The serious limitations of 'learning style'[1]

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A typical New Zealand class has between 20 and 30 students. Teachers are well aware of the individuality of each student, as well as of the extent to which many in a class will share some characteristics. It is difficult enough to cope with the differences in students' backgrounds, prior knowledge and ability to understand, and their willingness to learn. Anything that promises a solution to assessing differences, and catering for all children in a class, has an understandable appeal.

In recent years, one such promised solution has received considerable attention. It claims that identifying 'learning styles', and changing classroom teaching strategies to fit in with each student's own style, will lead to more effective teaching.

Unfortunately, it is not that simple. Current measures of learning style are not sound or valid enough to justify such a change. Those who recommend them assume that students arrive at the classroom door with 'built-in' differences, meaning that they cannot adapt to variations in teaching methods or classroom practices.

Such assumptions are perhaps more of a threat to effective teaching than the situations which advocates of learning style assessment claim to remedy. How could this be so? In this paper, I set out some of the things teachers should bear in mind.

First, there is no doubt that differences between students are real. There is even a long tradition suggesting individual preferences in their ways of learning. For example, Entwistle (1988) focused on learning styles and their implications for teaching in a much reprinted book. His research lead to the inclusion of a 'short inventory of approaches to studying'. The items in that inventory use a standard Likert approach (scoring on a five-point scale), yielding scores for an 'achieving' and a 'reproducing' orientation, and for the 'meaning' dimension (deep learning and intrinsic motivation).

But in recent years, use of the concept has proliferated. A search of the ERIC database (http://ericir.syr.edu/Eric/) for 'learning style' sources, from 1990 to 2000, found 1875 references, and a search of the *Current Contents* database found 139 references. There were reports of small-scale studies, in which one of the standard instruments for measuring 'learning style' was used with students; reviews of the relevant literature; and reports advocating that teachers should use the learning styles of their students as the basis for formulating an instructional strategy. A search for Internet references to 'learning style' with 'nz' in the domain name produced over 3800 references,[2] including web pages for schools advertising themselves as 'catering for the varied learning styles of our pupils'. Such claims indicate that parents, and the community at large, expect to see individual learning styles accommodated in our schools.

Most of the material reviewed for this article tends to assume that there is no debate about the notion of individual 'learning styles', and that measurement of those styles presents few difficulties. The implication is that the term refers to a commonly understood human characteristic (similar to 'intelligence'), rather than to a psychological construct. The Ministry of Education's 1999 guide to schooling in New Zealand states that 'Within the New Zealand state school system, there is provision for children's individual learning styles and room for different philosophies of education' (p.17). The Education Review Office also makes a number of references to the notion. Its report on *Working with Students with Special Abilities*, for example, commends a number of schools which offer programmes that help students identify, understand and maximise benefits from their own preferred learning style' (Education Review Office, 1998). It recommends that:

> Both initial and ongoing training for teachers of students with special abilities should focus on the elements of good practice discussed in this report and should include … an overview of current thinking about special abilities, including such notions as multiple intelligences and learning styles preferences. (Education Review Office, 1998, p.24)

Yet standard texts in the field of learning are careful in their discussion of the concept. A recent Australian text, for example, offers a general description of learning styles as 'characteristic cognitive, affective and physiological behaviours that serve as relatively stable indicators of how learners perceive, interact and respond to the learning environment' (McInerney & McInerney, 1998, p.243), but includes no further information. Porter (2000) is even more reticent; discussing 'fostering competence' on the part of learners, she states that 'students differ in their preferred mode for receiving information (verbally or visually), the pace at which they most comfortably learn, and the physical conditions … under which they learn best' (p.244). No further information is provided.

What do we mean by 'learning styles'?

Everyday conversations often include some appreciation of the fact that people learn in different ways. Diversity is characteristic of all educational groups. In this sense, it has generally been fair to claim that 'Teachers have always tried to adjust their teaching to the backgrounds, abilities, styles, and interests of the children they teach' (Olson & Bruner, 1998, p.11). What is less clear is how the differences are best understood, and in what specific ways such adjustments should be made, as teachers endeavour to optimise learning experiences.

Early investigations of learning drew on studies by Witkin (cited in Engelbrecht & Natzel, 1997, p.155). The Embedded Figures Test which he developed in the late 1960s claimed to reveal the individual's 'field dependence' (or 'independence'), which signified whether they learned in a 'global' (field dependent) or 'analytic' (field independent) manner. Those who have a field-dependent style tend to view matters globally, whereas those who have a field-independent learning style generally view things more analytically, solve problems more easily, and favour inquiry and independent study. According to McInerney & McInerney (1998):

> While field-dependent and field-independent [students] don't differ in their learning ability or memory, they do differ in the kinds of material they learn most easily, and the strategies they use for learning (p.244).

