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What is This?

The enduring appeal of 'learning styles'

Catherine Scott
Australian Council for Educational Research

Individualism is the dominant value system in Western cultures and, as such, it affects the conduct of every aspect of human endeavour, including education. One of the most enduring effects on education has been the search for individual differences that can explain and predict variation in student achievement, with the hope that pedagogical methods can be designed that will capitalise on these. 'Learning styles' remain a popular choice for filling this role and the number of models of learning styles on offer continues to proliferate. Research conducted over the last 40 years has failed to show that individual attributes can be used to guide effective teaching practice. That 'learning styles' theory appeals to the underlying culture's model of the person ensures the theory's continued survival, despite the evidence against its utility. Rather than being a harmless fad, learning styles theory perpetuates the very stereotyping and harmful teaching practices it is said to combat.

Interest in explaining variation in educational outcomes and interest in discovering attributes of individual learners that would allow educators to design learning opportunities to maximise the attainment of each and every student have a long history. Among the currently most popular means for discerning and classifying individual difference are theories of 'learning styles'. 'Learning styles' as a concept is widely endorsed, geographically, across educational sectors and in many other domains of human activity. This paper explores the current state of the learning styles field and the evidence for it as a worthwhile and effective basis for pedagogical decision-making.

With a history equally as long as the interest in individual differences that might predict educational outcomes is the research enterprise that has shown that teaching tailored to a child's supposed individual attributes has little to offer in the design of effective learning opportunities. As Bracht (1970, p. 627) noted: 'Although there is an increasing interest in the topic of ATI [Aptitude–Treatment Interactions] among educational psychologists, very little empirical evidence has been provided to support the concept'. Glass (1970, p. 210) proposed that he knew of no other 'statement that has been confirmed so many times by so many people'. A few years later Cronbach and Snow (1977, p. 6) also observed that 'well-substantiated findings regarding ATI are scarce'. More recently, meta-analyses by Hattie (2009) demonstrated that individualising instruction is, at best, an inefficient

strategy for increasing student attainment (mean effect size for all interventions = .40; effect size for individualising instruction = .23).

Defining learning styles

While the term 'learning style' has common-sense appeal, an investigation of the field reveals that it is characterised by considerable conceptual confusion and the lack of any generally accepted definition of what these 'styles' may be. As Cassidy noted (2004, p. 440) 'there exist almost as many definitions as there are theorists in the area'. A multitude of models exists, vying for prominence in a very crowded field. Coffield and colleagues (2004) reported finding 71 different theories of learning style in current circulation in the UK. Models are also based on a dizzying variety of perceptual, cognitive and physiological factors, including a preference for working alone or in groups, in the evening in the morning, when the temperature is high or low, while eating or otherwise, and so on. Not surprisingly, in his overview of learning styles theory, Cassidy described the field as 'fragmented and disparate' (2004, p. 419).

A few prominent examples of theories in current use include Kolb's (1984) four-way typology (converger; diverger; assimilator; accommodator); Mills's (2002) four-way typology, based on the work of Anthony F. Gregorc and Kathleen A. Butler (concrete sequential; abstract random; abstract sequential; concrete random), and the Felder–Silverman (1988) four-dimension model. In Australian schools, the most popular models are those that derive from Fleming's VARK theory, which originally divided learners into four but now most commonly uses three groups: visual, auditory or tactile/kinaesthetic. One is tempted to note that these categories are reassuringly concrete, unlike the others already mentioned, and apparently discernible by simply observing children.

Attempts to discover commonality across the many models are rare but the results of those efforts that have been made lead to the conclusion that they are not accessing the same constructs. Ferrell performed factor analytic studies on four commonly used instruments: the Grasha-Riechmann Student Learning Style Scales, Kolb Learning Styles Inventory, Dunn Learning Style Inventory, and Johnson Decision-Making Inventory and concluded that 'the instruments were clearly not measuring the same thing' (1983, p. 33). To speak of 'learning styles' is thus to attempt to shoehorn an eclectic mix of theories, models and notions into one category in which they patently do not fit. Those who promote the concept routinely ignore this caveat and speak as if there is but one accepted model: theirs— one assumes. In such a context, even if empirical evidence for the effectiveness of basing pedagogy on one discrete model of learning styles could be found, this cannot be said to provide proof of the efficacy of 'learning styles' as they are currently conceived, or misconceived.

