

CRITICAL THINKING ABOUT LEARNING STYLES: CHALLENGING LITERATURE REVIEWS

Eileen N. Whelan Ariza*, Philomena Susan Marinaccio** and Sandra J. Hancock***

Abstract

As educators, we encourage students to think critically and to question what we read in research findings. Should we not take the same perspective when reviewing literature for our own purposes? For example, learning styles is a ubiquitous concept that is bandied about by everyone from educators to legislators, but a myriad of controversy and criticism surrounds the operationalization of learning styles and its application to effective teaching and learning. This paper discusses a variety of issues concerning the concept of learning styles and includes diverse conceptualizations; questions concerning validity and reliability of instruments used to identify learning styles; construction of instructional designs; and reports the charges of bias that researchers make against each other's work. The authors suggest that these topics and issues be used to form guiding questions when reviewing learning styles literature.

*Assoc. Professor Eileen N. Whelan Ariza received a Master of Arts in Teaching English to Speakers of Other Languages/Spanish as Second Language/with a Bilingual/Multicultural Endorsement from the School for International Training in Brattleboro, Vermont and an Ed.D. in Multilingual/Multicultural Education from the University of Massachusetts, Amherst. She is an Associate Professor in the Department of Teacher Education at Florida Atlantic University. Before her tenure at FAU, she was a Teaching Fellow at Harvard University's English Language Institute, taught EFL in several countries, and won several awards for excellence in teaching throughout her career. She has also authored and co-authored many articles and books about language teaching and learning. She is the current editor of Sunshine State TESOL Journal and enjoys mentoring new writers.

**Dr. Marinaccio is a specialist in teaching preservice teachers to teach reading at Florida Atlantic University. She is responsible for a major grant that offers opportunities for young readers to be tutored by preservice teachers.

***Sandra J. Hancock, M.Ed, is a doctoral candidate and adjunct professor in Instruction and Curriculum at the University of Florida, Gainesville. Her specializations are literacy and English to Speakers of Other Languages.

Academic buzzwords are bandied about by legislators who have absolutely no pedagogical background regarding the education of students, yet statutes are passed that dictate the academic and professional lives of educators and students alike. Take the example of the 2001 Florida Statute 232.245(2)(b), (USA) which pertains to students who fall below specified levels of performance in reading, writing, science, and mathematics. The law states that poorly performing students must receive remediation or be retained “within an intensive program that is different from the previous year’s program that takes into account the student’s learning style” [italics added]. After contacting Florida’s Commissioner of Education to obtain information describing how districts are fulfilling this learning style legislation, and to learn about their research basis, a Department of Education (DOE) staff member explained that legislation such as this is established without regard to actual learning style research. Not surprisingly, it is common for lawmakers to enact new legislation with no knowledge of best practices or the appropriate theoretical research bases. Reference to the “learning styles” requirement might have been included because of intuitive appeal or the common sense approach; presumably, higher achievement will result when individual learning styles are addressed. The DOE does not actually monitor each district, since individual districts are responsible for establishing policy for statute implementation according to their own circumstances, preferences, and needs. Consequently, the DOE does not know what each district is doing.

Upon further investigation of literature and research on learning styles, we discovered a myriad of controversy and criticism that surround the operationalization of learning styles and its application to effective teaching and learning. This realization led us to conclude that we as educators must critically examine all aspects of the literature and research findings, whether or not they support our ideas of what is true, or right. As good teachers, we strive to encourage our students to develop critical literacy skills that look beyond the surface and to examine issues from multiple perspectives. As good teachers, should we not hold ourselves to the same beliefs, that is, take a more critical look at other points of view, especially if they are not our own?

In this paper, we seek to present a variety of issues concerning learning styles, including diverse conceptualizations, questions of validity and reliability of instruments, identification of appropriate instructional designs, researchers charges of bias against one another, and suggest that these topics be used to form guiding questions when reviewing learning styles literature.

