’s Model and The Felder-Silverman Learning Style Model.

Kolb (1984) classifies learners into four types:

- **Concrete, Reflective** – These learners need to have the purposes of any course made clear to them. They respond well to explicit connections between a course and their experience, their interests, and their future careers.
- **Abstract, Reflective** – These learners respond best to information presented in an organized, logical way. They need to have time built into any learning program for reflection.
- **Abstract, Active** – These learners want to have opportunities to solve problems, learn by trial and error, and work actively on clearly defined tasks.
- **Concrete, Active** – These learners prefer to solve real problems in which they can apply course material to new situations. They prefer to discover things on their own.

Felder-Silverman Learning Style Model (1988) puts learners into five categories:

- **Sensing** – learn through concrete, practical, oriented towards facts and procedures or **Intuitive** – conceptual, innovative, oriented toward theories and meanings; prefer to discover possibilities and relationships; like innovation and dislike repetition.
- **Visual** – prefer visual representations of presented material such as pictures, diagrams, flow charts or **Verbal** – prefer written and spoken explanations
- **Inductive** – prefer presentations that proceed from specific to general or **Deductive** – prefer going from general to specific
- **Active** – learn by trying things out and working with others or **Reflective** – learn by thinking things through; work better alone
- **Sequential** – learn in linear, orderly, incremental steps or **Global** – learn by thinking globally, holistically, and learn in large leaps.

Since there is a considerable amount of overlap in these models, e-learning programs can address these individual variables in learning styles, whatever the labels used for the individual elements.

Multiple Intelligences

As early as 1983, Howard Gardner, in his *Frames for the Mind*, developed a new psychological theory of the mind called "Multiple Intelligences (MI)"--a model that includes a variety of intelligent ways that people think and learn. Gardner initially defines seven (1983) and later a total of nine (1999) distinct intelligences as "the capacity to solve problems or to fashion products that are valued in one or more cultural settings (Gardner & Hatch, 1989).” Today, Gardner’s model of intelligences of the mind include:

- **Logical-Mathematical** – reflects a person's ability to see patterns, think deductively and logically.
- **Linguistic** – revolves around a person's language, or linguistic, ability. This intelligence allows us to use language to express ourselves.
- **Spatial** – gives a person the ability to use mental images to solve problems.
- **Musical** – allows a person to recognize and compose musical pitch, tone, and rhythm.
• **Bodily-Kinesthetic** – is the ability to coordinate and use physical body movements for problem solving.

• **Personal** – includes both *interpersonal*—the ability to understand others—and *intrapersonal*—the ability to understand one's own feelings.

• **Naturalist** – is the ability of someone to learn best through interactions with the environment.

• **Existentialist** – shows how an individual learns by seeing the “big picture” by asking philosophical questions about the world.

Gardner's Multiple Intelligences Theory speaks to the process of addressing individual differences in teaching and learning. By knowing how a learner tackles the solution of a problem and understands something, educators can help the learner succeed. A good pedagogical model ought to aim at accommodating a variety of intelligences. By "casting a wider net," a greater assortment of learning modalities are included in facilitating the teaching-learning process.

Gardner maintains that, although everyone possesses a unique mixture of each of these intelligences, they are all very different from each other and yet, they work in concert. That is, they work together to compliment each other as they help an individual learn and solve problems. Just as the development of the intelligences will vary from culture to culture, so they also vary in each individual. Although everyone possesses all of them to one degree or another, some will be highly developed, while others remain in a weaker stage. Thus, everyone has his/her own range of strengths and weaknesses in the learning environment.

**Addressing Learner variables in e-learning**

**Addressing Learning Styles**

A number of factors must be considered when deciding how to address learner variables in any kind of e-learning environment that is implemented. For example, we have known for years that *teachers* are much more comfortable teaching in their own favored learning style (e.g., Gregorc 1984). In contrast, Dunn and Dunn (1993) confirmed that *students* learn better when their education is delivered in *their* preferred learning styles. This is true no matter what kind of e-learning environment is used to deliver training. Significantly, Felder (1996) observed that if all teaching is done exclusively in a manner that favors students’ *less preferred* learning modes, the students’ discomfort level may be great enough to interfere with learning. On the other hand, if teaching is done exclusively in students’ *preferred* modes, the students may not develop the mental dexterity they need to succeed in both educational and professional endeavors. This certainly has implications for e-learning design and emphasizes that a wide variety of electronic and mediated instructional modes both satisfy and challenge individual learners.

