

LEARNING STYLES AND GENERATIONAL DIFFERENCES: DO THEY MATTER?

Evaluating the Impact and Variability of Learning/Cognitive Styles and Generational Differences

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INTRODUCTION

The recurring debate concerning the efficacy of learning styles and their impact on learning outcomes has been reflected in the literature for the past 60 years. However, the research has not overwhelmingly supported the premise that learning styles are useful in determining the most appropriate instructional media or teaching strategy to deliver content. To that end, the categorical labeling of generational differences (digital natives vis-à-vis digital immigrants) and their perceived effect on how they learn may not be an appropriate variability to consider in media selection. Since the goal of designing instruction is to attain desired learning outcomes and ultimately improve human performance, the question an instructional designer must address is: Should learning styles and generational differences be considered as variables when designing instruction? Consequently, this paper will explore the applicability of learning styles and generational differences applicable to the instructional design process.

RESEARCH ON LEARNING STYLES

A recent article in the *Chronicle of Higher Education* entitled *Matching Teaching Style to Learning Style May Not Help Students* (2009) addressed the aforementioned question. The article summarized a comprehensive meta-analysis on learning styles that revealed that there is not a compelling argument to support the predictive validity of measures of learning styles on learning outcomes (Pashler, McDaniel, Rohrer, & Bjork, 2008). A decade earlier, a similar conclusion was reached when Stahl (1999) found that research failed to demonstrate that assessing children's learning styles and matching them to instructional methods had any effect on their learning.

Nevertheless, there is a strong intuitive appeal to the notion that individual preferences and styles of learning must play a significant part in learning outcomes. Indeed, those who teach and those who learn notice the variability in the speed and manner with which their students acquire new information and ideas, and it seems reasonable that planning instruction to adapt to individual learning should yield improved learner outcomes (Coffield, Moseley, Hall, & Ecclestone, 2004).

Reliability and Validity

Whereas the discussion on learning styles focuses on individual differences in learning, it *should* focus on the whether learning styles can be used to *predict* performance. Despite the commonly held belief that learning styles—most notably the visual, aural, and kinesthetic (VAK) models (Sharp, Byrne, & Bowker, 2008)—affect performance, there is a debate about whether learning styles even exist, and that perhaps the only current evidence of their existence are the tests used to identify

them. Any discussion concerning the research on learning styles, therefore, must address the reliability and validity of the instruments used to identify learning styles.

Simply stated, *validity* refers to whether a test appears to be measuring what it purports to measure, and *reliability* questions whether a test will consistently produce the same or similar results over repeated measures. That said, if the instruments used to identify learning styles do not meet the criteria for robust reliability and validity, then the results of those tests could not be used with confidence to establish relationships between variables. This conclusion was similarly reiterated by Cassidy (2004) where the twenty-four most common instruments used to identify learning or cognitive styles were analyzed. Cassidy concluded there were many overlaps and similarities between the different instruments resulting in a lack of explicit information needed to draw any conclusions about the effects of such styles on learning—the absence of reliability and validity data notwithstanding.

Myron Dembo, an esteemed educational psychologist and Emeritus Professor of Educational Psychology, stated "any usefulness that might be derived from applying learning styles must be substantiated by valid and reliable instruments" (Dembo & Howard, 2007, p. 103). He concludes, furthermore, that "there is no benefit to matching instruction to preferred learning style, and there is no evidence that understanding one's learning style improves learning and its related outcomes" (p.107).

Although the visual, aural, and kinesthetic (VAK) learning styles are unquestionably the most familiar, research has identified *over 71 different types of learning styles* which have been categorized into 13 models and families (Learning Styles and Pedagogy in Post-16 Learning: A Systematic and Critical Review, 2004). Due to the low validity and reliability scores of the instruments used to identify specific learning styles, however, there are serious doubts about their psychometric properties (Coffield, Moseley, Hall, & Ecclestone, 2004; Liu, Ginther, & Ginther, 1999; Penger, Tekavčič, & Dimovski, 2008). This lack of reliability and validity of the instruments used to identify learning styles has been supported by Curry (1990). He claims that there are three basic problems associated with the use of instruments used to identify learning styles: (1) confusion in definitions of learning styles, (2) weaknesses in reliability and validity, and (3) the identification of relevant characteristics in instructional settings, or aptitude-treatment interactions.

Curry's conclusion has also been echoed in a comprehensive literature review conducted by Professor Thomas Reeves, of the University of Georgia, entitled *Do Generational Differences Matter in Instructional Design?* (Reeves, 2006). In his literature review, Reeves stated that the weaknesses found in learning styles research throws grave doubt on the validity and utility of employing learning styles as a basis for accommodating students of any generation (Coffield, et al., 2004).