To better understand the topic, the first section of this paper includes a brief history of learning styles in education.

A Historical View of Learning Styles

Aligned with the trend of individuals “finding” themselves, the 1960s and 1970s gave way to an interest in individual differences. This trend was especially evident in special education in which the perceptual-motor, visual, and auditory processes of students were tested and students were classified by modality (Snider, 1992).

Special educators focused on remediating identified cognitive deficits of learning disabled students and also attempted to match instruction to modality strengths (Jongsma, 1990). Reviews of related disorder research by Arter and Jenkins in 1978 and Tarver and Dawson in 1979 (cited in Jongsma) resulted in questioning the effectiveness of remediating weaknesses as well as teaching to modality strengths of LD populations.

During the past three decades, several second language (L2) acquisition researchers have been interested in the relationship of learning styles and L2 learning. Early on, researchers attempted to characterize the good language learner. Other studies concerned the relationship of style to aptitude, identification of learner preferences of LCD students, and modality-based instruction. Ellis (1994) concluded, after a review of these studies, that “at the moment, there are few general conclusions that can be drawn from the research on learning style” (p.508).

Researchers have also examined cultural differences in learning styles. Oxford and Anderson (1995) present related research beginning in the early 1970s, discuss findings, and present implications for instruction. These studies indicate that ethnic group learning style tendencies exist, but recognize that individual variation occurs within groups. Oxford and Anderson argue that it is crucial for educators to understand and consider the learning styles of LCD students when planning for and providing instruction to ensure equity and guarantee success. Coincidentally, this belief corresponds with philosophy espoused by professionals in the areas of multicultural education and L2 teaching and learning.

In regular education, a renewed interest in learning styles in the area of reading became evident in the 1980s, with an emphasis on teaching to student strengths and making accommodations for environmental and other preferences, rather than the prior focus of remediating deficits (Jongsma, 1990). In 1978, Marie Carbo, a former student of Rita Dunn, who is co-creator of the popular Dunn and Dunn *Learning Style Inventory* (LSI), developed the *Reading Styles Inventory* (RSI) based on the LSI that seeks specifically to identify reading styles in order to guide instruction.

Both Carbo and Dunn have frequently

appeared in the literature through the years advocating instruction based on student-indicated preferences, and substantiate their claims of the effectiveness of this approach and the validity and reliability of their instruments with several studies. However, while they and other proponents have attempted to substantiate their claims and clarify their models (Carbo, 1988, 1992; Dunn, 1990; Dunn, Griggs, Olson, Beasley, and Gorman, 1995), others have called into question the operationalization of learning styles, the effectiveness of matching instruction to styles, and the reliability and validity of learning style measures and research with the ever-present ongoing conflict (Curry, 1990; Jongsma, 1990; Kavale, 1990; Kavale & Forness, 1987; Kavale, Hishoren, & Forness, 1998; Snider, 1990, 1992; Stahl, 1988, 1999). After examining these articles, it becomes apparent that the battle is not just about learning styles for some; rather, it is also about the beliefs of some opponents that a strong phonics emphasis is a necessity for children to become successful readers. This belief is in major conflict with the opinions of learning style theorists who advocate different methods for different styles.

In the next section, we discuss issues that are commonly identified with learning style.

Learning Style Issues

Curry (1990) describes three problems with the operationalization of learning style: 1) diverse definitions and models; 2) questionable reliability and validity of measures, and 3) identification of alternative and effective educational adaptations that address individual learner characteristics and promote achievement. Another concern deals with possible biases on both sides of the learning style issue that can be fodder for criticism and attack. We recommend these issues as benchmarks to guide educators in conducting a critical analysis of what we read about learning style.

Learning Style: What is It?