Scanning the literature also demonstrates that learning styles are frequently conflated with other ways of categorising human mental function: for example, personality typologies and cognitive styles. As an example, Ford and Chen (2001) claimed to have found support for matching learning style to teaching method but the construct they used—field dependence/independence—is commonly regarded

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as a measure of cognitive style: that is, a person's habitual way of perceiving, thinking and remembering.

Measurement properties of learning styles scales

It would be surprising if a field so riven with conceptual confusion generated measurement instruments with respectable psychometric properties. Investigations of the properties of a variety of scales have revealed that even the most widely used are inadequate in this regard. Garner noted, of the studies of the psychometric properties of Kolb's Learning Styles Inventory published from the 1970s through to the late 1990s, 'results indicated that test retest measurements for the LSI did not reliably assess the learning styles of any learners' (2000, p. 346). Duff and Duffy investigated Honey and Mumford's Learning Style Questionnaire (LSQ), Kolb's Learning Style Inventory (LSI) and a later refined version (LSI-1985) and reported that:

> Exploratory and confirmatory factor analysis failed to support the existence of the two bipolar dimensions proposed by Kolb, and four learning styles hypothesised by Honey and Mumford. An item analysis and pruning exercise failed to raise the internal consistency reliability to a satisfactory level, or provide adequate model fit to the data. The results of a structural equation model find no consistent relationship between scores on the four learning style scales, two bipolar dimensions and academic performance. (2002, p. 147)

Kappe, Boekholt, den Rooyen and Van der Flier (in press) conducted a study of the predictive validity and reliability of the Learning Styles Questionnaire with a sample of Dutch students. They reported that:

> Although learning styles were matched to correspondingly suitable learning criteria, the LSQ revealed no predictive validity, however we can report good test–retest reliabilities over a two year time period. Given the lack of positive findings, using the LSQ to stimulate learning in college students is debatable.

Coffield and colleagues (2004) investigated the 13 most popular learning styles models and concluded that these models, their measurement and application have little to offer as guides for the design of instruction. The authors noted the considerable conceptual difficulties in the field and continuing issues with the reliability and validity of existing measurement instruments. They also commented that, even within the one model, the diagnosis of a learner's style can depend on which instrument is used, which makes organising teaching around the results at best a hit-and-miss affair, even if there were evidence for the effectiveness of this strategy.

Most recently Hattie, in his compendium of meta-analyses of studies of effects on student learning, meta-analysed results from 411 studies on learning styles and found that many were characterised by conceptual confusion (frequently conflating learning styles with learning strategies, for example) and significant measurement and methodological flaws. He summed up the evidence thus:

> The argument defended in this chapter is that successful learning is a function of the worthwhileness and clarity of the learning intentions, the specifications, and the success criteria; the power of using multiple and appropriate teaching strategies with a particular emphasis on the presence of feedback focussed at the

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right level of instruction (acquisition or proficiencies); seeing learning and teaching from the students' perspective; and placing reliance on teaching study skills and strategies of learning. *Emphasising learning styles*, coaching for tests, mentoring and *individualised instruction are noted for their lack of impact*. (2009, p. 199; emphasis added)

Effects of empirical evidence on teaching practice

Recent studies of the utility of learning styles as guides for teaching practice have reached the same conclusions as those from earlier decades that investigated Aptitude-Treatment Interactions: learning styles have fared no better than any other hypothesised characteristic in well-designed studies of their utility (Hargreaves, 2005; Reynolds, 1997; Snider, 1992; Stahl, 2002). Failure to find evidence for the utility of tailoring instruction to individuals' learning styles has not prevented this term from being a perennial inclusion in discussions about and recommendations on pedagogy. It also continues to influence what teachers do in their day-to-day work. Practitioners from preschool to university level attempt to apply the theory in classrooms, administering the unreliable tests, criticised by so many, to their students, using the results as a guide to classroom practice and encouraging or requiring students to apply the results to understanding, controlling and explaining their own learning. If nothing else, these activities represent a waste of precious teaching and learning time. It is worthwhile to inquire as to why this educational equivalent of snake oil perpetuates its hold on pedagogical thinking and decision-making.