Since most people are visual learners, many e-learning programs are ideally suited, especially if they incorporate a wide variety of visual elements rather than simply text-based pages. However, since everyone learns more when the information to be learned is presented both visually and verbally, it is essential that successful e-learning programs include the verbal (audio) element. The audio element can be delivered in a variety of ways in an e-learning environment, whether by computer in a strictly online delivery mode and/or by multiple means in the face-to-face part of a blended learning model. One strength of using audio to present and help explain complicated concepts is that “the speaking tone of writing helps auditory learners get more from the written elements while taking nothing away from visual or holistic learners” (Dubin, in *Online Learning e-News* 2002).

Some visual learners prefer to read information rather than have it presented in other visual, more graphic forms. Therefore, some interface designers suggest that training websites are presented with a “text only”
option for those who do not want to spend the time waiting for lengthy graphic downloads. After they have finished reading, they can download graphics to supplement what they’ve already processed.

For active and concrete learners, trying online learning is an interesting new adventure. For these learners, the facilitator can remain more in the background and let the learners work on their own. In a blended learning situation, discovery learning activities work well for this group. Reflective and abstract learners may need more time to accept e-learning models and will need time to review their options and all the issues that are presented within the learning package. They will often look toward the facilitator as an expert who is accessible when they are ready with questions and feedback.

Intuitive learners don’t like any course that involves a lot of memorization and routine activities, so it’s essential to provide a variety of ways for them to discover learning. The more innovative the system, the better for intuitive learners, although the information itself must be presented logically. For sequential learners, make the logical flow of individual activities and topics clear, but also be sure to point out connections between current activities and topics and the big picture – the remainder of the current e-learning course as well as how it fits into the learners’ programs, career goals, and everyday experiences – for the global learner.

Addressing Multiple Intelligences

Today’s technology can be used to facilitate learning in each of the intelligence areas. Gardner’s Multiple Intelligences (MI) Theory provides a helpful theoretical foundation for tapping into the various abilities of e-learners. Online, self-paced learning provides valuable content in a multi-dimensional way. A learner can log onto a networked computer (Bodily-Kinesthetic Intelligence) and access information any time, any where, and in the amount of time that he/she has available, thus meeting the critical needs of the learner (Personal Intelligence). Through the World Wide Web, a learner has the opportunity to retrieve material that is generally up-to-date and presented in an instructive manner (Logical-Mathematical and Linguistic Intelligences). In addition to the textual information provided, a learner can view graphics, charts, and figures to get a more in depth understanding of the information being studied (Spatial Intelligence). In some cases, a learner can even listen to appropriate background music as he/she reads text and/or can listen to an audio version of it (Musical Intelligence). Learners can sometimes click on unfamiliar vocabulary items to get not only a definition, but also to hear the correct pronunciation, including stress and intonation. E-learning also includes the use of audio, video, and digital cameras to record observations in the natural world (Naturalist Intelligence). With all of the visual and audio information a learner gathers, he/she can also participate in some of the interactive tools, for example, chat rooms, bulletin boards, etc. These tools are a popular component of e-learning today because learners can probe for further information and have their questions addressed (Existentialist Intelligence). Electronic learning has the ability to accommodate all of Gardner’s intelligences, thereby facilitating the teaching-learning process and helping learners succeed.

Implications

Is it really possible to create a learning program that will address all the needs of all learners? It is essential that learning styles be considered during the design phase of the program. In an ideal situation, a flexible structure can be provided. This kind of structure gives students a choice of which activities to complete or at least allows them to sequence activities to fit their preferences. It is essential to use a wide variety of media and methods to accommodate a variety of learning styles (Fastrak 1999). Felder (1984) summarizes that “A learning style model is useful if balancing instruction on each of the model dimensions meets the learning needs of essentially all students in a class.”

All e-learning programs should help learners build their skills in both their preferred and less preferred modes of learning. The goal is to make sure that the individual learning needs of each student are met at least part of the time. This is referred to as “teaching around the cycle” (Felder 1996).
**Implications Favor Blended Learning**

There is now solid evidence that an entire pedagogical program needs to address the multiple learning styles that are present in any group of learners, and a blended learning program usually does this more effectively than using e-learning alone. “The question is not if we should blend, rather the question is what are the ingredients” (Rosenberg 2001). He stresses that if the program designer does not consider all the essential elements during the design process, the resulting mix simply doesn’t work. That emphasizes the need to consider all learner variables along with all other elements when designing any curriculum.

Voci, SkillSoft’s Director of Corporate e-learning Strategies, summarized, “The effect of these combined online learning experiences with stand-up instruction was potent. Participants praised... the sense of heightened teamwork and camaraderie. The blended learning approach helped create a shared understanding of concepts important to the learning culture and provided opportunities to reinforce them in a live classroom setting. The approach respects learner differences in style, yet provides the much-needed social interaction that people seek and enjoy.” (Barbian 2003).