The definition of learning style depends on the literature being examined. Definitions may be simplistic, such as “how students learn and how they like to learn” (Jenkins, 1991, p.4). Riding and Cheema (1991) state that learning style theorists have not always considered the conceptualizations of others when forming their own platforms; therefore, what one theorist denotes as a learning style does not necessarily correspond to another’s conception. This lack of congruence causes confusion when trying to develop a clear understanding of the learning style construct. Additionally, this disparity creates difficulty when attempting to compare and synthesize findings of studies based on different conceptualizations.

The most common notion of learning style in education deals with modality preference, specifically, whether one takes in and processes information primarily from visual, auditory, kinesthetic, or tactual means. In contrast, some individuals consider preferences about environmental factors, such as the predilection to read while music is playing; aptitudes toward a topic, such as Gardner’s multiple intelligences; and/or cognitive styles, such as spontaneity in completing tasks, among others. For example, Oxford and Anderson (1995) posit that learning styles consist of six interrelated aspects affected by cultural background: cognitive, executive, affective, social, physiological and behavioral conditions:

(1) Cognitive elements include preferred or habitual patterns of mental functioning (often called ‘cognitive styles’).

(2) The executive aspect deals with the degree to which the person seeks order, organization and closure and manages his or her own learning processes.

(3) The affective aspect reflects clusters of attitudes, beliefs and values that influence what an individual will pay most attention to in a learning situation.

(4) The social contribution concerns the preferred extent of involvement with other people while learning.

(5) The physiological element involves at least partly anatomically-based sensory and perceptual tendencies of the person.

(6) From the standpoint of behavior, learning style relates to a tendency to actively seek situations compatible with one’s own learning preferences. (p.203)

Oxford and Anderson report that each person has at least 20 style dimensions, including modality preference, extroversion/introversion, field sensitivity/field independence, and impulsivity/reflectivity. However, Riding and Cheema (1991) believe that related multi-dimensions can be subsumed under other categories. They propose a two dimension bi-polar model exclusively for the cognitive style aspect after conducting an analysis and finding significant relationships between what others view as separate. For example, impulsivity/reflectivity and field sensitivity/field independence were found to relate to whether one processes information from whole to parts or parts to whole, leading Riding and Cheema to incorporate them into their wholist-analytic dimension.

Another issue in the conceptualization of learning styles is the ongoing nature versus nurture debate. Some individuals consider learning styles innate (style as a structural view), while others believe these styles are shaped by the environment and molded according to individual cultures (style as process view). Still others regard learning styles as a combination of innate abilities that are finally determined by the environment (Riding and Cheema, 1991). The style as structure view holds that learning styles are static over time, while the

style as process view holds that learning styles are dynamic. Some see learning styles as both a structure and a process, understanding them to be relatively stable, yet in flux as events occur.

The structure versus process distinction has implications for instructional settings in that they influence how learning styles should be addressed. If a student's learning style is viewed as unchanging, then educators are likely to see the need to adapt materials to match the style in order for learning to occur. A theoretical postulate of the Dunn and Dunn Learning Style Model structure view presented by Riding and Cheema: states that "learning style is a biological and developmental set of personal characteristics (Thies, 1979) that makes identical instructional environments, methods, and resources effective for some learners and ineffective for others" (Dunn et al., 1995, p.354). Conversely, if learning styles are viewed as changing, instruction will be geared to build upon preferences and strengthen weaknesses while implementing teaching strategies to compensate. Naturally, much depends on the identification of learning styles. To correctly identify learning styles, instruments must actually measure the construct of learning style in a consistent manner. This is the next area of concern that will be discussed.

Are Learning Style Measures Valid and Reliable?

To ensure appropriate decisions are made, learning style instruments must be both valid and reliable. Validity is the degree in which an instrument measures the construct of interest without contamination from other constructs. Curry (1990) posits that learning style theorists have not followed the "iterative pattern of hypothesis-investigation-modification, but rather rushed into print and marketing" (p.51), which results in weakened claims of validity when test scores are interpreted. In addition, she argues that

distinctions have not been identified between related concepts, which leaves the test user unsure of the amount of overlap from one conceptualization of learning style to another.