The implication is that the characteristics which are being measured already exist in the learner. Predictably, much of the writing about learning styles contains a strong inference that learning style preferences are biologically determined. Doolan & Honigsfeld (1996), for example, claim that:

> Learning style is the way each person begins to concentrate on, process, internalize, and retain new and difficult information …. It is the biological and sociological uniqueness of an individual that makes one person learn differently from another (p.274).

One view is that learning style is established simply as a result of hemispheric dominance. For example, a summary of a book by the director of the New Zealand College of Early Childhood Education (a Private Training Establishment in Christchurch) claims that it 'explains why many children are failing':

> The ways children learn and develop may be just as varied as their personalities. Patterns of learning, behaviour and personality are directly related to how an individual's brain is laid out and how effectively the brain's chemistry allows messages to be conveyed. External stimulation is critical to the healthy development of the brain…. Brain dominance helps us identify each child's learning style and develop a learning environment that best suits that child.[3]

Are there valid measurements of learning style?

Two models of measuring learning style appear to predominate. Kolb's approach focuses on understanding and motivating employees. It suggests that learners ask four different kinds of questions about the learning process, and that the different 'learning styles' these indicate can help training to be delivered more effectively:

- Why do we learn this? ('Divergers')
- What is to be learned? (An emphasis on learning facts and concepts: 'Assimilators')
- How? (An emphasis on practical learning: 'Convergers')
- What if? (A desire to try out variations: 'Accommodators').

As Reynolds (1997) notes, this type of 'measurement' of learning style has been taken almost for granted in management development. However, he suggests that there is considerable doubt about its validity from within cognitive psychology and education, and that the simplistic assumption of valid measurement should be abandoned.

Within educational contexts, the work of Rita and Kenneth Dunn (e.g. Dunn & Dunn, 1992) deserves closer attention. They make confident claims about the value of their work, for example:

- that 'research on the Dunn and Dunn model of learning styles is more extensive and more thorough than the research on most previous educational movements' (1992, p.ix)
- that research on learning styles explains why, in the same family, certain children perform well in school, whereas their siblings do not, demonstrating 'the differences in style among members of the same class, culture, community, profession, or socioeconomic groups … (and) the differences and similarities between groups' (1992, p.1).

The theoretical 'cornerstone' of their model is that:

> learning style is a biological and developmental set of personal characteristics that make the identical instruction effective for some students and ineffective for others.... this learning style model traces its roots to two distinct learning theories – cognitive style theory and brain lateralization theory (1992, p.4).

Dunn and Dunn have constructed their own measuring instrument, the Learning Styles Inventory. It consists of 104 questions, taking about 20 to 30 minutes to answer, and provides a score value for each of 22 scales. Illustrative sample questions include:

- I study best when it is quiet
- I study best at a table or a desk
- I can ignore most sounds when I study
- I like to study by myself
- When I can, I do my homework in the afternoon.

On the basis of this exercise, a model has been developed to represent the elements of style visually. Five main areas are assessed:

- ***Environmental*** (noise level, light, temperature, and whether the design of the classroom is 'formal' or 'informal')
- ***Emotional*** (motivation, persistence, responsibility, and structure)
- ***Sociological*** (working alone, in a pair, with other peers, in a team, with adults, or some combination of these)
- ***Physiological*** (perceptual items in terms of auditory, visual, tactile and kinaesthetic preferences, on the assumption that most students have just a single perceptual strength, preference for food intake (such as snacking while learning), preference for early or later study, and whether movement is part of studying and learning)
- ***Psychological*** (whether the learner is global or analytic, right or left brain dominant, and impulsive or reflective).

The implication is that the characteristics which are being measured already exist in the learner. Predictably, much of the writing about learning styles contains a strong inference that learning style preferences are biologically determined.

Many claims are made for this instrument. A large volume of research data is reported to support the findings, and it appears to be quite consistent with many other norm-based

psychological instruments. But how is it regarded by those responsible for evaluating tests?

There are two reviews of the Learning Styles Inventory (LSI) in the Supplement to the 10th *Mental Measurements Yearbook* (1990, repeated in the 11th MMY, 1992). In one, Jan Hughes notes:

> their instrument exemplifies all the problems characteristic of instruments designed to measure learning styles.… The authors' failure to provide a clear, theoretically based definition of learning styles contributes to their difficulty in establishing the content and construct validity of the LSI.… In the authors' published articles they clearly state the instrument is a diagnostic one ... This claim is not supported by the limited published data.…The LSI has no redeeming values (p.113).

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And perhaps most critically:

> The manual is written to sell rather than to inform. The heavy use of statistical jargon and the exaggerated claims of the test's content and predictive validity will impress the psychologically naive reader (p.113).