Evidence for the general pervasiveness of the notion of 'learning styles' is not hard to find. An internet search on the term yielded 2 160 000 hits. While time did not permit examining all the sites listed, a cursory inspection revealed that pro-learning styles sites outnumbered those containing material critical of the concept by a considerable margin. Benefits promoted as accruing from discovering one's or one's students' or children's learning styles were numerous, ill defined and very wide in scope. These included: 'motivate students and eliminate unfair labeling' (Fellers, n.d.), 'become aware of how each person's brain learns best' (Lake Tahoe Community College, n.d.), 'help improve your quality of learning' (Learning-Styles-Online.Com, n.d.), 'make our own learning more effective and more enjoyable' (Edith Cowan University, n.d.), 'capitalize on your strengths and improve your self-advocacy skills' (multiple sites and sources: this quote appeared on several web sites, which did not cite any of the others), 'trigger each student's concentration, . . . maintain it, and . . . respond to his or her natural processing style to produce long term memory and retention' (this quote was found, mostly uncited, on 43 web sites). This claimed benefit: 'Recognising young children's unique personality styles can help teachers/carers to better understand children and plan activities that children can learn from and enjoy' clearly demonstrates the deep conceptual confusion in the field, conflating as it does 'personality styles' and 'learning styles' (Early Childhood Australia, Inc. n.d.). 'A knowledge of your own and others' preferred learning styles can be of great benefit to your study at university as well as any aspect of your life that involves teaching and learning. Now that just about covers everything!'

(James Cook University, n.d.) certainly suggests the grand and ambitious nature of many claims made.

Scanning several of the sites also revealed that the concept remains well entrenched in a wide variety of contexts. Sites featuring positive discussion or promotion of learning styles belong to schools, technical and training institutes and universities, government departments and instrumentalities, organisations offering assistance and advice to parents, businesses and even churches: 'reaching all who God gave you to teach'.

It certainly does not help matters that those charged with teaching teachers and with assisting the development of learning and teaching in university settings appear to be unaware of the weight of evidence against the usefulness of the concept for instructional design. As an example, McLoughlin makes this claim: 'little research has been done on the relationship between instructional design of learning materials and learning styles' (1999, p. 222), suggestive of an inadequate familiarity with the literature that appears to be too common.

Searches of the web sites of a random selection of Australian universities revealed a plethora of mentions of 'learning styles', which were overwhelmingly positive about and promoted the concept. Many pages featured 'learning styles' questionnaires to be administered to students and instructions to university staff on integrating learning styles into their teaching. A great number of hits clustered on faculties of education pages, including in course materials aimed at pre-service teachers, and those of learning and teaching centres and student support services. Given that the empirical evidence shows that effective feedback is a powerful positive influence on learning, university sites were also searched using 'effective feedback' as the search term to gain an understanding of the balance of influence of evidence-based versus fashion-based concepts on learning and teaching in the surveyed universities. This arguably is a very rough measure but the stock phrase in discussions on feedback is 'effective feedback'. 'Feedback' as a search term on its own yielded a preponderance of hits to do with feedback on aspects of the university's operations or its web site, student feedback on teaching and other unrelated matters.)

A search of Swinburne University's web site yielded 147 hits for 'learning styles' (17 for 'effective feedback', several of which were from engineering papers, not those connected with teaching and learning). Other sites gave the following numbers of hits for 'learning styles' and 'effective feedback' respectively: University of New South Wales, 223 and 117; University of Western Australia, 704 and 66; University of Queensland, 1140 and 111; University of South Australia, 433 and 79; and Charles Darwin University, 57 and 4. The evidence would suggest that universities are expending disproportionate amounts of time and effort on a worthless strategy to the comparative neglect of arguably a highly effective component of teaching: feedback.