Another question about validity concerns the use of inventories with children, especially young children. Do they have a great enough awareness of their learning styles to accurately indicate their preferences? Are they interpreting items as the instrument designer intended? Do weaknesses in reading and other skills cause their responses to be more related to ability level than preferences? For example, children are asked to respond to an item on the *Reading Style Inventory* about how often they mix up letters when writing; they must answer "sometimes" or "almost never." Kavale (1999) argues that responses to items such as these are more indicative of ability—poor writers are more likely to respond "sometimes." A broader, but related, question asks how the letters are combined or mixed when writing relates to reading styles. For instruments to be truly valid, proof must exist that an instrument accurately gauges what it is intended to measure.

Reliability is the extent to which a score is free from random error; succinctly, an individual will score about the same from one test administration to another and between items. Perfect reliability is indicated by a coefficient of 1.0. Cohen (1988) states that non-cognitive measures should have reliabilities of at least .8 for high stakes decisions and of at least .7 for low stakes decisions. Reported reliabilities of learning style measures tend to be low to moderate (.6 to .7), with many publishers reporting ranges of indicators instead of a single reliability indicator. Kavale (1999) and Snider (1990) argue that reliability scores at this level do not meet the criteria that are essential in making important educational decisions. Further, Kavale posits that reported reliability is often inflated because students

generally respond in the same way to multiple items.

Unfortunately, reliability coefficients of instruments are seldom, if at all, reported in articles and studies about learning styles reported in popular literature. Neither are these reports published on the developers' website. After sending an electronic request for figures for reliability coefficients for two instruments that frequently appear in the literature (the LSI and related RSI), we were informed that we needed to purchase the technical manual to receive an answer to our question. Critical readers will question why this information is not readily available without purchasing the product.

Typically, instruments used to identify learning styles are implemented for particular instructional purposes. The next section discusses educational adaptations.

Which Educational Adaptations Are Appropriate and Effective?

Learning style is considered by some as a type of aptitude-treatment interaction, meaning that an individual characteristic (learning style) can be matched to a specific instructional method (treatment) to produce significant improvements in achievement. But what are the educational adaptations that will effectively interact with learning styles and produce higher levels of achievement? Curry (1990) identifies this element as a third issue that needs to be considered. She indicates that although some learning style theorists have conducted small studies that indicate the effectiveness of certain methodologies as related to their own conceptualizations, these studies have not always allowed for disconfirming evidence in their design. Intelligence may even play a role in treatment effect.

How can we be sure that results stem from matching styles to treatment? For example, Braio, Beasley, Dunn, Quinn, and Buchanan (1997) report that significant gains in reading achievement were revealed for both special education and general education students with LS [learning style] preferences when they were taught incrementally using learning-style strategies. For students with no LS preferences, reading achievement varied greatly across the course of the experiment. (Abstract)

Environmental adaptations were made for those 4th-6th graders indicating preferences, such as being allowed to listen to music or sit on a beanbag chair. Those showing physiological (modality) preferences were provided with activities that corresponded to their needs, such as hands-on tasks for kinesthetic learners. Those seven special education students who did not verbalize preferences were not offered "special treatment," except during one of the five phases when a tactual/kinesthetic activity was used for the entire class. Instead, they were exposed to traditional classroom methods while their counterparts received unspecified individualized accommodations. One can only imagine how the "no-preference" children felt completing traditional worksheets on hard chairs when they saw their classmates sitting on beanbags, munching on snacks, and working collaboratively to complete more interesting activities. Could this factor have affected their performance? Did reading ability play a role? Were traditional methods the norm for the classroom before the treatments were introduced? Although significant findings are reported, the critical reader must read between the lines and consider what is left unsaid when questioning methodological issues. It is imperative to search for other reasons that may explain conclusions—even when findings feel comfortable because they support personal beliefs.