Learning Styles vis-à-vis Learning Modalities

There is substantial confusion between the terms *learning modalities* and *learning styles*; these are often used interchangeably. Learning or cognitive styles are *habitual ways of processing information to memory*. They are the *ways* one senses, thinks, solves problems, and remembers information. In contrast, *learning modalities*, refer to one's senses: *visual, auditory, and tactile (including kinesthetic)*. Neuroscience, however, has revealed that "ninety percent of learning is visual with eighty-five percent of the brain wired for visual processing" (Lucas, 2004, pp 8, as cited in Clemons, 2005); one's *primary* learning modality, therefore, is *visual*.

The most significant variable in terms of one's retention of learning is one's attachment of meaning to what is learned. Retention is generally independent of the modality used to acquire whatever is learned (Willingham, 2005). Nevertheless, it should be noted that retention can be reinforced to some degree when learning occurs through a combination of text and images rather than through text alone (Mayer & Moreno, 2003). Furthermore, adding images to verbal (textual or auditory) learning can result in significant gains in basic and higher-order learning (Multimodal Learning Through Media..., 2008).

Unquestionably, some individuals excel over others at aural, visual, or kinesthetic tasks. But our brain does not work in a way that differentiates types of information received through the senses. The brain seeks for meaning, pattern interconnectedness, relevance, and usefulness of applications (Greenleaf, 2003). It does this by storing information into memory *collectively*, not *separately*. With respect to working memory, verbal/text memory and visual/spatial memory work together, without interference, into a framework (or *schema*) of understanding. Consequently, the development of schemata requires students to learn topics in ways that are relevant and meaningful to them, regardless of the modality (Multimodal Learning Through Media: What the Research Says, 2008). This is supported by Clark and Mayer (2008) where they state, according to the cognitive theory of multimedia learning, that "all people have separate channels for processing verbal and pictorial material", and "learners actively attempt to build pictorial and verbal models from the presented material and build connections between them" (p. 121).

Differentiation Between Learning Styles and Cognitive Styles

Research has revealed a wide disparity in the definition of *learning styles* and their relationship to *cognitive styles*. The term *cognitive style* has been introduced and reintroduced into psychological literature since the writings of the German psychologists at the turn of the century. The term has been used most recently to denote consistencies in individual modes of functioning in a variety of behavioral situa-

tions. Specifically, cognitive style refers to the preferred way one processes information (Kagan, Moss, & Sigel, 1963). It is viewed as a bipolar dimension representing one's typical or *habitual* mode of problem-solving, thinking, perceiving, and remembering; it is considered stable over time, and is related to theoretical or academic research (Cognitive/Learning Styles, n.d.).

Although there are numerous definitions of *learning styles*, the more common ones see these styles as being "multidimensional." They are generally not "either-or" extremes. They are characterized by how information is preferentially perceived (sensory or intuitive), organized (inductive or deductive), processed (active or reflective), and received (visual, aural, or kinesthetic). In other words, a learning style or modality describes how information enters the brain: visually, aurally, or tactically, whereas cognitive style refers to how the information is processed once the information gets to the brain. Perhaps the most cited definition is by Keefe (1979) who defines "learning styles [as] the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment" (as cited in Merrill, 2000).

GENERATIONAL DIFFERENCES

In a similar way that the concept of "learning styles" has led many instructional designers to select media based largely on a misperceived relationship with learning outcomes, the more recent focus on *The Digital Generation*, is also proving itself to be misleading. In a recent issue of Chronicle of Higher Education (CHE), in its *The Millennial Muddle* article, Palmer Muntz, director of admissions at Lincoln Christian University is said to have asserted that "To accept generational thinking, one must find a way to swallow two large assumptions. That tens of millions of people, born over about 20 years, are fundamentally different from people of other age groups—and that those tens of millions of people are similar to each other in meaningful ways" (as cited in Hoover, 2009). The same article reports that the University of California at Los Angeles' Cooperative Institutional Research Program, which has conducted annual surveys since 1966, shows changes are small and gradual—and differences are not significant between generations, but only over multiple generations. Some disturbing trends that were over multiple generations were noted, however: an increasing sense of entitlement, decreasing literacy, and general factual knowledge.