Selling learning styles

Among the 2 million-plus hits resulting from the internet search were a very large number of sites belonging to commercial concerns keen to market tests, training

and products. In this lies one explanation for why a concept widely regarded by educational psychologists as of little use is still so prominent in discussions of pedagogy. If there is money to be made someone will take advantage of the opportunity. While some may be able, famously, to sell snow to Eskimos, the merchandising of most other products requires willing consumers. Among these are some very influential buyers, and in Australia these include state departments of education.

Inspection of state education department web sites reveals that 'learning styles' theory is actively promoted as an educational principle. This is frequently in the context of the necessity to teach tolerance of diversity and to make education just and inclusive: among the learner characteristics to be respected and accommodated are 'learning styles'. As the web site for the Department of Education and Early Childhood Development in Victoria (DEECD) expresses it:

> Bennett and Rolheiser (2001) emphasise the need for students to recognize the importance of working outside their strengths. They advocate taking time to discuss with students their learning style and that of their classmates as a means to develop empathy and respect for self and others. The Learning Styles literature is clearly illustrated in the work of Bernice McCarthy (1995) and Rita Dunn (1993). In addition to helping inform the teacher and student about the differences in how individuals go about learning or solving problems; learning styles theory implies that how much individuals learn is primarily the consequence of whether the educational experience is geared toward their particular style of learning. Individuals perceive and process information in very different ways. (Department of Education and Early Childhood Development, n.d)

Certainly what is obvious from this statement is the extent to which the literature sampled and cited is very limited in scope, and that the empirical work that discredits learning styles as a useful pedagogical concept seems to have been missed entirely.

In addition to advocating for the theory the Victorian Department of Education and Early Childhood Development site provides teachers with classroom resources, including worksheets for children and paper and online tests of 'learning styles' for classroom use. The Department of Education and Early Childhood Development also offers professional development sessions on the theory and its application. It is little wonder that teachers remain wedded to the concept.

'Learning styles' is also pervasive on the New South Wales Department of Education and Training web site, with a search turning up 109 documents in which the phrase appeared, including major policy documents—such as the 'Report of the consultation on future directions for public education and training', (Department of Education and Training, 2005)—and advertisements for teaching jobs that specified that the capacity to utilise 'learning styles' in teaching practice would be an essential attribute of any successful candidate. It should be noted that discussions with personnel within the New South Wales Department of Education and Training revealed that the promotion of learning styles is not departmental policy; the frequent mentions of it in departmental documents are the result of and

further proof for the pervasiveness and popularity of the term. In case one is tempted to think that this is an east coast phenomenon, a similar search of the Western Australian Department of Education and Training found 147 documents in which 'learning styles' are at least mentioned.

In many cases the mention of 'learning styles' in the documents viewed was little more than phatic, with the term routinely appearing in any list of learner attributes meant to suggest awareness of diversity. But evidence such as the existence of learning materials and professional development on the topic and the inclusion of the term in job descriptions makes it plain that learning styles are taken seriously and given a great deal more credence than the empirical evidence would support, at least in some influential circles.

The sheer volume of mentions of 'learning styles' goes a good way to explaining why the concept prospers, despite the weight of evidence against its utility as a guide for teaching practice. That so many citations are positive appears, on the contrary, to point towards its being a respectable and proven educational tool. It becomes a case of everyone believes it because, well, everyone believes it but, as Beadle expressed it: '[Learning style theory] is palatable only to those for whom the plural of anecdote is evidence' (2006, n.p.).