In response to several critical reviews, Dunn, Griggs, Olson, Beasley, & Gorman (1995) have published a meta-analysis of studies, to report an overall effect size, using a correlational basis for calculating the relationship between the diagnosis of learning style and outcomes from teaching in the manner judged to be relevant to that diagnosis. If the effect size is large, then we can be confident that teaching based on the scores obtained on the LSI will provide for much more effective learning. Their own data indicate an effect size of .353. They note that an effect size of .33 is 'educationally significant, as it accounts for 10% or more of the variance of outcomes' (p.359). That means when the measures are compared, the overlap in what each contributes to the variance is 10%.

The problem is that the claim made by Dunn et al (1995) is itself a generous view of what constitutes an 'educationally significant' effect size. In other educational studies, even an effect size of .64 is termed 'moderate' (Corno, 2000, p.12). It is generally agreed by educational measurement authorities, however, that the 'typical effect size of educational interventions, identified from a synthesis of over 300 meta-analyses, is .40 for achievement and .28 for affective outcomes' (Hattie, Marsh, Neill & Richards 1997, p.55). Since the Dunns regard their studies as learning interventions, the effect size is lower than can be regarded as 'significant'.

While there is a considerable amount of other material, studies undertaken by researchers independently of the Dunn team are rare. Coker (1995) studied the learning styles of 23 athletes, who were asked to focus first on classroom learning, then on learning in their sport. His results indicated that their preferred learning styles changed, depending on whether cognitive or motor settings were the focus. Coker suggests that an instrument designed specifically to assess individuals' preferred learning style, at least with respect to motor learning, does not exist. There is certainly room to doubt that the Learning Styles Inventory can or does live up to the claims made by its authors.

What are the implications?

The concept of learning style has evolved from being an everyday or common-sense term to being a technical term. It is thus important for teachers to think carefully about their understanding of the term, and what specific aspects of learning style are to be taken into account in establishing classroom learning environments. There is a risk that conclusions about what can be accomplished may not reflect their own professional judgements, but rather the outputs from an instrument which has questionable validity.

There is also a risk that depending on the generic understanding of learning styles may signify belief in fixed, individual characteristics, which are to be accommodated by teachers. The notion also implies that only present experiences, and present methods for learning, are to be considered. That in turn suggests that learning is seen primarily as involving the transmission of information, rather than as the means by which individuals become part of a community of learners (Rogoff, Matusov & White, 1998).

Learning is also seen by many contemporary writers as occurring within a sociocultural environment, in the context of interpersonal relations, rather than being solely an individual matter. As Reynolds (1997) suggests, by decontextualizing learning, the concept of learning style may deal with gender or ethnic differences in a discriminatory manner.

There is much about the brain which is subject to radical and new research. It would not be sensible to base instructional strategies on matters which are not yet well understood. One recent authority in the field of left-right dominance (Springer, 1998) notes that it is not simply a matter of where functions are located in the brain, but also how and why those functions are controlled, and the remarkable ability of the human brain to repair itself and adjust from traumatic injury. In the light of such research, it is not sensible to assume that hemispheric dominance alone can or does determine human learning.

Can teachers use the concept of learning style? There are ways in which the common-sense notion can continue to be used, provided that within professional circles there is careful discussion about what is intended, and that assumptions about biological influences, fixed characteristics, and prescriptive approaches to teaching are carefully examined.

Should teachers use formal tests of learning style with their students? On the basis of the literature examined, there is little justification for doing so. The free or cheap tests available, for example through internet sources, are untested and invalid. They do not warrant being termed measuring instruments of value to

teachers at all. The commercially available versions are also of questionable validity, and are relatively expensive to use for whole classes. The 'scores' obtained may not apply across different subject areas, or over time.

In the long run, it is not helpful for teachers to rely on such instruments to identify the most significant differences their students may have. In fact, by having more faith in such measures of questionable validity than in their own judgements about how students are responding to content, teaching strategies and classroom practices, teachers are devaluing their own professional insights.

The risk is that the assessment of learning styles may be expensive for a school, may demean good teachers who know their students in much more powerful ways than any such test could possibly tell them, and may lead to ineffective classroom learning environments. It is a matter about which schools and teachers should be very cautious indeed.

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Notes

1. A longer version of this article was originally presented as a paper for the New Zealand Association for Research in Education Conference, Hamilton, December 2000.
2. It is possible to obtain commercial versions of simplified profiles of 'learning styles' on line. Most of the freely available versions have no technical information. In general, these profiles also have other severe limitations.
3. http://www.teacher.co.nz/bookrevi.htm, accessed 26th April, 2001.

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