In its September 2008 issue, The CHE published an article entitled *Generational Myth*. Its author, Professor Siva Vaidhyanathan (2008), claimed that there is no "Digital Generation." Today's young people—including college students—are just more complicated than any analysis of imaginary generations can ever reveal". The article

went on to say those focusing on those “born digital” ignore the “vast range of skills, knowledge, and experience of many segments of society, and ignores the needs of the those who are not socially or financially privileged.” Professor Vaidhyathan claims that familiarity with, understanding of, and dexterity with technology varies greatly within the 18-23 age group. While a few have amazing skills, a large number can’t deal with computers, consequent, one must avoid *overestimating the digital skills of young people in general*. Thinking in generations is too simplistic. The article goes on to state that “Once we assume that all young people love certain forms of interaction and hate others, we forge policies and design systems and devices that match those predispositions. By doing so, we either pander to some marketing cliché or force otherwise diverse group of potential users into a one size-fits-all system might not meet their needs.”

In another CHE article, Bauerlein (2008) claims that “The greatest disappointment of our time is that huge investments made in technology (beginning with Telecommunications Act of 1996) in public schools have met with negative results. In fact, he reports, reading proficiency dropped from 40% to 35% from 1992 to 2005”. Addressing the use of the new popular technologies and applications, Bauerlein claims that leisure-time technical skills did not translate to educational and training use of technology. Intellectual habits such as deep reflection decrease with increase time spent on browsing, blogging, Instant Messaging, Twittering, and Facebooking. *Fast scanning does not translate into academic reading*. So it appears that the learner’s familiarity with technology does not indicate how well he or she will perform in a distance learning environment. Our main point for instructional designers is that they should not be distracted by whether their learners are part of a so-called Digital Generation, but instead should focus on designing instruction based on sound cognitive learning strategies.

In a comprehensive literature review conducted by Professor Thomas Reeves of the University of Georgia entitled *Do Generational Differences Matter in Instructional Design?* (Reeves, 2006), addressed whether generational difference is a variable important enough to be considered during the design of instruction or the use of different educational technologies. Reeves concluded the weight of the evidence is negative. Although generational differences are evident in the workplace, *they are not salient enough to warrant the specification of different instructional designs or the use of different learning technologies*. Reeves also stated that research on generational differences suffers from many of the same weaknesses found in learning styles research, and that throws grave doubt on the validity and utility of employing learning styles as a basis for accommodating students of any generation. In his conclusion, Reeves stated in the light of the weak nature of generational differences as a measurable construct, that any quasi-experimental studies aimed at determining the effectiveness of different instructional designs or educational technologies across gen-

erations are not needed. That said, Hoove (2009) suggests that instead of worrying about whether Boomers, GenXers or Millennials will learn more from direct instruction or virtual reality games, instructional designers and educational technology researchers, working closely with practitioners and subject matter experts, should begin by identifying the needs of any given set of learners; design the best possible prototype learning environments *in situ*; and then conduct iterative cycles of formative evaluation and refinement to optimize the solution and reveal robust design principles.

A large group of university researchers has launched a campaign to refute claims that generational differences in the workplace are huge and pervasive. For example, researchers from the University of Kentucky and Kutztown University argue that “much prior generational research is based on samples limited to college-bound adolescents, college students, or white-collar workers. As such, claims of generational differences have been limited by sample selection and other factors, leaving broad judgments about entire generations open to skepticism and critics”. Furthermore, researchers at the University of Western Ontario, Michigan State University, and the University of California at Davis, argue against major generational differences in the workplace, citing sample limitations, failure to replicate findings in a national sample, and issues with the measures and instruments in studies that found broad generational differences. Put simply, the generational stereotypes perpetuated in pop-culture media, misguided organizational training, and lunchroom conversations have very little basis in fact.

CONCLUSION

The human dynamics of learning are a complex, multi-dimensional process, with cognitive science revealing that learners differ in their abilities with different modalities. Teaching to a learner’s best modality, however, does not affect his or her educational achievement. What does matter is whether the learner is taught in the *content’s* best modality (Willingham, 2005); learning is facilitated when content drives the choice of modality.

If a focus on learning styles does not work, what does work? Through the systematic design of instruction, integrating cognitive learning strategies that help learners link new information to prior knowledge should be a fundamental consideration. Myron Dembo, Emeritus Professor of Educational Psychology, may have summed it up best when he stated that educational research supports the teaching of learning strategies that contain scaffolding features and tailored instruction for different levels of prior knowledge (Dembo & Howard, 2007). This focus on instructional strategies is also supported by David M. Merrill (2000), who concludes that “learning style is secondary in selecting the fundamental components of instructional strategy appropriate for and consistent with a given learning goal” (p. 4).

On a final note, the research on how we learn has generally ignored the our agility in adapting to different learning environments. We have an intrinsic desire and ability to learn, although some of us are more adept than others. Learning style research, regrettably, has exhibited a tendency to “profile” learners into specific categories, and consequently has understated our individual potential to employ multiple learning “preferences” in our endeavor to learn. Consequently, we, as educators, must never underestimate the learning variable that “trumps” all other variables ...*the will to learn.*

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