Furnham's critique of 'emotional intelligence' and his explanation for its popularity, despite the paucity of empirical evidence for its validity and utility and the volumes of evidence against these, could equally well apply to 'learning styles':

> Lay people, even hard headed business people, are surprisingly unimpressed by psychometric evidence. Either because they do not understand or care about concepts like test–retest reliability, Cronbach's alpha, predictive validity, or orthogonal dimensionality, they appear to buy questionnaire products on packaging and promise much more than on evidence. This partly explains the popularity of EI. Demand is quickly met by supply, but not by reputable test publishers because validation is too time consuming. This does not, however, prevent others from aggressively marketing their essentially 'not proven' products. The large number of instruments available may make them appear to be more popular than they are. (2006, p. 144)

Harmful effects of labelling

Consideration of the empirical evidence leads to the conclusion that 'learning styles' are little more than a fad, albeit an enduring one, and one whose utility as a guide for practice has been questioned and refuted repeatedly for some decades now. But it is not a harmless idea. The harm it perpetrates has its origins in, first, that attempting to adapt pedagogy to learning styles distracts practitioners from those aspects of teaching practice that have proven benefits for children's learning and, second, that it encourages a cultural tendency to look for explanations for behaviour and attainment in the wrong place.

As noted previously, Hattie (2009) has drawn attention to those aspects of teaching practice that have been empirically demonstrated to improve student outcomes. Most powerful of these is quality feedback. In his recent book, he discussed why feedback so powerfully affects learning and drew the conclusion that

providing feedback on student learning benefits the teacher as least as much as the student. This is because, in order to give the type of timely, targeted, informative feedback shown to lead to learning gains, teachers must be thoroughly versed in what their students know and understand, both before a learning activity is undertaken and after it is completed. The best predictor of what a student will learn is what he or she already knows, not some aspect of his or her cognitive style or perceptual preference (National Research Council, 2000; Nuthall, 2007). The belief that what a teacher should learn about an individual student is his or her 'learning style' and not his or her existing levels of knowledge is a dangerous distraction from proven, effective practice.

On the second point—the encouragement of harmful cultural tendencies— American researcher Carol Dweck (2008) and her colleagues have investigated models of human attributes. Dweck proposed that people conceptualise human attributes as either entities (stable, universal—that is, fixed traits probably present from birth) or processes (malleable—that is, unstable, qualities that can be influenced and shaped by effort and experience). 'Learning styles' are classic entities.

International research has shown that different cultures have different attributional styles (Levy, Plaks, Hong, Chiu & Dweck, 2001). The Western cultural tendency is to use entity theories to explain human behaviour, for example, IQ models of human potential, which imply that children are born with a fixed quantum of ability that is resistant to environmental influences. In contrast, many Asian cultures favour a model that emphasises the process of developing personality and ability, and explanations for how people act and perform are more likely to feature observations about the interaction between individual characteristics and the context in which the person is acting (Levy et al., 2001).

Individuals (or cultures) that hold an entity model of ability—and any other human attributes, including personality—show particular patterns of 'people perception' (Levy et al., 2001). They tend to be constantly (subconsciously) searching for signs of the causal entities that (supposedly) control others' behaviour. Those in the entity mould tend to make judgements about people very quickly, based on very limited interactions with them and to expect that people's behaviour will be stable; that is, that how people are first perceived will be an indication of how they will act in all contexts.

In contrast, people who see human characteristics as processes come to more tentative conclusions about others, which they revise if they subsequently discover evidence that contradicts their first impressions. They are also much more likely to attribute people's behaviour to situational factors.

When forming first impressions, the entity model perspective predisposes teachers to the decision that the child is 'one of those' on the basis of just one interaction or upon reading reports of the child's previous attainment or behaviour. This is followed by the formation of rigid expectations about him or her in accord with that snap judgement. Process thinking leads to more exploratory attitudes to students: for instance, wanting to know what made this child act in this way in these particular circumstances, but also to being comfortable with revising original opinions, expectations and ways of interacting.

More worryingly, holding an entity model of human attributes has been shown to predict that people will be more likely to notice behaviour by a person that is consistent with individual 'first impressions' and/or social stereotypes about the group to which he or she belongs and to ignore behaviour that is inconsistent with those stereotypes (Levy et al., 2001). By these means, prejudices are maintained. In contrast, people who hold process models are more likely to notice behaviour that is not consistent with stereotypes.