Learning style theorists hold diverse views about the role learning styles plays in determining instructional decisions. Curry (1990) shares three differing notions that are found in the literature, which apparently relate to the structure-process distinction reported by Riding and Cheema (1991). Witkin (1977) and colleagues posit that style-based instruction may provide continued motivation and facilitate the initial acquisition of skills. Conversely, both Kirby (1988) and Pask (1988) argue that learning styles should not be identified and instruction should be inconsistent in addressing particular styles, since they view learners as being flexible and can adjust to different types of instruction based on cueing systems. Taking a middle ground approach, Snow and Lohman (1984) believe that it is better if a match of learning style with corresponding activity takes place initially when materials are introduced, followed by a mismatch of activity and learning style, which will enable students to develop coping strategies to deal with the diversity they will encounter in the real world.

Views on the correct way to address learning styles in the classroom may reflect biases about particular instructional methods, or one's own conceptualization. This issue will be discussed next.

Is There Evidence of Any Bias?

Being aware of sources of bias, whether related to learning style theorists or to critics, provides the critical reader with useful information when analyzing and evaluating information. The debate among Stahl (1988, 1999), Dunn (1990), Kavale and Forness (1990), Carbo (1992), and Snider (1992), and Kavale et al. (1998) serves as a case in point. In their ongoing arguments, accusations of bias are continuously mentioned. For example, Dunn claims that Kavale and

Forness' conclusions resulting from their meta-analysis of modality-based instruction, which showed little difference between experimental and treatment groups, "appear biased and are based on inappropriate choices [of studies]" (p.352). Kavale and Forness retort that "unlike Dunn, we have no vested interest in modality-based instruction" and state that "Dunn's motivation appears to be more mercenary, given the investment in assessment devices..., intervention techniques..., and a Center for the Study of Learning and Teaching Styles" (p.357).

Kavale et al. (1998), in turn, question the choices Dunn et al. (1995) used in their meta-analysis of studies using the Dunn and Dunn LSI as an instrument to validate the Dunn and Dunn Learning Style Model. This analysis showed considerable gains for those students exposed to style-based instruction. Kavale et al. responded by asking why 97% of the studies they cited were dissertations. They accuse Dunn et al. of making a restricted search using databases that were "both developed at the St. John's University Center for the Study of Learning and Teaching Styles, the home base of the Dunn and Dunn model (p.76).

A final example of the issue of bias is shown in Carbo's response (1992) to publications by Snider (1990) and Stahl (1988), both of whom argue for direct phonics instruction for all beginning readers, regardless of learning styles, which counters Carbo's own position. Carbo states that "the authors of those critiques have been as strongly *biased against* and *unfairly critical of* the research in learning styles, as they have been strongly *biased in favor of* and *completely uncritical of* the research in phonics" (p.19).

We argue that it is crucial to be aware of arguments such as the above, because it provides another lens with which we can critically examine the literature. We can deeply and candidly examine

the literal depiction of research when reading about studies and their conclusions. Relationships between and among learning style theorists and researchers should be investigated and refuting evidence to results and conclusions should be sought. In addition, appropriate supporting evidence should be provided. The next section presents criteria to consider when looking for substantiation of claims.

Does Evidence Used to Substantiate Claims Meet Accepted Criteria?

A review of literature is used to support research conclusions and validate models. An established and accepted scientific criteria exist for evaluating claims, which “teachers should know and apply as they evaluate a particular research study or a body of research evidence” (Jongsma, 1990, p.697). The critical reader should examine whether (1) findings and other supporting evidence are published in refereed journals using peer review; (2) results are replicated by disinterested investigators in different settings; and (3) a consensus has been reached by the related research community that evidence from a critical mass of studies indicate a specific conclusion. As Stahl rightly points out (1988), the burden of proof to provide sufficient evidence is on the researcher.