An increasing number of educational institutions and corporate training programs are discovering that a blended learning model is superior to the traditional e-learning model. For example, Ford Motor Company’s engineering department used a blended learning model to deliver training successfully to 20,000 employees (Sullivan 2002). Procter & Gamble converted from a primarily traditional model to a blended learning approach in 1999. Since they have a potential trainee population of 100,000, their decisions are crucial. P&G found the resulting program had immediate ROI (Return on Investment) benefits. In addition, their learning managers and trainers have choices they’ve never had before. This makes the course offerings for the trainees rich and varied, which should increase the user acceptance of mandated training programs (Barbian 2003).

NIIT categorizes blended learning into three models:

- **skill-driven learning**, combining self-paced with facilitator support to develop specific knowledge and skills
- **attitude-driven learning**, mixing various events and delivery media to develop specific behaviors
- **competency-driven learning**, blending performance support tools with knowledge management resources and mentoring to develop workplace competencies (Valiathan 2002)

The greater the variety of media, course offerings, and e-learning models, the more multiple intelligences and various learning styles get addressed. As a result, an improvement in the learning experience will inevitably create an improvement in target performance.

One example of how learning styles are successfully applied to the design of an e-learning product occurred at the U.S. Military Academy. Professors Carver and Howard developed a hypermedia course in information systems, delivered via the Web. They based their course content on the Felder-Silverman model. Each of the course objectives and presentations of lesson material are directed toward a different learning style. For example, verbal and sequential learners can go through a Harvard Graphics slide show to learn how to install a hard drive. Visual and global learners can learn to do the same thing by viewing embedded pictures, animations, and movies.

**Implications for Corporate Culture**

In today’s world of ever-increasing choices of educational and training programs, learners must perceive that their educational program is going to be beneficial. Innovation theory suggests that getting a person to adopt a particular theory or choose a particular model depends on “the degree to which an innovation is perceived as being better than the idea it supersedes” (Harrington 1999). The organization plays a key role in making this happen. The entire corporate culture – and certainly the training culture within the
corporation – needs to implement methods to motivate, encourage, and facilitate the learners as they move toward a new e-learning model.

Often, a solution to overcoming the psychological barrier towards pure e-learning is the blended learning approach where online and technology-based training are paired with more traditional face-to-face instruction in a classroom environment. Since blended learning is often perceived to be moving in more familiar, more graduate steps, it addresses the preferred modalities and learning styles of a number of learners.

Barbian (2003) notes that “Blended learning is more than a transition from traditional learning methods to technical solutions. It’s a cultural shift and an organizational blend that continues to find its legs among the educators, implementers, and employees who are learning as they go.” Since any kind of elearning, whether traditional or blended, requires a great deal of continuing organizational change, the organization itself should be prepared to help learners through the transition process (Sullivan 2002). This is an additional way in which individual learner needs and preferences are addressed by the educational program within the organization.

**Implications for Assessment**

According to Kirkpatrick (1979), learning is defined as the principles, facts, and techniques that are understood and absorbed by trainees. When trainers measure learning, they try to find out how much the skills, knowledge, or attitudes of their trainees have changed. Clearly, we get the greatest amount of change when we are able to deliver educational products to trainees in their preferred mode of learning. Those involved in evaluation must continue to examine their assessment strategies. In addition to Kirkpatrick’s classic four-level model and Phillips’s additional fifth level (ROI), a number of alternate evaluation measures are emerging (Strother 2002). While these measures take a variety of tacks, each should be analyzed for its inclusion of learner variables, such as learning styles and multiple intelligences.

**Conclusion**

The authors of this paper believe that a more personalized approach to e-learning is the best way to address all learner variables. The goal here is to integrate e-learning with the traditional classroom—a “blended e-learning” way of instruction. The marriage of self-paced online learning with the social interaction that one receives in the traditional, instructor-led classroom enhances the effectiveness of learning and satisfies all intelligences. A blended learning environment of a virtual classroom of self-paced study incorporated with the engagement a student receives in a more traditional classroom setting is the key to provide the most effective learning environment.

Human beings can learn virtually any topic if they can do it through their own styles and personal strengths. They are most successful when the instructional methods match individual learning preferences. When these individual elements are taken into account when designing any kind of e-learning, whether traditional or blended, the learner enjoys the learning experience more, can experience a sense of success without being as frustrated or stressed, and stays more motivated.

There is no doubt that whatever pedagogical strategies are implemented in whatever modality—strict online learning or some variation of a blended learning model—all learner variables need to be addressed. No matter what the pedagogical model, it is essential to find out what elements provide barriers to learning for some students and what elements, in contrast, make learning more accessible and enjoyable for other students. The conclusion, therefore, is that an entire pedagogical program needs to address the multiple individual variables that are present in any group to provide the most powerful learning experience possible for all learners.
References