Work by Babad and his colleagues (Babad, Bernieri & Rosenthal, 1991; Babad, Inbar & Rosenthal, 1982; Babad & Taylor, 1992) on what they call 'teacher bias' has confirmed the operation of these cognitive principles in teachers' judgements about and interactions with students. Babad and colleagues reported that 'high-bias' teachers (I would say entity theorists) formed rigid expectations on the basis of (in the case of the experiments, deliberately false) information received in advance of meeting students and proceeded to interact with them on the basis of these expectations, even where actual student attainment and behaviour contradicted these. 'Low-bias' teachers (I would say process theorists) in contrast interacted with students and designed learning tasks on the basis of the students' current level of work and were not swayed by the false information that they had received.

It is perhaps ironic that those who promote learning styles as a way to personalise learning and overcome supposed prejudices about students are providing practitioners with yet another way to stereotype and to form damaging expectations of students. As the Victorian Department of Education and Early Childhood Development web site notes:

> Principle 3 leads us to question our assumptions about pedagogy, curriculum and assessment. This recognises that we have much to learn about improving our practice and how we enact this in a learning community. Stereotyping fails to acknowledge the complexity of identity. Education theory has moved beyond the 'one size fits all' approach. Learning programs built upon labelling and deficit models are discriminatory and an impediment to learning and teaching (Department of Education and Early Childhood Development, n.d.).

Gutiérrez and Rogoff (2003) have commented on the ways in which learning styles, instead of liberating children from minority cultures from stereotyping, have become another way to confine them within expectations and to define what they can or cannot do and how they are supposed do it. Those 'styles' said to be properties of certain ethnic groups, according to Gutiérrez and Rogoff, 'reside not as traits of individuals or collections of individuals but as proclivities of people with certain histories of engagement with specific cultural activities' (p. 19). In other words, what appear to be individual or cultural traits are the results of learning experiences, which do not of themselves define the limits of the possible in terms of what and how members of any particular culture can learn. Given what is known about the effects, positive and negative of teachers' expectations, (Rubie-Davies, 2005, 2008) anything that licenses lower expectations for individual students or categories of students is to be deplored.

Evidence suggests that children in classes or school systems where learning styles are in favour and who appear to be having difficulties with academic learning are likely to be labelled as 'tactile/kinaesthetic' learners (Rubie-Davies, personal communication, July 2, 2009). Working with practising teachers has yielded many observations along the lines that 'at our school we have a lot of kids with problems with reading and spelling, because of different learning styles' (Scott & Dinham, 2008). If this is the case then it is little short of a tragedy because, instead of receiving careful diagnosis and targeted remediation, these children are likely to be subjected to 'instruction' purportedly tailored to their 'style', in short to teaching that is not informed by sound pedagogy.

Conclusion

Interest in individual differences as guides to pedagogical decision-making has a long history. In the 1960s it spawned a research endeavour that failed to find any support for personalising teaching as an effective and efficient pedagogical strategy. In the intervening period the results of the research into aptitude-treatment interactions have slipped below the horizon, a process encouraged by the expectation that scholarly writing consulted and cited should be less than about seven years old.

Running parallel to these developments has been a program of research into the general principles of teaching and learning that are effective for promoting the greatest attainment for the maximum number of children. We know 'what works' and what are the attributes of highly effective teaching but evidence-based practices lack the 'sound bite' appeal and easy marketability of learning styles theory. The hard and careful work of gathering reliable information about what students know and can do, and thorough understanding of 'where to next' is not something that can be learned in an hour-long professional development session but something that has to be built in collaboration with like-minded colleagues.

Learning styles as an idea chimes well with the individualist value system of our culture and fits its dominant, entity, model of human attributes but there is no credible evidence that it is a valid basis for pedagogical decision-making. At a time when evidence-based practice is gaining support, groups and individuals responsible for continuing to promote the 'theory'—university staff and personnel in state departments of education included—should examine the empirical evidence against its utility as a guide for teaching practice. Rather than being of no particular consequence, the continuing endorsement of 'learning styles' wastes teaching and learning time, promotes damaging stereotypes about individuals and interferes with the development of evidence-based best practice. It has no place in education theory and practice that claim to be scientifically based.

Keywords

individual differences	individualised teaching	learning styles
student achievement	pedagogy	aptitude treatment interaction.

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