Conclusion

This paper provides several issues to consider when reviewing the literature about learning style and other constructs. Our intention is to offer guidance in developing a more critical perspective and encourage “reading between the lines,” regardless of personal preference or bias when researching pertinent topics.

References

- Braio, A., Beasley, T.M., Dunn, R., Quinn, P., & Buchanan, K. (1997). “Incremental implementation of learning style strategies among urban low achievers”. *Journal of Educational Research*, 91, 15-25.
- Carbo, M.. (1988). “The Evidence supporting reading styles: A response to Stahl”. *Phi Delta Kappan*, 70, 50-56.
- Carbo, M. (1992). “Giving unequal learners an equal chance: A reply to a biased critique of learning styles”. *Remedial and Special Education*, 13, 19-29.
- Curry, L. (1990). “A critique of the research on learning styles”. *Educational Leadership*, 47, 50-56.
- Dunn, R. (1990). “Bias over substance: A critical analysis of Kavale and Forness’ report on modality-based instruction”. *Exceptional Children*, 56, 352-356.
- Dunn, R., Griggs, S.A., Olson, J., Beasley, M., & Gorman, B. (1995). “A Meta-analytic Validation of the Dunn and Dunn Model of Learning-Style Preferences”. *Journal of Educational Research*, 88, 353-362.
- Ellis, R. (1994). *The Study of Second Language Acquisition*. Oxford: Oxford University Press.
- Jenkins, J.M. (1991). “Learning styles: recognizing individuality”. *Schools in the Middle*, 1,3-6.
- Jongsma, K.S. (1990). “Learning styles [Questions & answers]”. *The Reading Teacher*, 43, 696-697.

- Kavale, K.A. (1990). "Substance over style: A rejoinder to Dunn's animadversions". *Exceptional Children*, 56, 357-363.
- Kavale, K.A. & Forness, S.R. (1987). "Substance over style: Assessing the efficacy of modality testing and teaching". *Exceptional Children*, 54, 228-239.
- Kavale, K.A., Hirshoren, A., & Forness, S.R. (1998). "Meta-analytic validation of the Dunn and Dunn model of learning-style preference: A critique of what was Dunn". *Learning Disabilities Research and Practice*, 13, 75-80.
- Kirby, J. R. (1988). "Style, strategy, and skills in reading". In R.R. Schmeck (Ed.), *Learning Strategies and Learning Styles* (pp.229-274). New York: Plenum Press.
- Oxford, R.L. & Anderson, N.J. (1995). "A crosscultural view of learning styles" [State of the art article]. *Language Teaching*, 28, 201-215.
- Pask, G. (1988). "Learning strategies, teaching styles, and conceptual or learning style". In R.R. Schmeck (Ed.), *Learning Strategies and Learning Styles* (pp.83 - 100). New York: Plenum Press.
- Riding, R. & Cheema, I. (1991). "Cognitive styles—an overview and integration". *Educational Psychology*, 11, 193-215.
- Snider, V.E. (1990). "What we know about learning styles from research in special education." *Educational Leadership*, 47, 53.
- Snider, V.E. (1992). "Learning styles and learning to read: A critique". *Remedial and Special Education*, 13, 6-18.
- Snow, R.E., and Lohman, D. (1984). "Towards a theory of cognitive aptitude for learning from instruction". *Journal of Educational Psychology*, 76 (3), 347- 376.
- Stahl, S.A. (1988). "Is there evidence to support matching reading styles and initial reading methods?" A reply to Carbo. *Phi Delta Kappan*, 70, 317-322.
- Stahl, S.A. (1999). "Different strokes for different folks? A critique of learning styles". *American Educator*, 23, 27-31.
- Witkin, H.A., Moore, C.A, Goodenough, D.R., & Cox, P.W. (1977). "Field dependent and field independent cognitive styles and their educational implications". *Review of Educational Research*, 47, 1-64.